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A Gradefor Every VehicleEXTRILIGHT' FORD"NP. 1 LGнt medium HEavy extra heavy
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A HEMAHKABLE ADVANCE IN OIL REFINING.

## The above makers

 EXCLUSIVELY REGOMMEND.We do not ask you to accept our opinion, but that of the above and many other famous makers, who, after making exhaustive tests before adopting and recorrmending it, ask owners of their vehicles to use only Adcol New Process Oil.
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I his is a testimonial sent to us by Messrs. John I. Thornycroft \& Co., Ltd. As they are one of the biggest engineering firms in the kingdom, their views ought to be sound. As a matter of fact, the writer of the letter told us it was so gond that the tin was too small to hold all hes wanted; perhaps, but we think we have hit on the size most convenient for everyone, from the cyclist to the motor-boat owner.

FOR THE HANDS

 "the yese yes nesitation in mom softer
"no sesione whom very mure mejorityers, whe iind nenas then eressenomicel Non these so 1 so mo nave nis wis nit "and it is anything
 6d ${ }^{\mathrm{emp}}$



For the better Spurit on the Road

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Youknow the puddly, muddy lanes with barely one car's width -they are one of the features of our English countryside. They possess no sidewalk or footpath, and pedestrians must of neecssity walk in the road. The motorist who slows down to walking pace whilst passing pedestrians not only does an act of common courtesy, but he helps to promote the "Better spirit on the road."

Look for No. 14 of the Seriey.
Correspondence on these interesting subjects is invited.


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# Reliability, Comfort, Economy. 

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These are the important factors in the choice of a car, and in the whole Humber range - from the 8 h.p. Light Car, illustrated above, to the most luxuriously appointed model listed-these factors have received the maximum of attention. This delightful little car is, to the most minute detail. a miniature of the higher-powered models. Its reliability, comfort and economy will be instantly appreciated.

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On April 5th, midnight, Mr. Ian Macdonald, driving a privately-owned 12 h.p. Calthorpe 4-seater-Standard in every particular-covered 1,000 miles from Oundle to Inverness and back within 50 hours, receiving the distinction of being the first man in the Kingdom to drive 1,000 miles in 50 hours on the road at the wheel himself all the way.

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A coupe or open ear at will. A serleel filing hood, side cursains which open wh the doors, and a three-piece wint sereen. A door is provided on bith aides: a nealocker for your gloveri, Beaulifully nainied Royal Biue with blact mouldingi, well varnished, and all metal parts nickel finish.

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Brief Specification:
9 h.p. Four-cylinder Engine, Dynamo Electric Lighting and Starting. Dickey, Speedometer.

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He will not press you to buy.
The whole of the Technical Press-all Ownersand over 300 practical and experienced Motor Engineers throughout the countryareenthusiastic about it.
May we send you the name ol our nearest Agent and copy ol our descriptive catalogue?
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4 -cylinder, water-cooled. 2 or 2.3 -scater. costs only 198 Gns. complete.


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# " 15,000 MILES AT A COST OF 8/-FOR RENEWALS." 

THE above is an extract from a letter of appreciation-remarkable restimony, you will agree, when - the initial cost is only 105 Gns. Here are others:-
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II am more than delishted that the sallant tithe car is to hold the road still. I have never regretted $m y$ purchase.
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"Wichate one of your old type Cardens in resular use as a shop car, and same has diven every satisfaction."
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Only $£ 7$ tax, 50 miles per gallon, $40 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. . electric lighting, hood, screen, and all necessary fitments. ready for you to drive away.
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Write for full particulars, or call and haves a demonstration-it will convince sou, anyway.
THE NEW CARDEN LIGHT CAR CO., LTD. 22, Hythe Road, Willesden, N.W. 10 Phone: IVillesden 2297. Crams :-Amothant:


## "The Envy and Admiration of my friends."

 HE following is a letter from another satisfied JOWETT Owner:This car is the admiration and envs of my friends - one bought a four-seater (from Bournemouth yesterday), two or three prospective customers waiting. It proves we can still beat the World at engineering." Yours faithfully, J. N.H.

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## The "cheapest Light-car

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There's the Tax-there's upkeep coststhere's running expenses-there's wear and tear-there's fetrol consumptionthere's oil consumption - there's tyre replacements-there's length of effective service.

Now we make no claim to producing the lowest-priced car, tut we do assert that nothing "cheaper" can be offered than the

# Rhode 

Note its prices and then that - The Tax on the Rhode is only $E 10$; the petrol nad oll consumption tyanti, 200 inhles per gahlon, resoectively; and will find on cerefulanalysis, a totalrunalag cost of but a fractionoterapenay permile!

As to service-well. If you desire to judge of lis possibilities in that direction-lcok at its rec rd of successes in the Classic Trials.
SInce itsintroduction Just two years ago il has wicn 8 Trophies 1 Team Prize 50 Gold Medals 2 1st Class Awards and 6 Silver Medals
and the Rhode is British to tts tiniest nut!don't forget that.

Models are illus rated at side, and if you will write us we will send you adoress of nearest agent, who will arrange a demonstration run.

The glorious summer is ahead - the open road is calling you-take that next week-end holiday on a Rhode-take every holiday thereon-use it fer business too-keep it working for you the $u$ hole year round and-you will realise its 'cheapness, " enhance the pleasures of life enormously, and -economise as well.
"Occasional Four," all Passengers under the hood. £235 - with starter, £250

## Rhode Motor Co. <br> Rhode Works, Tyseley, Birmingham.

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"Star ascent was made by Frank Smith on his Clyno." "The Motor." April 3rid.
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That means consistent reliability, which must mean something to you as a possible purchaser.
Anyway, won't you investigate our claims that it is a real car-and within your means? We have a genuine service, even afler purchase.


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2-Scater $\quad 200$ guincas
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(Successors to G.W.K. (1919), Ltd.)
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SOMETHING more than ordinary engine efficiency can be obtained by application of the authoritative information contained in
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Dealing with the functional working of the internal combustion engine in a simple and interesting manner, it also gives complete and practical information on the secrets of engine tuning, and the tuning of carburetters of all makes, and for any purpose.

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raHE necessity for leaf-spring lubrication is never In dispute - the method of lubrication is The added riding comifort derived from easy sliding leaves is npprecintle.
Thausands of satisfied users have proved DUCO GAITERS to be the simplest and most efficient Spring Protectors and Lubricators.


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A Brass sleeve, fitted with fell washer, stopping air leaks between valve stem and guide, lubricating otherwise unlubricated bearing surfaces. They make the engina tick over slower and run quieter, give casier starting and more power on hills. and reduce petrol conaumption enormously. Ayrtite Sleeves do not throw extra work upon your Valve Cams.

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- The difference in the running of the engine now compared to y esterday is as much as the difference between chalk and cheese.'
Price 2/6 each. If they do not do all we claim, your money is refunded immediately.

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Name and Address
(or enclose card)

## *.Stoneleiab <br> THKEE SEATER

## Seats Three in Comfort.

THE Stoneleigh 3-Seater-made by a branch of Armstrong Siddeley Moters. Ltd.-is the car for those who want to share their pleasures and carry three as often as two. Driver and both passengers ride in comfort-plenty. of room for all. and lots of space for luggage in the tail. All are "in the party"- and there fore happy. No one rides in discomfort in the dickey. As value for money the Stoneleigh 3-Seater-at £185. complete with hood, screen, and electric lighting-is unsurpassed, and its running costs are very low. Its Reliability is proved by its publicperformances-made with a full load of three.

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with Hood, Sereen and Dynamo
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Teims of pnyment arranged to suit your convenience.

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PERILOUS CORNERING

The top and worst bend on Balkum's Hill, Goudhurst, where the Kent A.C. ran off a successful hill-climb last Saturday. Lewis Humphries (G.N.) is seen rounding the corner with the invaluable assistance of his passenger. After the event a noncompeting car, swinging round too fast, completely overturned.

## Notes, News and Gossip of the Week.

Summer Time.
Befuro retiring to-morrow, Saturday, might put the clocks forward one hour. Summer time comes into forco ufficially on Sunday, at 2 a.m.

The Solution?
At a recent meeting of the creditors and shareholders of Cubitts Engincering Co., Lld., Sir Arthur Whinney suguesterd that the solution of the difliculties of the company and, indeed, of the whole motor engineering industry, might well lie in a policy of nmalgamation and concentration of production in place of the present systemi of producing a varicty of different small cars.

## 'Ware Spare!

A brisk business is being done by the spare-wheel thicf, who does not wait for the cover of darkness, but boldly "lifts" the goods in broad daylight. In cortain districts pedlars are enlling at smanll garages with "spare wheels to sell." Thoy should be questioned ns to where the wheels were oblained and, if necessary, their names and addresses should bo taken.

## LIGHTING-UP TIMES

## for Saturday. April 21 st, 1923

| London | 7.34 | Edinburgh | 7.59 |
| :---: | :---: | :---: | :---: |
| Newcastle.. | 7.49 | Siverpool | 7.51 |
| Birmingham | 7.43 | Bristol | 7.44 |
|  | blin | .. S 34 |  |

Lighting-up time in Irelagd is one hour after sunset and in Scolland half an hour after sunset.
Moon.-First Quarter, 24t's.
Roads Development Exhibition.
An interesting announcement is mado by the Society of Motor Manufacturers and Craders. From November 22nd to 1)ecember 1st a Cammercinl Notor Transport and Roads Development Exhibition will be staged in the recently enlarged Olympia, London. It will be divided into four sections : (a) Commercial motor vehicles and bodywork, (b) accessories and components, (c) tyres, and (d) read plant. machinery, and roadmaking materia!s.

## "Hail." Smiling Morn!

Unless one's car is fitted with a Triplex windscreen or no windecreen at ail, it is decidedly unwise to drive in tho teeth oi a hailsturm, as more than ono motorist discovered to his cost last weckend.

## Car or Motorcycle Size?

Tho vexed question of car or molor-ovcle-sized number plates for lhrecwheeled cyclecars forms the subject of att editorial in this issue. Weight is the ruling factor, and the majority of threewheeled cyclecars, as well as many motorcycles and sidecars, should be fitted with the larger plate, according to tho letter of the law.

## In Hertfordshire Lanes.

Porfectly surfaced, gently undulating, and surrounded by Englind's fairest scenery, the Hertfordshire lanes form an ideal route for an ille afternoon. Potters Bar is an excellent jumping-off point, and, after passing Northaw, the motorist may turn left or right as fancy dictates. A camera and a tea-basket will greatly add to the enjoyment.

The Tour de France.
There is only one British entry, namely, Ian Macdonald (Calthorpe), in the 2,500 -mile Tour de France, which starts on Monday next from Paris. The two separate trials which were to have titken place have been merged into one.

## London-Land's End Result

The foilowing addenda in connection with the London-Land's End trial results are announced :-No. 242. IV. A. Hirst (10 h.p. Hands), disqualified; No. 355. V. Ioyd ( $12 \cdot 20$ h.p. Loyd-Lord), gold medal; S. A. McCarthy (8 h.p. Morgan), bronze medal.

## Trapping in the Park

The police are very actively engaged in trapping in Hyde Park. Timing is carried out by two plain-clothes men, and a policeman in uniform stands farther along and pulls up the offenders who exceed $20 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. The measured fursong is sometimes on the road parallel th the Bayswater Rond and sometimes between Marble Arch and..Hyde, Park Corner.

## Road Repairs in Croydon.

A notice from New Scotland Lard roints out that the repairs in thermain road through Croydon, between the Norbury tram terminus and Broad Green, are likely to be in progress for some considerable lime. It is unavoidable that a certain amount of traffic obstruction will occur, and drivers who can make use of alternative routes are advised to do so.

## A Severe Test

We recently conducted a simple hut. interesting experiment with Lwo Bramon. mend patches-a new commondity, sold complete with special cement at 5 s . 6 d . per tin by Bramen (1920), Lut., St. Nicholns Street, Coventry. The canvas was partially pulled off two patches, which were then pressed together betwoen the tingers, no cement being used, for 20 semnds. All efforts to tear or rip them apart were then unsuccessful, a joint of surprising strength having been made between them. Each tin contains sufficient patches of various sizes to last the tourist atllicted with frequent.tyre trouble a whole season, or longer.

LIGHT CAR-ICATURES.


## RAYMOND MAYS.

An A-maz-ing Bugatii Exponent.
Neither helmet nor cap, and why not?-a hat he
Considers de trop in his sporting Bugatti.
Overalls, too, one has heard Riy. mond state,
Are luxuries which merely add to tho weight!

## Preserving the Paint.

The harmiul effects of benzole upon varnish are too well known to ned em. phasizing, and it will come as welcome news to many motorists to hear that petrol and benzole-proof varnish and enamel is being marketed by Sir W. A. Rose and Co., Lid., 1. Fenchurch Avenue, Iondon, E.C.3. These producls are made in all colours and are applied in just the same way as ordinary varnishes and enamels, the only precaution necessary being to see that no gas fumes are iu evidence at the time of application.


NEARLY 60 M.P.G.

Mr. J. Russell Sharp at the wheel of his Riley. The car covered $118 \frac{1}{\text { miles on two gallons of fuel, under R.A.C. }}$ observation. (See report in our previous issue.)

Cheaper Suspension
Owing to lower manulacturing cost, the makers of the A.F.S. suspension an nounce reductions in the price of this special form of sprowne

Big Farnborough Hold-up. Thero was a big hold up by Farm borough (Kent) police with their new d-in. rules quite reccutly. A Lig haul was made, the majority of offen. ders being discovered amonist motorcycle and Morgan drivers.

## Inner Tube Developments.

According to Reuter, a mesange irom Colombostates that an interenthy imet. tion has recently been patented which covers the manufacture of inner tube from raw rubber. One of the featureof the invention is the ease with which punctures and bursts can he monded. It is stated that the tubes have ubreadr been tested, and it is lopped to phace them on the market in the near future.
Handy All-weather Equipment.
Theorection of side curtains is, its : rule, a nuisance, but when whe in position they are rertainly a bumb then, however, the side screns can be lut in
situ and the three cornevel fillong in or

"One man" all-weather equipment. Hood and side curlains can be erected without either driver on passenger leaving his seat.
gusset pieces can lee lowered or raisel with the hood, the whole operation bein. performed without leaving the car, all. weather equipment really is apprecinted. We recently tested such equipment on a 1923 Unit, and, although wo understand that it is not standard, it can bo fitted at small extra cost if desired.

## Authoritative Running Figures:

A certificate issued by the Royal Automobile Club in connection with the recent 5,000 -mile test of a $10-23 \mathrm{~h}$.p. Talbot cal provides some illuminating running figures. The total distance covered was achually 5,005 miles, at an werage speed, running time only, of 19.9 m.p.h. The petrol consumption worked out at 43.39 m.m.p.g., or 48.21 ton-miles per fallon; the oil consumption was 1,314 miles per gallon, and the total nmount of water consumed throughout the trial was just over 3 gallons. Tho car was a foursoater, fitted with a four-cylinder waterconled engine of a total capacity of onl? 1.074 c.c., and the total weight unladen was approximately $1,600 \mathrm{lb}$.


Punctures ad lib.
The makers of puncture repair outfits mity expect an immediate demand for freill supplies, judgme from the number of muturists, motoreyelists, and cyclists who were afflicted with tyre trouble last week-end.

## The "Tyre King."

It is probable that Sir Eric Geddes will in future be known as the "tyre king," in view of the hastle which he promoted in the completion of the Dunlup liubber Co.'s new Americnn head quarters at Buffalo. The necessary money for tho completion of the works was riniscd by Sir Fric Geddes between breakfast and lunch-time.

## An Engrossing Volume.

The observant tourist is probably more closely in touch with rural England than ihe majority of other road users, nud he wiil be particularly interasted in a fine, illustrated volume by Mr. Ernest Pulbrock entitled "Englishl Country lifo and Work." which is described as an account of "Some Past Aspects and Present Features." The publishers are Messrs, B. T. Batsford, Ltd., 94, High Holborn, London, W.C. 1 , and, bound in cloth, gilt, the price is 16 s . net.

## The Cup Tie Final

As alreaty anmounced the Cup Tie Final will be piayed in the new Empiro Stadium at Wembley on April 28th, and arrangements have been made to cope with the in vasion which is expected from :ill parts of the country. Motorists would be well advised to remember that on this day the roads leading to the Stadium will probably be congested. It is anticipated that the new roads, ns promised by the Ministry of Transport, will he ready, in which case thero will bo a big fleet of motor omnibuses patrolling them at 30 -sec. intervals. By arrangement with the British Empire suthorities, the Roynl Automobile Club will take over the control of the motorcar and char-a. hancs parks. Parking space for 1,600 private cars has been arrangerl, and there will be a special reserved enclosure for motorcars nt a charge of 10 s. each. All inctuiries shnuld he addressed to tho R.A.C., Pali Mall, London.

Women's Engineering Society.
The first qualified lady eugineer, Mliss C. Griff, A.AII.A.E., chairwoman of the Council of the Women's Engineering Society, recently attended the inaugural


The road sweepers. A rural cameo from Northumberland. Note the cartload of thorny hedgegrowth.
conference of this body, which was held in Birmingham. Part of the proccedings vere devoted to a visit to tho Wolseley works, where the ladies displayed a lively interest.

## B.M.C.R.C.

The second members' meeting of the British Motor-Cyclo Racing Club will take place at Brooklands on Saturday, May 5 hh. As usual, there will be events for three and frum-wheeled cyclecars under 1,10 ) r.c.

## For the Disabled.

That friction-driven cars should appear in force at the Saffron Walden hill-climb on Saturday last was not surprising in view of the ease with which they can be hanalled by the disabled. The G.W.K.s were surprisingly fast and " nippy" ; the Units also acquithed themselves creditably.

## No Change in Motor Taxation.

No reference to motor taxatiun was nade by the Chancellor of the Exchequer in introducing his Budset on Wonday afternoon in the Ilouse of Commons. In view of the Royal Commission, perhaps no lergthy statement was to be anticipaled, but many penple interested in the industry had hoped that some indication of future action might have been made. Instead of this, the only allusion of the Chancellor to the motor duties was when, speaking of the estimated income for the year, lie said the motor vehicle tax was expected to produce $£ 13,250,000$. No doubt. when the Finance Bill comes to be considered, motoring members will press the Government for a statement as to its intentions.

## A Debatable Question.

Trouble is brewing for those motorists who fail idequately to illuminate their rear number plates. As the Automobile Association points out, however, the regulations do not prescribe the distance from the car at which the index marks and numbers should be readable after lighting-up time. In their own interests all motorists should satisfy themselves that the rear plate is properly and reasonably illuminited. On uany cars the tail light is wired up in series with the headlights, with the switch in the dim position. The light thus obtained at the rear is often fotally inadequate, and the cure is to wire up the tail light in parallel, which can be effected by onnnecting it via an additional tumbler switch direct to the accumulators.
(In circle) Miss C. Griff, A.M.I.A.E. (Below)
The Women's Engineering Society, of which Miss Griff is chairwoman, inspecting the works of the Wolseley Co.


FIRST QUALIFIED

The Modern Ad.
A garage ndvertisement in the West Comitry vears the wording, "If you

Ladies' Hour Record
We hear that Miss Lilian lioper, of Leamington, has aspirations to attempt


ANOTHER 5,000 MILE TRIAL.

Commencing the run. A 10 h.p. B.S.A.car leaving the Daimler Works, Coventry, on Monday last, in charge of the official observer appointed by the R.A.C.
want a thyroid gland giren to your car send it in to

## Popular Personalities.

Having received several regnests for copies of the drawings of well-known personalities published as " Light Caricatures" in this journal, wio have made arrangements for posteard sizo conies of the originals. to be sold at, 1 s . 6 d . each. post frec. Lellers should he marked "Caricatures." aud adkiressed to this office. The copies can Le ob tained on plain paper or on postcards, whichever is desired. Larger reproxiuc. tions, mounted, can also be surplied.
the ladies' hour record at Brooklands, which now stands at about $70 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. Knowing Miss Roper, we would imagine sho could put up a six-hour recolil as easily as the one-hout

## Light Car's 5,000 Miles Official <br> Test.

A 1923 model twe-cvimiler I3.S.A. is about to undergo a 5,000 milo road trial under R.A.C. observation. Interest is added to this test by tho fact that the car has been picked out of the makers' slock by an R.A.C. official, so as to ensure it being an absolutely standard vehicle.
R.A.C. and Competitions.

Club secretanes and trials organizers should at once aprly for it copy of the Royal Automobilo Ctub's Competitou liules, which deal with open amd closed events.

Important Brooklands Rule.
With reference to a dispute that aruse at the Faster meeting of the 13.1 R.C., we understand that int the vating rules of the club it 25 statiod un prage 4 that Frery vehicle lasal be wnsidered as having stasted which has left the paddock and is on the wom

Christening the Triumph Car.
On Tuesday lan: (lie Trmanph Dhotor Co., Itd., gave al luchasio it Coventay, at which lard loagh powiterl, in urder to introdnce thenr ase 10 h.p. car la agents and the l'ane The watherme wis woll allembed If. Vamuia, in projusing the lieatth of Nh. Jiethmann, the mannging directur, iwelt "pollt the
 mam, in reply, stanand thitt lie thomeht tho visitors ivesuld andender that the Trimmph car maintanmeal (incontryz reputation for excellence of workminship. to much had bern exprex lod of elin machine, ho samd, thought it would abmat bublo to ily and be purchasable fow was (os bothing Sir James Derey, in frominge the dhair man's (Iord Leigh) health, alated that tho ear should alsumsis loo ible to run without petrod on 16 repritation alone, and wound up hy eaphasizing the importiane of the intioduction of tho petrol fax in place of the horse power fax Both the motorcyede and can works were visited by tho company, who were favourably impresed by the cleataliness of the premises and high quality of the workmanship of tho products di-played.

## THE 1,000 MILES MERIT BADGE.

 Further Details and Conditions of Performance.$\mathrm{A}^{\mathrm{s}}$$S$ we anmounced in our last issue, we are cooperating with the York and District Motor Club in connection with the award they give for the feat of covering 1,000 miles in 50 consecutive hours, which performance we consider to furnish real prool of driving ability and, on the part of the car, true road-worthiness. To the driver of every light car or cyclecar that accomplishes the necessary $20 \mathrm{~m} . \mathrm{p}$.h. atverage for 1,000 miles we award an aluminium radiator plaque, the design of which is reproduced herewith

In order to ensure satisfactory organization and to keep within the rules governing motor competitions, all those who intend to endeavour to earn our badge must become members of the York and District Motor Club and abide by their supplementary regulations governing the trial. The route covered may be circular, starting and finishing at a point chosen by the competitor. but we insist on at least three wellknown hills being included. The same driver must handle the car througnout, and intimation of an attempt must be received at this office at least a week before the run is made and the proposed route must be approved by us. During the run proof must be afforded that the car has covered the route ; checking books will be provided.

The secretary of the York Cluh is F. T. Cleveland, Kiosk, Lendal, York, and from him all information B16
regarding the run can be obtained. Already sereral owner-drivers have expressed their interest in the scheme, and propose to undertake the run in the near future

The first thing necessary is for the driver to have been $a$ member of the York Club for at least a month. The entry fee for the trial is one guinea, and observers can also be provided for $f_{1}$ per day and expenses. done on Sundays.

Everyone entering for our merit badge must keep us advised as to causes of failure, etc., etc., and failures as well as successes will be roported. In case there is any doubt as to what are considered to be well-known hills, we give herewith a list that provides some indication of the type of gradient meant. At least three have to be included in the itinerary. The hills are Kirkstone (from Ambleside), Sutton Bank, Lynton, Countisbury, Porlock, Amul ree, Kenmore, Trinafour, Spittal of Glenshee, Mow Kop, Bwlch-y-groes, and Cairnwell.

## NEW AND BETTER ROADS.



Extensive road improvements are being effected between Dorking and Reigate. (1) Shows the great amount of excavation which is often necessary in order to carry out a small section of widening. (2) This photograph clearly shows a ferro-concrete road in course of preparation. The metal reinforcement is plainly visible on the right. (3) It would be difficult to convey a better impression of the benefit conferred on road users by a widening than that given in this photograph. The old narrow road can be seen on the left. (Inset) A key-map showing the stretch over which operations are being carried out.

# TORQUE-TUBE OR HOTCHKISS DRIVE ? 

> Interesting and Important Facts Connected with Chassis LayoutDecreasing Unsprung Weight and Improving Suspension.


IN small ears of all types the majority of interest is usually centred around the engines, but, since the specd of any sutomobile is timited by the quality of its suspension, it is very necessary that the prospective purchaser should know something about the pros and cons. of different types of chassis and back-axle layout. In the first place, therefore, let us understand clearly what are the torque tube and the Hotchkiss drive systems
Inside the back axle are fitted "final drive "gears, which transform the rolary motion of the propeller shaft into motion at right angles thereof in the backaxle driving shafts. There is a large gear known as a crown wheel on the axle shafts in mesh with a smaller pinior on the propeller shaft. As the latter is turned by the engine it naturally turns the former. Now, every action has an equal and opposite reaction, and therefore, when the rotary motion of the pinion endeavours to turn the axle shafts, the pinion tends to "climb" up the crown wheel, as it were, and, by reason of the fact that it has a braring in the axle casing, there is a tendency for this casing to turn in: the direction opposite to that in which the axle shafts revolve.

## The Meaning of Torque.

This tendency is known as "torque," and rapid realization of how it is evolved can be ohtained by placing a small and a large coin edge to edge and endeavouring to turn one with the other, when it
absorption consists of rigidly attachime a tuhe 10 the back-axle casing, so that it encloses the propeller shaft, and providing it with a unisersal hearang at its front end on some part of the wassis. The place of the tube is sometimes takm hy a forque arm, which is similarly attached (o) the fhassis hy a universal joint (usually spring loadedl, as is shown in one of our sketches.

## The Hotchkiss System

In the Hotchkiss syst semi-olliptio ran springs alone are utilized to comberact the loming tombency of the axle casing, the inherent stifturss of ibe sprimgs being utilized to this effeet.
We can now consider the advantages of each system. In the first place, any realuction hat can: be made in the weight of unsprung parts, such as axles, wheels, etc., is leneficial the suspension. As will he appreciated from the illustrations reproduced herewith, a very low unsprung weight is ol tained when the Hotchkiss drive systom is used. With the torque tube or terque arm method of alisorption there is half the weight of the torque memher to be considered as an unsprung mass, which may not le altogether inconsiderible.
There would appear. however, to bre a tomdency at the present time for designers to fawour the torque-tube system, hy reason of the fact that, among other advantages, it gives smoother action of the clutch. Car comfort demands very supple springs,


THE SYSTEMS
From these six drawings the salient features of the various systems of back axle construcCOMPARED. tion can clearly be grasped. On the left is the Hotchkiss drive, in the centre is the torquetube system, and on the right the torque arm principle is shown. The lower illustrations indicate the unsprung weight involved in each system.
will be found that the one through which the power is originally applied wil! try to craw! round the edge of the other; by using non-technical language the action is made clearer to the novice. This torque naturally must be absorbed, otherwise the car would not move forward, and the torque-tulse principle of B18
and if very supple sprines are used with the Hotchkiss system, they will "give" a little as the clutch is let in and the torque comes into effect, the result. being that the rear of the chassis "heaves," which is not desirable. Another very important point in connection with the Hotchkiss drive system is that

TOルQUE TU゙BE: (comld.).
the brake mechanism has to be very carefully"laid out, otherwise, as the axle casing turns slighty with the springs, the effective length of the brake rods will the either reduced or increased, so that either very harsh or very indetermirate hraking is obtained. ()n ai. least onc make of light car we handled during the past year this effect wats so pronounced that the hrakes practically serzed on so soon as they were touched when the car was moving forward, whereas They had no grip whatsoever in the reverse direction. With the torque-tube system this particular defect is non-existent. Again, the illustrations show how this effect is produced more simply than do words.
some cases it is omitted altognther when the torquetulue system is employedi, and this, of course, tends towards reduction of cost. On all counts, therefore, there is not very much to choose; but what advantages there are would appear to be held by the torque-tube system, which, as we have already noted, appears to le gaining iavour in this country.

A point of appeal to the owner-driver is that where it is used there are fewer points in the chassis to lubricate, which more than counterbalances any slight falling off in the quality of holding the road, as is generally acimitted to be a noticeable feature when a properly designed Hotchkiss-drive system is fitted. To obtain maximum results with the Hotchkiss system the rear springs should be practically flat

(Left) Showing how braking is affected by the twisting of the axle casing, altering the virtual length of the operating rods. Flexure of the springs is shown in the centre, while a simple analogy of the final drive gear (crown wheel and pinion) is on the right.

As to the question of cost, this is a little difficult to decide which is preferable, uwing to the fact that it is not only the back axle and torque tube that. have to be taken into consideration when reviewing the matter, buit the laycut of the chassis as well.

## Different Types of Springing.

Where a torque-tube system is used, quarter-clliptic or. cantilever rear springing can be adopted, so that the chassis frame need not be made so long (thus de(reasing overall weight), and, again, instead of the rear universal joint in the propeller shaft being exposed and subjected to considerable flexion, it is cuclosed, and only wor*s through a small angle (in
when under load, for it will readily be appreciated that they take the drive strains as well as the torque, both of which are dealt with better if the spring leaves are straight than is the case when they are curved.


Superimposed quarter-elliptics, as used on the Citroen, do not need any separate torque-absorbing device as the axle casing cannot turn.

# PARLIAMENT AND THE MOTORIST. <br> <br> Congestion at Kingston. <br> <br> Congestion at Kingston. <br> <br> Use of Tow-ropes. 

 <br> <br> Use of Tow-ropes.}

DESPITE the rixciting events in the House of Commons of last week, members interested in motoring subjects were able to elicit valuable information from Ministers. As all motorists will agrec, a matler which requires immediate attention is the congested state of the traflic at Kingston, and an endeavour to improve the conditions prevailing there will be heartily welcomed. Useful service was rendered by Mr. Penny, the member for Kingston, on Wednesday, when he pressed the Ministry of Transport to state what progress was being made: with the construction of the Kingston by-pass road. He inquired if every effort would be made to expedite the completion of the scheme, in view of the growing volume of motor traffic passing along the main thoroughfares of the Royal horough, which caused dangerous congestion, particularly on Saturdays and Sundays. Col. Ashley, who replied, gave some hone of progress soon being made. Ho stated that the surveys, plans, and specifications were now completed, and that advertisements had been published inviting tenders for the execution of the wark.

The Government have been considering the use of tow-ropes by motor vehicles, in view of the report of the Departruental Committee. Replying to Sir Walter de Frece, who asked if steps could be taken to ensure that better warning should be given to the public and cyclists when tow ropes were used, Col. Ashley said the report of the Committee had received careful consideration. He was awaiting a favourable opportunity of introducing a Bill to give effect to the more important of the Departmental Committee's recommendations.
Workpeople in the mnturing trade are bestirring themselves to get Government assistance in their business. Mr. Penny, last Thursday, presented $\Omega$ petition. signed by 4,761 workpeople engaged in the manufacture of components used in the building of commercial motor vehicles, praying that the exemption from import duty of foreign commercial vehicles should be abolished, and the same import duty should be imposed on these vehicles as on forcign touring cars. The petition was signed by workers in all parts of Great Britain.

## CLEE HILLS, SHROPSHIRE.

SHROPSHIRE is not frequently quoted as a general touring ground for motoriats, yet it boasts of excellent roads. interesting villages and hamlets, and several large towns which well repay a visit. Situated for the most part on very high ground, in places above $2,0(4) \mathrm{ft}$., wonderfin views are obtainable, whilst the air cannot be rivalled for its keenness and invigorating properties. Clee Hill is only one of many surround ing peaks, but, as can be gathered irom our sketch, the road over the summit is wide and interesting in view of the fact that the edge is lined with white stones. which serve as invaluable gaides to motorists on dark nights

Cleobury Mortimer itself somewhat belies the artistic sound of its name, which is derived partly from its situation in the Clee Hills and partly from an historical connection with the Mortimers, who were old manorial lords. It hoasts, however, of an interesting Gothic church.

One might make an interesting itinerary, branch ing off from the centre of many main roads, namely, Kidderminster, and running through Bewdley thence by a sceondary road orer Clee Hill to Ludlow, an ancient and historic town and the one time seat of government of the Marches of Wales. Here Ludlow Castle-admittedly one of the finest fortresses of England, although now a rootiess ruin-calls for a halt and tour on foot.
Leaving Ludlow and once more regaining the main

road, the motorist takes the leit fork at liromficld, passing through Lecentwardin: Knightom, turning right to Clun, Bishops Castle, doubling liack via Lyedham to Craven $\Lambda_{\text {rass }}$ thence via it direct and istoresting ronte through Church Stretton to Shrewshury Now turning southward, a return to Kiddorminster is made via Much Wenlock and Bridgmoth.
The above itinerary will neerssitate stmying from the borders of shopshire on to the wige of Wales. and, therefore, combines :a four in some of England's most pleasant country, together with a glimpse of the Principality:

A Hint Worth Knowina.

## ANCHORING THE MAGNETO.

ACOMMON method of securing the magneto to its platform is by means of a Hexible brass strap, the open ends of which are drawn together by a set-screw working in universally jointed collars.

This represents an excellent fastening, for it enables the instrument to be fixed in position or removed in a moment : hut it suffers from one disadrantage, insomuch as ribration is liable to slacken off the screw, with the result that the magneto eventuilly will zome adrift.

No serious harm will be done but, obviously, the engine will immediately cease firing, and retiming will become necessary. In the majority of cases this is easily dune, for it is not a difficult matter to reintroduce thesdriving pins into the holes made for them in the fibre coupling, which is usually the type of connection.
If it be found that the pins register in any of the various possilile positions, the magneto may be retimed by a system of trial and error: but it must be remembered that six different positions are possible.
An easy method of preventing a recurrence of the trouble consists of introducing a pad made of emery raper hetween the strap and the top of the magneto. This should take the form of a strip doubled so that both the strap and the tops of the magnels bite into the roughened surface of the emery cloth.
B20


Sometimes it may he found that even this is ineffective and that there is not sufficient room to introduce a lock-nut on the eud of the set-screw. It has been discovered by experience, however, that slackening off is efficetively stopped if another strap lee introduced, and, as it is not an expensive item, it will repay the fitting. Both straps should be tightened up firmly with a powerful screwdriver after the magneto bas been accurately set on its plafform.

Conducted by Edmund Dangerfifld． TEMPLE PIRESS LIMITED Pronrictors of＂THE MOTOR，＂＂Motol CYCLING．＂ 7－15，Rosebery Avenue，London，E．C．r．

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## LIGHT CAR \＆CYCLECAR

was founded in 1912 to cater for the needs of users and potential purchasers of various new types of cyclecars and light cars，and it has con－ sistently encourastad the development of this new motoring movement for over ten years．

The journal is published every Friday．There shonld be no difficulty in obtuining a copy at any bookstall or newsagent，as arrangements have been made to ensure a regular supply． Should any difficulty be experienced，we should be grealiy obliged to reccive the name and address of the reader＇s newsagent．

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## Topics of the Day

## A Wily Taxation Suggestion．

aT a recent gathering of influcntial uscrs of commercial vehicles a suggestion that needs very full consideration was nade by one who holds a responsible position in the industry． Rightly，assuming that automobiles of all types in this country were over－taxed the proposal that there should be Fair Play for an all－round relluction of one－sixth of the present Small Cars．amounts paid was put forward．At first glance this is acceptable，but only is it so until we con－ sider that，whereas a light car owner would have his burden reduced by some $£ 2$ per annum，the heavy vehicle would gain to the extent of $£ 1+$ or more．In other words，it would make less fail an already incquitable tax．From every point of riew the heary vehicle and＂big－mileage＂interests are already having far too much say in the taxation affairs in this country，and we are strongly opposed to this suggested reduction in their taxes． The tax on all motor vehicles must be proportionate to the amount of damage done to the road．Notining else is fair to the great majority of road users at the present time

## Number Plates for Three－wheelers．

I
I has been an accepted iact ir the economical motoring world that motorcycle－sized plates－i．e．，those in which the dimensions applying to car plates are halved－meet the require－ ments of the law in connection with three－whecled eyclecars，

Car－sized Plates Usually
Necessary． plates forthwith

An investigation of the whole matter points to the fact that the police have shown a certain nmount of very commendable latitude in administering the law，and it should be understood at the outset that，even although the three－wheeler be regarded as a motor－cycle for the purposes o：taxation，this in itself is not sufficient to justify the use of small plates，which is governed strictly by weight．
Readers who have any doubts on this question are referred to the Motor Car（Registration and Licensing）Order，1903，Fourth Schedule，Paragraph 7，which reads as follows：－
＇In the case of the plates for a motor－tricycle or bicycle of a weight unladen not exceeding 3 cwt ．，each of the dimen－ sions mentioned above－i．e．，car sizes－must be halved，and the shape of the plate need not be rectangular so long as the minimum margin between any letter or figure and the top，${ }^{\text {b }}$ botom，and sides of the plate is preserved．＇
The meaning of this stipulation is strengthened by a para－ graph which appears in the addendum to the Motor Car Regis－ tration and Licensing（England）Order，1903，an extract from which is as follows ：－
＇It may be mentioned that the term motorcycle is not defined in the Act，and the Board have no authority to define it ：but they understand that，though the term might some－ times probably apply to other vehicles．it would be generally cousidered as limited to notorears designed to travel on not more than three wheels and weighing unladen not more than 3 cwt ．＇
Bearing in mind the fact that the average three－wheeler does not conform with the weight limit given，it seems clear and un－ questionable that car－sized plates are essential，and we recom－ mend that the necessary alteration should be made from small to large plates unless it be definitely ascertained on a weighbridge that they are within the limit．It should be added that the issue in no way affects the tax on three－wheeled cyclecars，which，up to 8 cwt．unladen，cost only $£ 4$ no matter what the horse－power．


A Critical Causerie of Light Car Comment.

## A Neglected Touring Centre.

FOR some obscure reason or other the arerage tourist-and apparently, also, the average writer on motoring matters-penetrates as far west as Lynton, explores Devonshire, and then comes home. Few have a wide experience of Cornwall as a touring centre, which is curious, for Cornwall is very delightful country.

As I have oft repeated, as each Olympia Show. year by year, reveals new and better light cars, the map of England shrinks. But a little time ago few would have considered Cornwall as a week-end rendezrous, yet last week-end I proved that it is within comparatively easy access of the Metropolis on a 1,500 c.c. three-seater.
Between lunch in London on Friday and dinnertime on Sunday I covered cso miles, allowing ample time for all meals, breakfasting at a gentlemanly hour and closing down at 7 pm . each night. My mount was not particularly fast, and, as a matter of fact, was far from being free from trouble. I quote the trip to provide an instance of what can be done perfectly easily on a present-day light car.

## The Charms of Cornwall.

I MUST revisit Cornwalt. The qouls ire gondthe main routes straight, while the ly landes hemb sufficient attraction to make interesting the negotsation of the myriad twists and rises. The semery is gorgeous. We followed the man road through Exeter, Bodmin, and Redruth, on tho outward journey; Lurued on to the worst rateds just befure reaching Hayle, and huged the seaboard as clusely as possible on the way hack

Cormwall is an artists' platymmal. Vast, rugged clifis thrust out against the rolling surges that come in from the Allantic swells and break spraying and spuming over their feet. The road dips into sectuded little bays and coves or rises up into the beather clad moor tops, where the clean, salty aif is more invigorating than finest wine of France

## True Motoring.

C LEAREST sunshine altemated with driving rain, but, clad in mackintoshes and sung behmed a wide windscreen, one enters into the spirit of the elements and finds only exhilaration--no discomfort.


THE AVIETTE. The equivalent of the cyclecar in the aero world is the aviette. Fitted with a 3 h.p. engine, this little machine, the "Wren," flies successfully at 50 m.p.h. There is to be a big competition B22 organized for aeroplanes with engines under 750 c.c. capacity in the autumn

RIC'II MIXTURE (contel.).
Such is real motoring-none of your weffeminate luxury bohind the glass pancls of a town saloon.

Newquar, with its tropical plants, is fascinating. lime olfered excellent nights' lodging at the Grenville Hotel, and lunch at the Valley of the Rocks hostchy at Lyinton heartened us for a chainless slither down the slimy slopes of the famous hill and the following climb up Countisbury, where wheelspin nearly brought us to a standstill. Porlock, too, was greasy: The passenger hall to lie over the back of the cal to give better adhesion-a hint worth knowing.

## Valve Troubles.

AR.ITElER interesting mishap was experienced during the trip. At ahout 300 miles the engine dieveloped an intermittent "clish"-ing sound when it was rumning slowly, and an inspection revealed a broken valie spring. The breakage was such that the valve was not returned to its seat when the engine was stopped or was running slowly, and yet (ince it got under way and was revring at anything over l.(00 r .p.m. it fired perfectly on four cylinders up to what was its ordinary maximum rate of revolution. There was no noticeable loss of power, which gives one to wonler whelher the supposition that fuprex strong valve springs are very necessary on high speed engines is correct or not.

## Tappet Derangements.

ALITTLE later another valvular incident occurred. The exhaust note became woolly, and a few seconds afterwards a most alarming series of bangs nucl popss came from underneath the bonnet. The engine contimued to fire on three cylinders and the noise was regular, occurring apparently about once every cight revolutions. It seemed that nothing less than a hown-in piston crown could have caused the noise,
yct, when the valve cover was again taken off, it was nothing worse than an exhaust tappet that had slacked right back, so that tho rocker was only opening the valve to about one-thirty-second of an inch, instead of giving it its full lift. The push-rodoperated type of overhead-valve engine seems to be rather delicate as regards its tappet adjustment, but it makes up for this shortcoming by its extreme accessiljility.

## The Aviette.

AVIATION seems to be following closely the lines of progress that characterized the development of the automobile, and now we have a counterpart to the cyclecar movement in the develnpment of the Aviette. I hear that in the autumn of this year the Royal Aero Club are holding a competition for aero planes with engines not exceeding 750 c.c. capacity, the marks being awarded on the basis of petrol consumption, each competitor being given a gallon of fuel and the winner being he who does the longest fight.

Already several of the best-fnown aeroplane concerns are designing these $\Lambda$ liettes, and the one illustrated on the opposite page has already made several successful trial flights. Made by the English Electric Co., Ltd., of Preston, and named the Wren, it is fitted with a 3 h.p. motorcycle A.B.C. twin-cylinder engine and its monoplane wings are built on the cantilever principle. Some idea of its dimensions are given by the following figures:-Span 37 ft . . height 5 ft ., and weight 20 J lb . The pilot sits just ahead of the main plane, the engine, fuel and oil tanks are carried forward on a tubular steel cabane, and the landing wheels, fitted with pneumatic tyres, are partially enclosed in the fuselage to reduce wind resistance. It is expected that speeds of about $70 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. will he obtained by a $750 \mathrm{c} . \mathrm{c}$. single-seater, and that a better m.p.g. will be recorded than would be possible with a light car.
S.S.


No cyclecar trial in France is complete without a few accidents. Atrocious roads are chosen and a high apeed is maintained. (1) Gives some idea of the course of the recent Concoura d'Endurance. (2) Shows a Bedelia on the point of retiring, and (3) is the air-cooled four-cylinder S.A.R.A. hors de combat. Its English driver, W. F. Bradley, was injured.

# EFFECT OF WHEEL DESIGN ON SPRINGING. 

Limitations of the Leaf Spring. Possible Auxiliaries Which Would Improve Suspension

0NE has only to take a rum in what is acknowledged to be a well-sprung car over a badly pot-holed road to realize that the system of suspension adopted on the moderin small car is very far from perfect, and the writer questions rery much whether it will be possible to solve the problem solely lyy deroting attention to spring leaves, shock absorbers, etc.
The spring leaf is called upon to meet so many different conditions of stress that, in being perfected in one direction, lamentable shortcomings are obvious in another, and it would appear that the problem must be tackled from a separate point of view-i.e., wheel design.

At the outset it will be apparent that the multi wheeled vehicle-a very fine example of which is provided by the stean locomotive is as near perfect as possible, for the simple reason that, with so many individual points of support, the frame must necessarily take what might be described as an average path along a horizontal plane, this average being struck between the various upward and downward movements of each and all the wheels as inequalities in the road surface are encountered.

## Are Five Wheels Impossible?

It is true that the locomotive runs on a rery smooth road surface, in the shape of steel rails, but it must not be forgotten that points and crossings have to be negotiated at very high speeds and that, therefore, the onus of providing shock-proof running does not devolve entirely on the rails.

An ingenious arrangement, and one which would go far to solve the springing problems in light cars, is that depicted in one of the accompanying sketches. which shows the introduction of a fift wheel midway along the chassis.


## INGENIOUS

## Bút

IMPRACTIC. ABLE.

A floating fifth wheel, disposed as shown, would certainly improve the running over rough surfaces, but the idea is impracticable from the constructional point of view.


MULTI-WHEEL SUSPENSION

A 4-6-0 express locomotive, the springing being ahown diagrammatically. Apart from rail adhesion the advantage of multi-wheels is obvious, the frame riding easily over rail inequalities such as pointa and crossings.

The diagrammatic inset demonstrates the ohvious advantage of this arrangement, but, of contse, the front wheel, which is shown suspended over a pothole, would, in point of fact, he thrust into it by spring tlexure, the shock, however, not beng communicated appreciably to the chassis. U'nfortuantely, thern are practical and in. superable difticulties whech render the introduction of a fifth wheel at the point shown impossible
A far more workable scheme is that wherein twin tyres are adoptod. 'Ihis idea has already been proved a combmereial success, and we should not be at all surprised if this year's Olympia Motor Show reveals a vehicle so fitted. Again, hy reference to tho sketch, the manner in which the full effect of a pothole is avoided will be manifest, and only those road inequalities of the larger order would transmit any shock to the car
A narrow rear track has been tried as a means of improving the rear suspension of a three - wheeler. Virtually, however, the car at once becomes a four-wheeler.

## Carrying Two Spares.

The arrangement, moreover, has a double advantage, for it can be regarded as one by which spare wheels are carricd-not in an ugly and useless position on the running board, but where they share the hard work which one fread is usually called upon to perform, and where, in the event of a puncture, they are in position, and would eliminate thernecessity for changing a wheel on the spot.
The additional adhesion when elimbing or when negotiating greasy surfaces is also worthy of comment, whilst, all wheels being interchangeable, the car would not be crippled in the very unlikely event of the two side-by-side inner tubes being punctured together. It is suggested that the arrangement should figure, to begin with, on the back ixle only. but there is no reason, apart from that of cost, why twin-tyred wheels should not figure at the frontras well.
In parenthesis, it may be noted that a praiseworthy endearour was made by the manufacturers of the. Merrall-Brown to eliminate the inconvenienco occasioned by the single driving wheel of a threcwheeled oycle by adopting an extremely narrow track at the rear. This practically amounted to twin

WILE゙E゙TA DE゙SLCEY AND SLMMNGIVG（contcl．）．
tyres， hut：whereas it certainly improved the car when regarded in the light of a three－wheeler，it was obviously more practical to adont a standard full－ width back axle．

## Conventionality the Stumbling Block．

Convention，it is to be feared，will be the stumbling block in many designs calculated to improve the rum－ ning and comtort of the modern light car，and for this reason it scems doubtful whether larger diameter wheels will be entertained

The fact remains，however－to carry the idea to cxtremes－that half the jolting to which the occu－ pants of a car are subjected over our present roads would instantly vanish were the road wheels made twice the dimeter：Appearances，of course，would


Large diameter road wheels would look unsightly and unconventional，but they would go far to solve the difficulties of modern suspension systems．
be all against such a revolutionary change，but it is all ：qucsion of that to which one has become accustomed．

## Advantages of the Endless Track．

The larger wheel，if boldly adopted by small car manufacturers，would soon cease to be strange and manufacturers，would soon cease to be
would be accepted in exactly the same way－without comment－as is the present small－diameter wheel．
The obvicus claims of the caterpillar track must not be orerlooked．In the past this was always regarded as being extremely slow moving and suitable only for vehicles wherein speed did not matter but hauling power did．
The latest type Kegresse has dispelled this idea．for $25 \mathrm{n} . \mathrm{p} . \mathrm{h}$ ．，a speed at which many light cars are constantly driven to－day，is well within its range，and， further，can be maintaincd over surfaces which would bring the average light car down to $1 \mathrm{~m} . \mathrm{ph}$ ．，if，in actual fact，it could traverse them at all without danger of breakages．
One does not suggest that the tractor attachment should be slavishly copied and regarded as being possibly a futrere system of light car springing，but in a modifird form it is worthy of discussion．
It is anticipated that the average owner－driver would checrfully sacrifice the ultra－efliciency of the

Kegresse tractor if，whilst still providing far better suspension than that found on the average light car yet not being able to uccomplish all of which the Kegresse is capable，a modified form of Kegresse en．


Adopted with success on commercial vehicles，twin－ tyred wheels suggest possibilities in connection with amall cara．
abled the car to be driven，say，at $30 \mathrm{~m} . \mathrm{p} . \mathrm{h}$ ．over the worst possible roads and，say，up to a limit of $40 \mathrm{~m} . \mathrm{ph}$ ．over medium roads．

## A Future Development？

After a！l，maximum speed is not everything．and． as every motorist knows，a good average，which is far more 2 mportant，depends on the elimination of long and short stretches of slow running，with the inevitable deceleration and acceleration．

It seems probable that developments will take place with regard to the sprung wheel－i．e．，a wheel which in itself gives a certain cushioning clfect，due to its peculiar construction．Again we have to refer to patents which have becn worked out in connection with commercial vehicles．
This type of wheel presents a wide field to the in－ ventor，and although a very smadl amount only of peripheral distortion is permissible，every little helps， and the self－sprung wheel would materially assist in solving many of the present－day difficulties of sus－ pension．
The advantages of this type are best demonstrated by comparing the functioning of an imaginary wheel made of hard solid rubber，shod，of course，with pner－ matic tyre and tube，with a modern disc whecl．The give in the rubber wheel undoubtedly would be marked in contrast with the same quality in the steel disc．A rubber wheel is impossible，but the same effect can be obtained by introducing what way be deseribed as a spring－loaded foating rim．


It is to be hoped that the effect of wheel design on springing will seriously engage the attention of manufacturers who have，be it said to their credit， devoted a great deal of successful experimental work to the improvement of the present basis of suspen－ sion，i．e．，the leaf spring．


In our previous issue our contributor dealt with the earlier portion of his journey, describing in detail the rarions formalifies to be obscred prior to embarkation. The following article is a contimation and forms an interestink suile to tourink conditions as they note exist in france. From the list of expenses mentioned at the conclusion of the arlicla. it is evident that an excellent holiday can be enjoyed for quite a modest sum.

ACURIOUS point one cammot fail to notice in France is the consideration shown by all other classes of road users to automobilists. At the first mot of his horn they make way and no wilful obstanction is encountered. Everybody. from children to policemen, seems to take a lively interest in cars as cars. The Stoneleigh was at once recog nized as a new type everywhere. Even when one pulled up at the village "essence" pump one had to answer fricndly inquiries as to this "noureau type Anglais."

## Rain and Snow.

Returning to our journey, we reached Auxcre (133 miles) about $5 \mathrm{p} . \mathrm{m}$. and found good food and every comfort at the Grand Hotel i'Epec.


Arriving on a stormy winter evening one found a most courteous reception, pubiic rooms most taste fully decorated and furnished with ampic illumination. Floors of polished golden oak everywhere, and warm, airy bedrooms with radiators and hot and cold running water.
There are many large provincial Einglish towns in which no such standard of comfort is arailable. I feel sure that a visit to some of these French towns would cause English hotel owners to modernize their ideas.
b26

On the morrow we resumed our southward jonnoy but the weather continued bad, and, moreorer, the weather forecasts were most gloomy
We lumehed at Avallon whale the rain poured down.

Resuming, we climbed steadily aloug semi-flooded roads to Saulicu (Cote-d'()r). The road rises to about $1,800 \mathrm{ft}$ above sea-locel, ath there are sums very heavy gradients.

The Banks of the Yonne.
I felt that in such abominable weather and on such roads we were putting the little ear to a vory heave test, but she stond an to it wonderfally, and on most heartbreaking hills kept up a good rate on second speed, rarely dropping below $20 \mathrm{~m} . \mathrm{p} . \mathrm{i}$.

Between Saulicu and Autun we encountered mist and some snow, and we were glad to vach dutum without mishap. Our mileage for the day was only 80, but, as I have said, my passenger is an invalid, and I found the continued bad weather was telling on his nerves.

Autun is a charming little town high up in the mountains, and a great motoring eentre. Seven main roads enter the town, and cars are contimally arriving and departing.

At Autun I felt that if we went on farther south the object of our trip might be defeated, so I mroposed a rest and a more leisurely return northwards. The enthusiastic reception of this proposal sulfici ently confirmed its wisdom.
We revisited Auxerre and spent another night ar, the Grand Hotel de l'Epee.
En route we passed the Grottoes diArey, and we photographed the tunnel by which the road passes under the precipitous clilis

## Arrival in Paris.

The Yonne flows alongside, and the scenery is most interesting. In the evening we went to the thentre, where a travelling revue gave an excellent performance, with very good music and amosing dialoguc. They really worked very hard, and although the Auxerrois turned out in full force the seats were so cheap that [ feared the reward of the company could not he commensurate with their excellent performance. Morcover. they began at 8.30 and went oll till midnight. The Auxerrois are energetic people.

Next day we journeyed leisurely northwards and stopped at Sens for lunch. The cathedral here is

## ABROAD WITII A S'TOVELJIGII TIIREE'S'j:ITER (contd.).

very fine, and we visited it. The guide was rather shocked because we decided to leave just when he was about to show us " the treasure." There was a deathly chill in the atmosphere of the building, and we were glad to escape it for that reason. It is, however, a beautiful Gothic building dating from the twelfth century. From Sens we went on to Fontainchieau and found rest and comfort at the Cadran llew. In the morning we walked round the


Arras as it now stands. From here the tourists made via St. Pal for Boulogne.
heautiful palace gardens, watched the huge carp swimming and jumping in the pond, and, having wated for the late opening hour of 11 a.m., we cntered the palace and followed a most able guide round the magnificent apartments. After lunch we re-entered the forest and moved on the capital, as a general would put it. Here the road was good, but the rain came down again harder than ever. It nearly washed off the car all the sand and clay we had brought from farther south. We entered Yaris by the Porte d'Italic and, thanks to the careful use of a plan we had bought at Fontainebleau, we reached our hotel near the Opera without a wrong turning. Here, again, even in Paris, we found a well-managed hotel, with central heating, electric light, hot and cold water and telephone in each bedroom, with free telephone serwice all over l'aris at 16 francs per room per day. With petit dejeuncr in cne's room for three franes and déjeuncr and dinner at 11 francs each. $\Lambda$ laris friend who came to see mo complimented me on my choice and made careful note thereof. Anyone anxious to know further should write to me. We spent the week-end in P'aris. I love it, but it still rained and I was beginning to hate rain. After lunch on Sunday we invited a Parisian airman friend to drive us out in the Stoneleigh. He took us to the Fiffel Tower. the Longchamps, and to Versailles, and was full of praises for the performance of the "voiturctte."

## Returning Home.

On Monday morning we collected letters at the Poste Restante and found that there had heen more sunshine at home than had fallen to our share. We left Paris about noon by the Porte St. Denis and made our firsc call at Le Bourget, the great French air port. It was raining hard and we found a small crowd of weather-bound Britishers who had just
been informed that there would be no flight and who were returning gloomily to paris. We lunched at the air port restaurant and pursued our way to Amiens. The roads north of Paris were much better, and we made good time. At Amiens we found comfort, good food, and an obliging proprietor at the Hotel de l'Univers. With his assistance we mapped out ior the morrow a route to Boulogne via 'Thiepval, Albert, P'oziceres, Bapaume, Arras, and Vimy Ridge, which would include interesting features of the Hindenburg Line. This last day of our tour in France gave us a new set of impressions.

## Tatters of War.

At Albert we saw the ruins of the cathedral where the image of the Virgin had hung up above the altar during two years of shot and shell. We passed many cemoteries of British dead, with gardeners employed by the War Graves Commission, keeping them in order. At Poizieres we saw the fine monument recently crected to the memory of the Tyneside Scottish and the Tyneside Irish. We made a tour of Arras and lunched at the Hotel de I'Univers, along with numerous Britishers, most of whom secned to be engaged in the melancholy duty of visiting graves of lost loved ones. We had proposed visiting Lens and Bethunc and returning to looulogne via St. Omer, but the weather worsened; from rain it changed to snow, so we got "wind-up" and mado for Boulogne by way of St . Pol and Montreuil.

From Arras to St. Pol Route N 39 is mostly pavé, but it is in fine order. and we did a steady to in spite of driving snow. I had rigged up a wiper which enabled me to clear the windscreen at intervals. As previously the hood and curtains protected us perfectly.
Back on English roads, we resumed driving on the left. We enjoyed the improved surface, and we noted the sudden turns and twists and bends which made the roads unsuitable for high speeds and yet beautifully picturesque. We had sunshine from Dover to Charing and thought we had found at home what we had sought in vain for abroad, but it was only for a short time. At Canterhury the rain recommenced, and we returned to find London still wet, but with its glittering electric lights sparkling in the raindrops.
The cost of such a trip can be reduced to quite $n$. low figure. We carried oil sufficient for our journey, and petrol cost us about $6 s$. per hundred miles-that is less than ${ }^{3} d$. per mile for two pcopie with ample


The exit from Arras by the St. Pol Raad. During this portion of the journey the rain changed to snow.
tuggage. Food and lodging cost us about 30 trancs to 40 francs each per day. So long as the exchange contiuues at its present rate it is evident that an excellent holiday can be enjoyed for quite a modest expenditure. I will couclude by quoting, as an example of the effect of the exchange, the cost of purchasing Michelin maps. In England they are three shillings each, in France only eightpence.

## COMPACT NEW AIR-COOLED FLAT TWIN.

## Remarkable 10 h.p. Cyclecar Engine by a Famous Aeroplane

I$N$ the fly ing world the Bristol Aeroplane Co., Ltd., of Filton, Bristol, is one of the oldest pioneer aeroplane constructors. After the war the concern took over the manufacture of the Cosmos air-cooled aero engines, which have since proved their qualities under the severest Goverument tests. It is, therefore, interesting to note that the same concern has produced an aircooled flat $t w i n$ suitable for engining light cars and cyclecars.
This twin possesses a number of norel features. lts compactness is such that it can be fitted in a standard Morgan frame, since its overall width is only 2 ft. $1 \frac{1}{4}$ ins. This compactness has been obtained by fitting the overhead values in the side oi the detach able head instead of in the top, and operating them by means of special mechanism, which will be described later.

The second feature of interest is that the value dris ing gear is such as to eliminate excessive clearances and the development of noise when the engine is hot, this being all the more interesting in view of the fact that an aluminium head is attached direct to the cast-iron birrel. A cooling fan is fitted to the front end of the crankshaft, and lubrication is effected by means of a simple type of plunger pump. The weight of the engiine, withput magneto or carburetter is 96 lb ., and $16 \mathrm{~h} . \mathrm{p}$. is developed at 2,000 r.p.m.

Coming now to detail, the cylinder barrels. the fins of which are united front and back in order to prevent ring, are held to the one-piece crankcase in the usual manner. The bore and stroke measure 85 mm . and 91 mm ., the capacity working out at 1,066 c.c. The cast aluminium heads, the finning of which is disposed at right angles to that of the barrels. are held to the latter ly means of four tolts of sufficient length to withstand the strains of expansion. The longreach plugs are screwed direct into the back of the alumirium head, the valves being inclined in the top side, with their springs and B2S


The cleverly made valve gear in detail. It is claimed that it is particularly quiet in action and free from vibration.

## Construct.or.

operating gear en. tirely enclosed in atn casily ditach. able aluninium citse.

As aluminium expands about there times as much as cast-iron when heated, it hats been nucessity to design it speccial form wi valve opsritiner gear whicll shall he anclopenclent of ubis explitision, illel thus milintain the col' reet cleitritsce lse
 and strikimg gnir. rhas desideritlum has been altailsed
in flne following manner.
'I he calla: haidil. which is monumbed on jlimin h(eilings. is locited immerdiately it hove t he crankshall, takink
 from the binios mounted on ithe frourt end of the shaft. lour cams are used to atchate the values througin the medium of conclosed rockin! shafts and rockers. short fingers being interposed betweell the cams and the rocking arms, the other ends of which carry the necessary means of adjustment and rest direct on the valve stems. The rocking shaft itself is carried on two bronze bearings, extra springs being provided on the ends remote from the cam shaft to keep the shaft back against their bearing faces, and also to keep the tappet tips silently in touch with the valve stems.

The rocker shafis are contained in oil-tight stecl tubes. a rubber joint making good the union with the crankease. The valve seats are cast into the aluminium, the guides themselves being pressed in when the cylinder is warm.

The two-throw crankshaft is of sturdy construction, beirg supported on three bail bearings, the front one of which takes the load of the fan. An external fywheel is used, and when the rear cran!case cover plate is removed, both crankshaft and connecting rods can be withdrawn, the light cast iron pistons, which are furnished with two rings, each being accessible when the barrels and heads are withdrawn. As the H -section connecting rods are designed with their distance pieces on the outside, there is very little "couple" in this cngine.

## 

Substantial roller bearings are used for the big ends, whilst the gudgeon pin is floating. The oil sump contains one gallon of lubricant, a springloaded planger pump, driven from an eccentric on the crankshaft, delivering oil to the camshaft from


Graphs showing the main performance cbaracteristics of the Bristol engine.
which it is splashed to the interior of the engine. An accessilite oil filter is provided, and a special form of sight feed is fitted in a convenient position on the crankease, wherely, when a nlug is removed be hand, the pulsations of the pump can be judged irom the rise and fall of the oil-a feature common to certain aeroplane engines. The oil filler is situated fow down on the front of the crankease, and, when full to the brim, indicates the cerrect level.

The engine can be fitted in the frame either by means of four arms or else by means of tubes passing through holes cast in a fore and aft direction through the sides of the crankeas.

The timing case, which can be easily and quickly detached, is situated in front of the engine, and contains a train of helical spur wheels to drive the camshaft and Lucas Magdyno, the latter being mounted on a platform almost midway along the topsides of the casing. A spocial vernier adjustment is used to enable a fine setting of the ignition, and is also availableswhen the magdyno has to be moved without disturbing the driving mechanism. An unusual refinement is a spring ?onded brake on the camshaft wheel, adopted with a view to eliminate rattle.

## A Well-made Unit.

The carburetter is set alongside the magneto, and feeds the engine througis the medium of two pipes of unequal length located parallel with the cylinders.
The engine has been under test during the past twelve months, and recently completed successful bench tests under A.I.I. supervision. A power curve was first taken, the engine developing $20 \mathrm{~h} . \mathrm{p}$. at $2,300 \mathrm{r} . \mathrm{p} . \mathrm{m}$. It was then run at $15 \mathrm{~h} . \mathrm{p}$. for 50 hours, non-stop, and then for one hour at full throttle, which concluded the test. Throughout the endurance test the throttle was not toushed, and the revolutions did not alter in any way. At the conclusion of the test the engine was stripped down, measured, and found to be in perfect condition. Present or prospective constructors of light cars and cyclecars on the lookout for a power unit of this type can obtain further details from the Bristol Aeroplane Co, Ltd., Filton House, Bristol.

## HARDNESS TESTING APPARATUS.

## New Instrument which Simplifies and Expedites Laboratory Tests.

AFTER a gearwheel, crankshaft, or other similar part has been heat-treated, it is necessary to test the metal for hardurss ; in fact, such a course is of vital importance, even before the metal is machined. There are various methods of doing this, but hitherto it has been a somewhat lengthy process, and, morcover, in mosi cases the mass or inertia of the specimen under test has to be considered in the readings obtained.

Fidward G. Herbert, Ltd., Atlas Works, Chapel Strect, Levenshulme, Manchester, have just introduced a new piece of apparatus for this purpose, known as the Herbert Pendulum hardness tester. Apart from the simplicity of the instrmment, no special skill is required to operate it, whilst a test can bo carried out in a matter of seconds only.

The principle of working depends upon the natural oscillations of a pendulum, which has for a pivotal point a lall of ruby or steel one millimetre in diameter In what is known as the "time test" the pendulum is moved out of balance until the bubble in the evel indicator rests at or near 50 on the scale, when the pendulum is set in motion by a feather. The time taken in making 10 swings is taken on a stop-watch, and as examples of the times registered on different metals it is interesting to note that the pendulum takes 100 seconds to make 10 swings on glass, 50 to 85 seconds on hardened steel, soft steel 20 to 40 seconds, and on lead 3 seconds.

## A Simple Princip!e.

The reason for this difference is easily explained, for the softer the surface on which the ball rests the greater will be the indentation made in that surface hy the weight of the apparatus, which is about 9 lb . As the pendulum swings. the ball will roll out or clon-
gate the indention, the energy thus absorbed in displacing the metal being taken from the potential energy of the pendulum, with the result that the softer the specimen the shorter and quicker the oscillations. As an illustration, it may be mentioned that


The Herbert Pendulum hardness tester in use. The point of balance may be a ball of ruby or steel.
in what is termed the seale test, wherein the degreo of oscillation of the peedulum is read of the scale affixed to the instrument, such a substance as lead will not allow the pendulum to swing, so relatively heavy is the indentation made by the ball.

There is, of course, no limitation to the application of this instrument.

# IMPROVING A 1920 SINGER. 

## Practical Running Hints to Owners of "Gearbox in the Back Axle" Models.

THE following practical notes have been compiled for the benefit of owners of $10 \mathrm{~h} . \mathrm{p}$. Singer light cars nade between 1914 and 1920. The writer has corered 20,000 miles on this type, and the troubles that have ariser and been cured are described below. The Singer is not of the "super-sports" type of light car, but is designed for general utility and scrvice at the hands of the average owner.

## Reducing Engine Noises.

Dealing first with the engine. The three-bearing crankshaft gives excellent balance throughout all engine speeds, so that $5 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. is impossilule on top gear-4.3 to 1 -and up to $30 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. on second- 7.5 to 1 . The engine is rather ncisy, and the following adjustments will probably improve matters in this direction. The tappets ought to be set to 61.000 in . and $4-1,000 \mathrm{in}$. for exhaust and inlet respectively. (They have fibre insets which deaden clatter fairly well.) The magneto drive should be tested for backlash, as should the timing-gear pinions. Flexekas fitted to the valve stems give good resuits, preventing much wear


## THE DISTINCTIVE FEATURE.

Details of the combined gearbox and back axle, an outstanding feature of eariy mode Singers. The gears are of the constant mesh type.
and stopping air leake. Renewal of valve springs is desirable every 5.000 miles Variable ignition is not worth the trouble of fitting.

## TheMost Effective Carburetter Setting.

The Claudel-Hobson carburetter, with an 85 jet, gives $42 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. and $40 \mathrm{~m} . \mathrm{p} . \mathrm{g}$. , but, for starting from cold, the air intake should be closed. Vacuum "A" is suitable for the engine, and the sump should be cleaned every 1,500 miles and all connections tightencd. Failure of the oil indicator on the dash board can usually be traced to air leaks or a choked filter. It is essential, therefore, that the oil-lead pipe joints should be periodicallyrexamined and the filter cleaned.
The back axle is reputed to give trouble, but by D 30


FAMILIAR LINES.

The Singer has always been one of the most popular of economical cars, and was, until recently, distinc tive by reason of the location of the gearbcx on the
back axle.
periodic care this component can be made as reliatle as any other lype, over which is has several advantages. It is of the constant-mesh order, and when adjusted properly it shouid be dead quict on all gears and at all speeds. It will be found that most noise can be traced to loose hevel pinion bearings, which allow the pinion to mesh " anyhow " with the crown wheel. These bearings are adjustable by a locking nut, on the principle of a cycle axle. The nut should be screwed up until no shake can be felt in the shaft, and then drilled and pinned to prevent slacking off. The drive is adjustable in mesh.

## An Important Point

Proper adjustment of the gearoperating rods is most important. It will be found that after much use they sag at the telescopic spring joint, with the result that the dogs for engaging the gears do not mesh deeply enough-often with disastrous results. These rods should be set to give an equal amount of movement each way to the bell crank lever: of the striking arms-i.e., the clogs for first speed and reverse must engage an equal amount. Double-clutching will proloug the life of the dogs.
The tie-rod should be kept light, also the nuts securing the axle casing to the gearbox, to prevent broken axle shafts. A mixture of Ambroleam and gear oil should be put in through the inspection cover: it is not safe to trust to the filler cap to show the correct level of lubricant, as the latter is flung un by centrifugal force to the back of the box. whilst the front may be almost dry

The back universal joint wears rather rapidly, and to prevent the hollow cardan shaft magnifying any noise, it can be wrapped round with an old cycle inner tube.

The clutch spigot bearing and front universal should be regularly oiled, as per maker's booklet.

The road springs if often greased will improve tho rather poor springing due to the short wheelbase

Brakes can be cured of squeaking by swilling the drums with paraffin, a practice which does not imnair the efficiency of the system. Vinally, follow the makers' instructions as to when and where the chassis shoald be lubricated.
X. B. 577 U.


Kop Hill-climb
Spontine mitorists should make a bunt "i being present at the now Immas Kuly !ill on Saturday week, 11. C. C. on belzalf of the Suuth Mid. fand Centre of the Auto-Cycle Union, "i:l hold a hull-:limb. 'The proceedings will stant at 2 p.m. and a number of is near l'rinces Risboso', and is, there fore, easity accessible from Iondon and thie provinces.

## Wessex Centre A.-C.U. Speed

 rifals'The Wessex Centre A.-C.U. included (inly three classes for cyclecars in their speed trials last Saturday. The istance menstred half a mile, with o llying start of 50 yds., the course being rim over a concrete strip some 17 ft . wide nt one side of the remarkable new road now being built between Avonmouth and Shirehampton, near Bristol.

An enormous crowd lined the norrow strip and watched the racing with intercst for six hours Results :-

Touring light ears up to 1,100 c.c. : A. R. Passey (G.N.), $57 \%$ secs: ; P. Bonnett (G.N.), 1 min. $33:$ secs. Sports models up to 1,100 c.c. : A. J. Sgonina (G.N.). 35 secs. ; Iord Cheddar (G.N.), 57 s secs. Any model un to 1,100 c.c.: A. J. Syonina (G.N.), 33 secs.

## Angel Bank.

An excellent and representative entry has been received for the Sutton Coldfield and North Birmingham A.C.'s unnual hill-climb, which takes place 10-morrow. Saturday, at Angel Bank, near Cleobury Mortimer. Angel Bank lies on the road irom Cleobury Mortimer to Ludlow, on the slopes of the Clee 1Hill. Straight for the distatice of half a mile and with ample pulling-up 100 m , it provides a good situation for the purpose, especially in view of the dilliculty of obtnining a suitable hill in the Midlands. The event will be run on the sow generally accepted plan of allowing ench competitor not more than two ascents of the hill, and as there are only 15 classes, comprising motorcycle, cyclecar, and car ontries, the minimum of time should be occupied in running them off. A feature of the classification is that threo-wheelers will competo ngainst both siclecars on time end arainst the low-powered four-wheelers on formula.

## B.S.A. and Wycliffe Cups.

At a meeting of the Redditch and District Motor Cycle Club (affiliated 10 the Auto-Cycle Union) it was decided that the first reliability trial epen to the Centre should take place on April 21st, the premier awards being the B.S.A. and Wyclifie Cups. We are informed by the hen. Press secretary that cyclecars are weicome, and usually figure in the clab's events.

## FORTHCOMING EVENTS

FROM APRIL 21st to APRIL 29th.
April 21st.-Disabled Drivera' Motor Club Reliability A.C.U. Eastern Centro Closed Redditch and Distriet M.C.C Reswich. abitty Trial. Sutton Coldgeld and N. Nirmingham AC. Closed Hill-climb. Angel Bauk, Cleobury Nortimer, Salop. climb. Mect Northaw Church, near Pottera Bar.
Aprif 22 nd.-Surbiton Motor Club's Social
Mun. York and District Motor Cluh'a Run. York and District Motor Cluh'a Run to Sution Bank.
April $26 t h$. - Wurcester and District and
Worcestershiro Motor Clubia Social
Hun. kun.
April 27 th--Faling and District M.C.C. London-Kolybead. A.C.U. Eastern
April 28th.-York and District Motor Club's Sutton Bank Mull-climb. Middiesex County Automobile. Club's Opening Run to Hrooklands. Junior Car Club'a Spring Meeting at HrookCentre) IXill-clizab. Exses County and Southend-an-Sea Automobice Club's Relay Fill-climb, South Midland Centro A.-C.U. Hilt-olimb at Kop.
April 29th.-Italian Cyclecar Grand Prix, Monza, Milan. Sarbiton Moyor Clubi "Find-your-was " Trial. York and ney Freak Mill-climb.

## The Scottish Six Days'

The Edinburgh Club's Scottish " Six Drys'" trial, from May 8 th to 12 th , promises to be one of the most interesting ovents of the jear. Although the route is not yet announced. we can rely on Campbell McGregor and his lieutenants to discover roads that will thoroughly test the capabilities of the competitors and their mounts, and already in motoring circles this trial is being dischessed with liveliest anticipaton. The entrics have not yet closed, but we understand that a very representative selection of small cars is already down to face the starter. The "Six Dnys" is an ovent worthy of the full support of minufarturers. and is usually regarded as a classic event

## In the Lake District.

The Cumberland and Lake District motoring season has commenced. although the weather during the past weeks has not been exactly ideal so far as the Lake District is concerned. Generally speaking, the roads are in fairly good cond:tion, although nariov. at places. and, of course, very hilly. Ihe recently formed Whitehaven and District (Cumberland) Notor Cycle and Light Car Club, had a trial run on Easter Monday, when a hill-climbing competition was held under the auspices of the Auto-Cycle Union.

## J.C.C. Spring Meeting

Eleven events are down for decision at the Junior Car Club's Spring Hace Meeting, which takes place at Brooklands on April 28th, when racing begins at 1 p.m. This year there will be races for individual makes of cars, one definite event being a Rover scratch race for standard as catalogaed $8 \mathrm{~h} . \mathrm{p}$. Rovers in full touring trim. The lad'es' handicap, the disabled drivers' handicap. and the ten-lap handicap will also figure as usual. Entries closed on Wednesday last, April 18th, at ordinary fees, and were accepted at duuble fees up to first post this morning, Friday, April 20thwather quick work, us the entry forms were not received by the majority of the nembers of the Club until April 13th. As the entire entry is made up of small cars of 1,500 c.c. and under, the event is of more than ordinary interest to light carists.

The London-Holyhead
The Berkeley Arms Holel. Crunford Bridge, Middlesex, will be the startingpoint of the Ealing and District Motur Cycle Club's fourth annual 24 -hour Lon-don-Holyhead trial, the first man leaving at 12 o'clock midnight on April 271 l . The following is the route :-Maidenhead, Reading, Wantage. Faringdun. Cirencester, Birdlip, Gloucester, Here ford, Kington, Kadnor, Rlayader, Devil's Bridge, Llangurig, Llanidtoes, Stay-a-Little. Machynlleth, Cemmaes, Dinas Mawddwy, Bwleh-y-Groes, Bala, Ffestiniog, Bettws-y.Coed, Capel Curis, Bangor, Menai Bridge, Mono, Molyhead. The principal award is the Maudes' challenge shield, but, in addition, there will be gold, silver, and bronze medals. Cups will be awarded to the best trade team performanee, and for the best. cluh or privately nominated team performances.

## WEEK-END EVENTS IN DETAIL.- <br> Disabled Drivers Battle Again= at Balkum's Hill.-C-



VOTE. -Chub compeflions and events are creat= ,ur rat fors are especially referred to the eneci "sually figures in each issue of lins journalare

## ABLE-BODIED TEAM WINS THE

 DAYIX IMEN disabled drivers pit their strength and skill against an ablo-bodied team they must be crerlited with no small amount of optinism afd a vast amount of pluck, but it is not altogether surprising if they fatl to win the dily.

List Saturday's hill-climb at Saffron Walden, organized by the Disabled Urivers' Motor Club, proved extremely interesting, and the disabled team suffered what must really be rerarded as a very fine defeat in the face of dificult odds.
The results in brief are as follow :Time: Able-bodied team. 61 points; formula, 57 points. D.D. M1.C. : Time, 46 points; formula, 50 points.

In parenthesis, it may also be men Tioned that the D.D.M.C. were handicapped, first, by the non-appearance of N. Ficlden, a particularly capable G.N. driver ; and, secondly, by the fact that, owing to some cause which we were unable to ascertain before leaving, Gordon England's racing A.B.C., which put up a very fine performance, was dis quatified.

## Mayor Acts as Starter.

The venue was Deemster Lane, about a mile and a half from Saffron Wialden. It is a fairly easy climb, averagine perhaps 1 in 12. and finishing up with a short stretch 1 in 9 . In length it is less than half a mile. whilst, apart from a bend near the start, it is practically straight. High -speed work, therefore, was the order of the day, and even those cars heavily loadod, with an eve on formula, made quito apeedy ascents.
Mr. D. Miller, J.P., Mayor of Saffron Walden. acted as the starier, and elec tric liming was adopted. The organization was somewhat disappointing, and the cars did not follow one another so B32
st: Odds at Saffron Walden.-Kent A.-C.'s Hill-climb Creates Much Local Interest -ivil Service Motoring Association Makes Big Success of Inaugural Rally


WたEK-END EVENTS (contd.).
1.368 c.c. power unit when thus loaded; 1R. S. Prior and G A. Pope (standard two-seater G.W.K s) showed what a difference a lighter load can make by ascending at least $5 \mathrm{~m} . \mathrm{p} . \mathrm{h}$ faster than was anticipaled by our observer.
A. 11. Doherty (Eric-Campbell) was good, whilst C. Finch (G.N. Vitesse the same car which made the fastest time of the day at Simms Hill) ran I3. 11. Austin (Bugatti) very close for the sesoud hastest time of the day


Results.
Results. not exceeding 1.100 c . (amateur):-1, S it. Con stable (Morgan), $70 \frac{1}{3}$ secs. ; 2, G. . 11 ©leaver (K.R.C.), $84{ }^{3}$ secs Jurt (G.N.), 92t secs

Ditto (genera!) :-1, S. J. Constible (Morgan), $68 \frac{3}{s}$ secs. ; $2, \mathrm{~J}$.. . Deveril (Gwynne), 74! secs. 3, G. N. Вぃ (G.N.), 793 secs.

Fouring lwo-zeaters, not exceeding 1,600 c.c. :-1, C. Stanbindice (sibatross), $71{ }^{3}$ secs. ; 2, R. M. Cleaver (K.R.C.) $60 \frac{3}{3}$ secs. ; C. Gregory (Mathis), 84 ? secs Four-seaters, not exceedine 1,600 c.c. -1, C. Stanbridge (G. W. K.). 1 mm $56 \frac{1}{5}$ secs. ; 2; J. Tisley (Albert), 2 mins 1 sec .
Standard sports cars :-1, P. J. Cramp (A.-C.), 64년 secs.

723 secs.
Racing cars:-1, L. Humphres ( $1 ;$. N.), $57!$ secs. ; 2 , ir. J. Cramp (i..C.), COt, secs.

## BIG RALLY AT NEWLANDS CORNER

THEinaugural run of the Civil sirrvice Motoring Association, which was held on Sunday last, was one of the most ruccessful of its kind which we have attended, and if the number of members who fook part is ant indica thon, the C.S.M.A. should become a very strong body.
There wero three contingents in all, the venue, Nowlands Curner, Surrey, being made from Kew Gimen, the Alhert i[all, and Clapham Common respectively.

Nowlands Corner has perhaps never seen more pienic parties, for at 12.45 over 100 members and friends sought the mure protected spots, the air not being wariicularly warm.

During lunch a party sel off to nrrow the course to Winterfold Hill, 10 which spot at 2.30 a move was made. W'inter fold Mill, whilst not being a freak gradicut, forms a very useful lest for a standard car, and nearly 50 per cent. of the members present tried out their machines. The only light cars to make the climb were a Stoneleigh and an A.B.C., the latter making a speedy ascent.

After everyone had had an opportunity of making the climb if he felt 60 disposed, a move was made to the Bull's Head Hotel, Ewhurst, where tea was provided.

After tea members and friends were entertained by the musical section of the Association, an impromplu concert of about two hours' duration being given.

The rally was in every way a success, the long column of vehicles which eventually made its way back to town bearing testimony to this; we should, however, like to make a suggestion to the organizing secretary. When anything in the nature of a hill-climb, timed ur otherwise, is contemplated, it is essential that some means of signalling should be introduced so that confusion may not arise.
The C.S.AI.A. represents the biggest purely private motoring body, and, unlike the average club. its social events are likely a! ways to be well attended. In view of the fact that experts are in the minority, hill-climbs and speed trials-if such be held-may not prove so interesting from the spectators' point of viow, but standard machine trials appeal strongly to the buying public.

# "Deserve all the praise they get" The Amazing 'A-C’ 12 h.p. Car 

"Worth more than any other."

Delancare Mansions,

Maida V'ale, London. W. 9.


#### Abstract

" I read with pleasure of the splendid performance of your 'ACC' at Brooklands by climbing the test hill so many times. I really think that 'A-C' Cars deserve all the praise they get. Last June I left London zeith my ' A-C' for a tour through France and Italy with my zife and daughter and a good supply of luggage, and I covered well over 3,000 miles. I had such confidence in the ' $A-C$ ' that 1 only carried as spares one valuc complete with one attra cover, and hadt occasion to use neither. During the zchole journey l had no trouble whatecer, the car was the admiration of all zeho sanc it. The Mount Conis zeas climbed in fine style and the Maritime Alps, with their many hairpins and steep gradients, were taken splendidly. On the return journcy 1 had the proverbial three punctures, but apart from that I might have carried no tools. On a thorough examination of the car after this rather strenuous journey 1 found the 'A-C' perfect in every respect and the tyres none the acorse for it. I enclose a fac snaps and an itinerary of my journey, and if you zcish to knoze more I shall be pleased to give you fuller details.


" Wishing you and your cars every success."
lours faithfully.
(Sgd.) A. M.tRI.INI.

## 'A-C' Prices from £325

# 'AC' CARS, lut. <br> (S. F. EDGE, Governing 

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 LONDON , , , W.I.



## BACK TO THE REAL CYCLECAR.

## Pioneers Getting to Work Again with a View to Producing New and Improved Types.

The wrifer of the accompanying article has at heart the intercsfs of a section of the moforing comminity which, ten years ago. represented the backbone of the cyclecar industry, but mowadays, undoubtedty, is suffering from neglect There is still plenty of room on the market for the really simple machine, which may be said to represcnf a step up from the motorcycle.-Iid.

$T$HELRLE is at present a large section of the economical moturiag public which deplores the present-tity endency on the part of manufacturers to probluce small cars which, so far as possible, are repliciss of their latger road compranions.


The 1921 Popular Model G.N This excellent little vehicle is no longer manufactured, a gearbox having taken the place of the final chain drive.

The introduction of such improved vehicles must le accepted, it is true, as being all for the good; they are designed on sound principles, are made to last, whilst much scientific thought has been exercised in their construction, so that, from an engincering point of view, they ofler no grounds for adverse criticism.
The fact remains, however, that designers are tending more and more to explore new fields rather than to develop those in which their first ideas were worked out-ideas which they might, therefore, have pursued and perfected with great adrantage to a big section of the buying pablic.

## What is Wanted.

One might investigate at this point exactly what are the requirements of the class to which reference has heen made. They are as follow:-

In the first place, they wish to motnr at the lowest possible cost, and, commensurate with this condition. with the greatest possible comfort The motorcycle and sidecar, therefore. is ruled out, whilst the averago light car is very likely too expensive.

The vehicle which most nearly approaches their ideal is the threewheeler, and the continued popularity of such simple types as those which still retain


The layout of a simple cyclecar on the lines of the 1912 G.N. (a) 90-degree air-cooled engine. (b)
BACK TO
THE OLD. Firat countershaft, carrying aimple-type clutch. (c) Low-gear chain. (d) Top-gear chain. (e) Countershaft with 8 -in belt pulleys. (f) Final drive by belts over large rear pulleys.
chain drive and two forward speeds only, proves the contention which is made. The three-wheeler, how ever, does not entirely fill the bill, and a four-wheeler built on much the same lines is urgently required.

The writer takes as a worthy example of the particular type under discussion the 1912 G.N., with its twin-cylinder, air-cooled engine, chain drive to : simple-type Ferodo-faced clutch mounted on a countershait, thence by twin chains to a second countershaft embodying dog clutches, and a final drive by two large-secticn belts. The layout of this machine may lie compared favourably, from the economical motorist's point of view, with any at present on the market: its particular attraction lies in the fact that nothing is hidden, that evervthing is accessible, and that expensive repairs are never necessary.

## Will Belts Be Tolerated ?

It is the sort of job capable of being looked aiter and kept in proper working order by any man with only motor-cycling knowledge. and such a machine could be taken over with a mind entirely easy on the score of the possible amounts which would have to be


Withengine at the rear. The A.V., a notable example of simplicity in design, coupled with low first cost and upkeep.
spent on repairs, etc., in the future. En passant, it is worthy of note that in our nwn experience a heltdriven $G$ N. of the earlier type covered no fewer than 18,000 miles with few renewals.

Criticism will, of course, be levelled at the final step in the transmission, but it must not be forgotten that two belts are being used, and that, there fore, the troubles associated with this form of drive are practically nonexistent. The difierential question is solved in a moment, whilst the construction of the rear axle is as simple as that of the front, because each wheel floats separately on its own hub.
The writer is aware that there are at present on the market simple-type ma chines which conform, generally speaking, with the suggested condition of simplicity. There are, for instance, the 'Tamplin. Metro-Tyler, A.V., and Gibhons. to mention only four: but there should be a far wider selection, and the writer is convinced that the specification which he has outlined is the one upon which designers ought to concentrate in order to capture the particular section of

## H.ACK TO TIIF REAL CICLECAR (contd.).

the public which at present is in a mood to favour this machine, but will very soon make up its mind to go in for something more expensive.

It may here be taken as a very significant fact that one of the pioneers of the movement, namely, Mr.


The New Carden, a feature of which is the combined two-stroke engine and gearbox.
H. R Godfrey, is at present engaged on the design of an aircooled, chain-driven vehicle, and this undoubtedly is an extremely bold step. His lead unquestionably witi ve followed by others, and we helieve that this season may mark the beginning of a new era in the simple cyciecar movement.

## Manufacturers' Views.

It will have been noticed that other designers of four-wheelers, such as Messrs. Tamplin, Adamson, Avey, and Carden, also refuse to deviate from their present path and that they continue to concentrate on the most simple type of vehicle.


## Unconventional, but with obvidus possibilities. The Adamson twin car which is being improved by its designer.

Here are the condensed and recently expressed views of these pioneers:-
Mr: H. R. Godfrey: The machine upon which I am concentrating will appeal dircctly to the man who wants something better than a motorcycle and prefers four wheels to three; it will have a very high power-weight ratio and will fill what is, in my upinion, a very long-felt want.
Mr. E. $\Lambda$. Tamplin: I certainly feel that there will always be a future for the simple cyclecar, provided that the weight is rigorously kept down and that ample power is provided to avoid engine fatigue. Such essentials, together with good braking and a suitable reverse gear, enable the machine to compare favourably with other types.

Mr. F. Avey: I am still a believer in the light. cheap cyclecar, and I also believe that there will soon be renewed interest in this type, particularly if four-wheeled vehicles under 1,100 c.c. capacity and 772 lb . weight be taxed the same as threc-wheelers. With regard to my own plans, I am busy with the 138
preliminary drawings of a new cyclecar embodying a 1,000 c.c. air-cooled engine.
Mr. J. V. Carden: I quite agree that there is likely to be a demand for the simple cyelecar. It appears to me to be purely a matter of price, and it in cyclecar of unconventional design can he produced at a substantially lower price than the light car, the public will have it.
dr. R. Barton Adamson: I am still a firn belnever in the real simple type of cyclecar with final lictt. drive. I feel convineed that there is enormous business to be done with the simple machine, and that the future true cyclecar will have a final belt drive.

The writer hastens to correct the impression which may have formed in the reader's mind that he is criticising modern small economy cars. As has already been stated, these fill their own particular niche very worthily; but, excellent as they are, it must be admitted that they are not built on the lines


Employing final chain drive and an air-cooled engine, the Tamplin adequately meels the demand for a simple, economical, and reliable mount.
of the cyclecar of 1912, which, after all, started the public thinking, and proved to be the foundation of the whole economical molowing movemert.

## The Brighter Outlook.

There is room for this type of vehicle in just the same way as there is room for such excellent and simple productions as thee-wheeled cyclecars, and it is felt that the range of economical motoring vehicles should provide a type to suit the purse and tastes oi every purchaser
Trade is improving, which means not only that production is getting cheaper, but that there is a bigger demand. Hence, in a few years' time it is to b : hoped that, thanks to this increased demand, every type of small car will come in for its fair share of


In the Gibbons simplicity is the keynote. Actual experience with this machine reveals its surprising efficiency.
attention. Pending developments in connection with the simple economical vehicle will be watched closely and criticised fearlessly by this journal-a policy in which we know we have the whole-hearted supnort of our readers.


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IIIHFN a I'ressman has to work to schedule times siderind an elent which tikes place a conwittingly make the jumeney on London, he does not he knows to be rediable, comfortable, and fairly fast, wheretom our choies of a Straker-Syuire light car, as a means of transport to Wevonshire at Easter, is in itself a criterion of cirr opinion of its design, and in the formalation of our choice, no doubt, the reputation of its mamulacturers played a certain part.
We have proviously given a general resume of the performance of the Straker Squire on the open road, and as we were interested in tho car we were glad to pat it though its paces on an extended journer. Equipped with a fourcelinder overhead-valve engine. wit-constructed four-speed gearbox, and suspended on semi-ellintic springs all rund, there is nothing outre in the design of the Straker-Squire
The conchwork appeared to us to he substantial and comfortable, and the detachable side screens, which form a portion of the all-weather equipment, proved themsclues to be imvaluable as a means of guarding against those chilly mist-laden draughts which one only sems to experience betreen three and four o'clock in the morning, at which time, in our case, we were wending our tortuous way on the road between Devizes and Bridgwater, having left Slough at midnight.
First and foremost, we must record a certain docility in the way in which the engine behaves that

is rery pleasing. A staunch puller on top gear, it can climb all ordinary gridients such as those found in the Suwernake Forest without recourse to the gear lever, but at the same time it revs. heal thily, and
A noticeable feature. The overhead rocker mechanism. achieves quite $\approx$ uscful turn of speed when ascending really steep gradients on second gear. Third speed permits of $10 \mathrm{~m} . \mathrm{p}$.h., and the maximum on top we found was $5.4 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. For a heavily laden $1,500 \mathrm{c} . \mathrm{c}$ e engine this is quite good, but what makes it all the more praiseworthy is the fact that the contemporary petrol consumption is woll over $30 \mathrm{~m} . \mathrm{p} . \mathrm{g}$.,
due, no doult, to the efficient design of the value gear, the combustion head, and the way in which the Solex carburetter and new type M. L. magneto do their work.

U' n fortunately, when we took the car over it had come straight out of the hody shop, and the spring ing had not set tled down; it can best be described as lumpy, hut it gave promise of comfort. and, in fact. improved considerably during the 10 miles we drove the car; it was also appreciably improved by the addition of extra load in the dickey seat. This fitting, it may he mentioned, is of a trpe more comfortable and roomy than that
 rovally found on light cars, and. except for the absence oi a hood and screen, provided really excellent accommodation for occasional passengers.

## Few Criticisms.

All light cars nowadays will climb I'orlock, and the Straker did so without any hesitation; in fact, we even had the temerity to climb so fir as the middle of the first bend on second gear. depending upon the gearbox to permit of an easy change right on the 1-in-o gradient, and our anticipations proved to be correct. A difficult gear change in such circumstances is apt to be irksome.
There is no car that cannot be criticised, and if we were called upon to ask for improvements in the Straker-Squire, we would suggest attention the paid to the steering, which was none too light, probably

## THE STRAKER-SQUIRE"TEN" (contd.).

due, no doubt, to the fact that the car was new, while the torque absorption ir the back axle might be improved. If hoth brakes are applied really hard, so that the wheels are locked when the car is travelling at about 20 mph . on a vers bad surface, the back axle is inclined to judder a little, and there is by no means such effective brakiug in a backward direc tion as s obtained when the car is running forward, this probably being due to the turning effect of tho axle on the springs.

## 400 Miles Without Trouble.

It is comparatively a small point, and would not be noticed unless the car were driven excentionally hard, with a view to finding out faults. $\Lambda s$ so the rest, the coach work appears to be very sturdily buili. and we covered the 400 miles without a trace of trouble, unless one can put down as a mechanical failing the fact that the fastenings for the all-weather equipment were not quite sufficiently secure.
The doublepane windscreen nllows good visi-
bility in the worst wearher, the fitting of the from portion of the hood is watertight so that the equiva lent of a coupe is obtained, the engine is quiet, fres


From this view of the engine, which has an exceptionally clean appearance, the accessibility of the carburetter will be noted.
from vibration, and its response to the adecelerator is very pleasing.

At ftu this light car is a notable new-comer; it is one that is already heing nppreciated hy owner drivers in all parts of the country, and, for a towiner car, we should put it down as ia lively, substantia!, and roadworthy production.

In appearance the car is well balanced and orthodox, the polished alnminium bonnet setting off the radiator to advantage. Standard equipment includes properly an incorporated Ex-a-gun systom of chassis lubrication, which simplifies upkep, and, as a whole, nothing that is necessary is lacking. Thn makers' address is Straker-Squire, Ltd., Angel Road, Tottenham, London.

## COUNTRY BUSES ADOPT ANTI-DAZZLE LENS.

## L:G.O.C. Takes Steps to Make Roads Safer.

WE have witnessed numerous demonstrations of anti dazzle devices during the past twelve months, but the most convincing was undoubtedly that recently given at the Loudon Gencral Omnibus Co.'s training school at Milman Road, Chelsea. The L.G.O.C. have been searching for an effective device which would meet with the approval of Scotland Yard, for whilst the painted lens lamp was dazzleproof, the lighting value was reduced to such an extent as to rule it out for really safe driving on the country routes.

The device now approved is known as the National and consists merely of a lens to take the place of the ordinary lamp glass. This lens is indented with vertical flutes on the outside. whilst on the inside the glass is stepped in a peculiar manner, as may be seen in the accompanying illustration

Viewed on the screes in the private cinema attached to the training school, it could be seen that the National lens rendered a lamp dazzle-proof, but although the pictures shown were interesting, the practical demonstration which followed was much more convincing.

## Convincing Demonstration.

It was proved that whilst the driving light was reduced by ahout 12 per cent., there was no indication of dazzle, even wel! helow normal cye level. In the case of a Ford car, when the engine was revved right out, when of course, the lamps became almost incandescent, it was still possible to see the edges of the lamp when looking right into the beam.

On bending down, it could be seen that a powerful and practically uninterrupted beam of light was beingr thrown from the upper portion of the reflector, and, therefore, a good driving light well below the eye level is provided. A similar demonstration was given with the National lens fitted to a bus iamp, in which

case the current supply was steady. Dazzie was again absent whilst a powerful beam was thrown on
to a wall some 20 or 30 yards ahead.

The National lens is certainly effective, and in view of the reasonable price-17s. Bd. per pair in any view obtained from any of the large accessory dealers.


The

THIS beautiful smalltwo-seater is on an entirely different plane from the numerous cheap cars of cyclecartype - it is a really high-grade car, built throughout to the same high standards as the larger Wolseley models, world-famous for their robustness and road efficiency. The two-cylinder engine possesses marked advantages over the miniature four-cylinder type. It gives a better performance on hills, the water passages arelarger and moreefficient, and the engine is consequently much more durable.

## Price £199

The Equipment includes:
Waterproof canvas hood: Adjustable windscreen: Spare wheel with tyre: Electric horn : Electric lighting equipment,including pair of combined head and side lamps and tail lamp: number plates: tool kit.

Dunlop Tyres filled as stunderd.

The coachwork is designed on the most modern lines, and the seating accommodation is roomy and comfortable. The car is easy and simple to control and the springing is delightful.

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## A Sturdy French Light Car with a

THERE is no doubt that the small water-cooled four is the most popular type of small car on the Contincot, and the French concerns certatinly know how to build this type of engine. The \& h.p. (harmon, which is typically French, is fitted with it four-cylund water-cooled engine of 1,057 c.c. The valses aite of the side-by-side type, and the cooling is on the thermo-siphon principle, a fan being used in conjunction with a radiator of generous area. The thre-speed and reverse gearbox is centrally controlled through a rertical-type gate, whilst the hand brake, most conveniently positioned, is on the righthand side. The hody is of the three-seater cloverleaf type, atcess to the rear compartment being gained through a cut-awny portion in the back of the front seats.
Although designed to take one passenger, it is possible to squeeze in two adults with a fair amount of comfort, although, of course, the chassis is not

Commendable Road Performance.
about it, which suggests solidity and the desirable quality of power production at moderate engine specds.

## First Acquaintance.

On first taking over the driving wheel, a little prac tice is necessary to accustom oneself to the disposition of the control pedals, which, incidentally, are a trifle on the small side. We found that it was just a little difficult to operate the clutch pedal without touching the accelerator pedal, nut this, of course, is only a question of use, as quite early on this feature ceased to cause further inconvenience

In spite of the fact that the Charron does not boast of the capabilities of a sports model nor make any


The crankcase breather and the oil level indicator are ahown in the sketch on the left. The petrol tank filler cap is instantly removed or replaced by pushing down and giving a quarter of a turn (centre). The centrally pasitioned gear lever (right) works in a vertical gate. The minimum amount of room is thus required to change gear.
designed to carry four passengers ns a regular thing. The characteristic of most small French fours is their ability to turn over at a high rate of revolution. and for this reason they are frequently termed "buzz boxes." Although the Charron unit is capable of high revs., there is quite a distinctive feeling
claim to a high maximum speed. it can certainly put up a very creditable averuge without showing signs of fussiness, a characteristic of many similar types of car. [n the absence of a speedometer it is only possible to estimate the speed tlat out on the level. and we should say that this was slightly in excess of

## YHE \& IIP. C'HARRON ON TLST' (contd.).

40 miles per hour; the steering is so positive and directional and the car so well balnnced that it holds the road quite soindly. For the first 20 miles or so gear changing called for a certain amount of finesse, owing to the fact that the clutch pedal was inclined to hang up, and that rather a sweeping movement with the gear lever was necessary to pass through the range of gears. This, again, is only a matter of practice, and one soon forgets that one is not changing wath the ordinary type of gate.

The suspension, which is carried out by rather long semi-elliptic springs, is most eflicient, but is


The positively driven fan and the combined inlet and exhaust manifolds will be noted. The engine, as is the chassis throughout, is built for hard wear.
certainly at its best when a full complement of passengers is carried, although the difference under varying loads is not so apparent as might be expected. Despitc the absence of a controllable magneto the Charron performs excecdingly well on top gear, as no straightforward main-road hill called for a change down to second.

The climb up to Newlands Corner, a rendezvous well known to motorists, from the Shere side was just a little too stiff for top gear, but, even so, second was only engaged for a matier of a hundred yards or so. This must be considered very good going for a 1,000 c.c. pnginc in a car weighing $12{ }^{3}$ cwt. with an additional load of three passengers. Pebble Coombe Hill, near Box Hill, Surrey, is a good example of a single fignre geadient, being 1 in $5 \frac{1}{2}$ at the steepest portion. The Charron made quite comfortable work of this on first gear, making twothirds of the climb on second. Box Hill was then descended, and afterwards ascended at an average speed of about 15 miles per hour on second gear.

The braking system is very efficient, the braking strains being absorised in such a manner that the car pulls up cvenly and progressively from 40 miles per hour in direct relation to the pressure on the pedal or the pull on the lever.

## An Efficient Starter.

When the car was ôrst taken over it was not appreciated that it was fitted with an electric starter, and the engine was therefore cranked over by hand. After stopping and switching off we were somewhat startled on getting out of the driving seat to find that the engine was running. Quite unconsciously the starter motor switch, which is located in the floor and covered with a mat. had been depressed, and it speaks volumes for the starter that we were, for a moment, at a loss to know how the engine had started.
No better test of the efficiency of an e'ectric starter B46
could be arranged than to leave the car out in ${ }^{a}$ cold east wind for four hours and then, withe out flooding the carburetter or even touching the accelerator, to get the engine going by the merest touch on the starter pedal. This happened during our test, the engine starting instantly ; in fact. one had to be at all times very quick in releasing the switch.

The weather in the South over the weckend was particularly stormy-rainstorms being havy. We therefore had occasion to unearth the side curtans, but only to discover that they would not fit quite so nicely as might be desired. The curtain on the driver's side, for instance, when in position, effectively screened the bulb of the horn, and therefore the forward turnbutton had to be released. The windscreen and the hood are commendably effective, the former being of the double panel type of sturdy build, and the latter a distinctly one-man fitment.

## No Loss of Cooling Water

The engine was found to be jarticularly docile and flexible, traffic work being quite a pleasurable undertaking. Although umwards of 200 miles were covered during the week-end, the level of the oil, as shown on the indicator, had dropped but a quarter of ant inch, whilst the water in the radintor appeared to Le at the same level as when the car was taken over, a fact which speaks well for the efficiency of the cooling system. Lncidentally, it may be mentioned that the fan is positively driven from the tuming case, the water leads are of large diameter, and that the top of the radiator is carried beneath the honnet, and thus a large quantity of water is carricd. A very commendable feature of the Charron is the large-section fyres with which it is shod, and these, in conjunction with the generous Jength of springs, combine to render the car a particularly comfortathe one in which to ride.


The arrangement of the seating, in which four
passengers can, if necessary, be accommodated.
The coschwork ia very well finished.
Summing up this adinirable French production, which hears evidence of sturdiness of construction throughout both body and chassis, the only comments which we have to offer are in respect to the size and disposition of the control pedals and the all-werther side curtains; the former should be a little larger at the husiness ends and spaced farther apart, whilst the latter should be capable of being erected in the matter of a few minutes, as, of course, it is necessary to get out of the car properly to fit them in position.
The price of this car, which was loancd to us by the London Motor Garage Co., Ltd., 33-37, Wardour Street, London, W. 1, is £275, at which figure it represents excellent value, being a thoroughly wellbuilt vehicle, and one which should give useful service over a long period of hard usage.


## The ROVER commands the open road Whatever the Weather

## APRIL SHOWERS

The $8 \mathrm{~h} . \mathrm{p}$. ROVER is transformed into a closed car in a few moments when April showers come on, for all-weather side curtains are part of the standard equipment of every model. No need, therefore, to fear the changeable weather-you can enjoy the sun in an open car, and shelter snugly when the clouds gather.

## ค

COMFORTABLE TRAVEL
Rough roads don't trouble you in a ROVER 8 . Potholes are smoothed out by the cfficient leaf springing, while the upholstery of the body is equal to that of cars of twice the price. The horizontal twin engine, too, is perfectly balanced, and does not vibrate at any speed.

## ค

## NO "EXTRAS" TO BUY

When you pay $\ell$ iso for a Two-seater ROVER 8 you obtain a fully equipped car. Dynamo electric lighting, spare wheel and tyre, screen, hood, and all-weather curtains, and horn, are all included in the standard equipment. It is undoubtedly the most economical car to buy and run.

This is the range of ROVER Eights:-Two-seater, $£$ ISo; Two-seater De Luxe, 2 200; Four-seater, $\not \subset 190 ;$ Four-seater De Luxe, $\mathcal{L} 210 ;$ Coupe with self-starter, $\ell^{2}+0 ;$ Self-starter on other models, $\not \ell^{1} 5$ extra; Dicky Seat on Two-seater, $\mathcal{L} 2$ ios. extra.
So far as can be foreseen at present, there is not likely to be any further reduction in the prices of Rover Cars during the 1923 season.

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> He welcome at all fimes lefters sent us by readers for prablicafion int these columns, and while fakink nп responsibilify for the opinions expressed therein, pive preference to those letfers which deal with smbjects of gencral interest. No anomymons communicafions will be accepted, but the urifer may nse a nom de plume if desircd. Leffcrs should be as bricf as possible and, preferably, fypenvriffen He re'serve the right to make any altcrations or deletions which we deem nccessary

## An Innovation for Brooklands--The Land's End and Prospective Light Car OwnersFast Main Roads-An Economical Easter Trip-115 Miles on a Tin of Spirit.

Selling Races at Brooklands.
We notice with interest your article re standard cars racing at lizumbanis and in hall-climbs. Is we lave always raced on standard productions, the varions cumponents being drawn from our stock, we are quite pre-
Why Not? pared to dispose of any car entered by us at any meeting at our catalogued standard price, before or after a race, providing the sale does not interfere with any immediate future event

As we are very interested in the question, we should like the fact known that we are all in favour of the British Automobile locing Club promoting events at Brooklands in the form of selling daces. Why not? Eric-Longenen Cahs.

## Standard Gears and the Land's End.

I was at Lymon at Easter, and as an enthusiastic ownerdriver I was greatly interested in watching the cars climb Lynton Will. What a great pity it is, however, that special gear ratios are allowed. Interesting as Freak Hills Not the trial was, it shows nothing in the way

Wanted. of the ability of standard cars to climb such hills. It would be most interesting -and, I believe, onlightening- to know how many of the cars had special ratios.
Beggar's Roost is a freak hilt, and I cannet see that any reasonable motorist would want to climb a hill with such a gradient and surface when it is off the main road. Lynton and Porlock are, however, main-road hills, and every car as supplied to the public ought to climb them. If the trial showed which cars would and which cars would not, it would be more interesting to me and probably to the majority of other car owners.
It seens to the that the trial would be far more informative if the M.C.C. excluded Beggar's Roost and.stipulated that only standard gear ratios were used. IV. $\mathrm{H}_{2}$ Ricunids.

## Another Fast Stretch.

I have just been reading with interest The Z,iyht Cur and Cyclecar of April 6th. You mention the Bath Road, Readiag to Suvemake Forest, as a fast and good stretch.

You say: " Is there a longer atretch and

## From Baldock <br> to Norwich

 one eqqually as fast," etc.I know this road very well, but in these respects it absolutely does not compare with Baldock to Norwich, via Royston and Newmarket ( 78 miles).
I am very doubtful if any of your readers can mention a more perfect stretch than this: it is the usinl route to Norwich from Iondon, at any rate from Rovston onwards; vut many motorists follow the Great North Road to Baldock,' and then bear to tho right (or east), ns I have indicated.
E. J. Moeran.

## Reliability and Economy.

I think the following details of an Faster trip may be of interest to readers of The Light c'ar and C'yclecar. For the satisfaction of the doubters, not only am I prepized to swear

A Good an attidavit at to tho accuracy of the Average Over a Long Distance. times, otc., but can prove them by independent witnesses.
Car: 1923 Huver 8 h.p. de luse fourseater.
Left Acton, 7 a.m., Good Friday, self, wife, child, and luggage aboard.

Arrived Frizinghall, near Bradford, 4.25 p.m.
Total distance checked by route (A.A.) and speeds, 216 miles.
Two stops for meals, totalling 48 mins.
One stop to fix spare wheel after wail puncture, 8 mins.
Stop at garage to repair spare tyre. 36 mins.
Actual rumning time, 7 hirs. 52 mins., or an average of 27.46 m.p.h.

The return journey on Easter Sundav was mado over the same route and the average m.p.h. worked out at 27.23 , but we were delayed by rain and mist for the first 40 -odd miles at !east.

I might add that I took delivery of this car last November, and have since done 3,800 miles with exactly three involuntary stops-two for nail punctures and one for oily plug, due to intentional over-oiling.
Pedrol consumption, working on Carburine (which I find the most suitable spirit), has never been beluw 50 m.p.g. Usual disclaimer.
N.H.if.

57년 Miles to the Gallon
In reply to "J.S.B., Accrington," in your issue of March 30 th dealing with the Jowett car, as I am driving my second dowett-"Coo ee "-I think I can speak as to its capabilities. Forty-five miles per hour is, I fiud, $45 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. Under somewhat under the maximam. My Maximum. advice is-go to an expert Jowett agent, and I can ricommend Mr. Sixon Jefferies, of Manchester : and if you will apply to Mr. David Themmas he will put the car absolutely " $0 . \mathrm{K}$.

This week-end I have done over 500 miles, and "Coo-ee" could not have performed better, cither uphill or on the level. On ono journoy of 115 miles, witnesses can certify that it did the distance on a tin of petrol, but I was travelling fast along the long Holyhead road, and that, no doubt, lent some assistance, because my avemge consumption is abmut 38 miles to the gallon on town rork and 4045 mikes in the open country.

Having now got my second Jowett, that speaks for itself, and "Coo-ee" seems happiest when bowling along at $35 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. : but treat it like a car should be treated-gentlywith a visit periudically to a first-class mechanical doctor.
F. Weldron-Wili.ing.

OUR READERS' OPINIONS (contd.).

## Improving the Morgan.

Noticing the recent discussions on the Morgan in you columns, and as a staunct Morgan enthusiast, having owned two G.P. models, amongst various light cars and cyclecars, I cannot help oftering a few criticisms of
Suggestions of an otherwise deligitful fine relle diat an Enthusiast. well suits my ever-empty pucket. In my opinion, if certain minor points in design were altered, the machine would be even more fascinating and generally useful than it is at present, without any great increase in cost of manufacture
First, there seems to be only ono trouble that spoils one peace of mind where reliability is concerned, and that is chains. One chain is always too loose or too tight, either hrough wear of the chain or the sprocket. A chain break age is a nightmare - and they do sometimes hreak. Why not incorporate a three-speed gearbox with the present beve gear and have a single final chain drive?
Secondly, front-wheel brakes a:e fitted as an extra, but are anost essential as a standard fitting in really hilly counry. If one does not live ${ }^{\text {in }}$ hilly country, one will want o tour in it some time. The hand brake on the rear whee could then be eliminated, and a more accessible detachable device for the foot brake band bo fitted to facilitate rearhee! removal.
Thirdly, I have found the rear forks occasonally become bent, either by applying the brakes hard in an emergency, or by taking a corner very fast and so twisting them.
Fourthly, the direct stecring is apt to prove heavy on a long run, and with three wheels here is a tendency to pull to the road camber. Could not the steering be geared down? I admit this is a luxury, and, if necessary, should be listed as an extra. I feel sure many would avail themselves of it, however.
The foregoning criticisms are, of course, merely my own opinion, and, no doubl, have all been thought of by the designers, and perhaps Jeasons of economy have forbidde. heir incorpd pular that few han gotimind popular But elminale pls present pelly an
weaknesses would be worth the while?
would be interesting-although, perhaps humiliating-to hear the manufacturers' reply to these suggestions

Porlochian.
Capabilities of the A.B.C.
Having read with much interest the opinions of some of your readers on the question o maximum and average speeds, I should like to

> A Fast put forward my experience Touring Car. which may be of interest. 1 frequently make a trip
dowr to Newcastle, Co. Down, a distance of 34 miles, and recently I have been taking accurate records. The last fou journeys were inade in the following times: -58 mins. 62 mins., 65 mins. and 65 mins.
The road is a good example of a fair "give-and take" road, with about five villages. through which one must run slowly, but, on the whole the road is level, with long straight stretches. Between the villages my speedometer needle was rarely below the $40 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. mark. and on short barsts I went np to $57 \mathrm{~m} . \mathrm{p} . \mathrm{h}$., which is $4 \mathrm{~m} . \mathrm{p} . \mathrm{h}$. or $5 \mathrm{~m} . \mathrm{p} . \mathrm{h}$.
Thin the car's limit.
The above, I know, only shows that 34 miles can be ac complished in the hour by an air-cooled "nat twin" engined car, which "Rover Morris," in your issue of March 30th,
appears to think wipossible
I quite agree with "Leon," whose letter appeared in the same issue, when he says that "the average speed of a car should liny 100 miles.


This fine array of nine Deenster model
A USEFUL represents a delivery by the Ogston Motor Co Ltd., to their agents in Wallington, Surrey The call of the open road is never more insistent than in the Spring.

## Three Up on a Rover.

We note in your issuc of April 13th, page 588, that Mr. H Swift, of Bakewell, Derbyshire, asks whether it is possible to carry a third person (weight $10 \frac{1}{2}$ stone) in safety on a

Dispelling key seat, the combined passenger weight
Doubts. In reply 33 stone
In reply to this gentleman's query, we should like to say that many hundreds of users of $8 \mathrm{~h} . \mathrm{p}$. Rover cars carry as a matter of habit three persons approxi andig to the cotal weight mentioned, and that wo list as of carrying two adults and two children, or even four adults, carrying
We think that this should satisfy your correspondent as to he practicability of carrying extra passengers.
Coventry.
The Rover Co.
D. H. Noble, Advertising Manager

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## AROUND

:: THE TRADE.
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A service manager with excellent credentials and a very sound business knowledgo is seeking a situation with a reputable small car concern. Inquirics addressed to this olitice and marked "Scrvice" will bo redirected.
The dependability of British-made tyres in specd and rond grip was again magnificently demonstrated on Easter Mhnday. In the Foxhills and Octon Hill-climb the fastest car of the day was fitted with Spencer-Moulton cord lyres.
No fewer than 52 tours in Glowestershire and the alljoining counties are outlined in a new route guide recently published by Messrs. L. A. Smart and Son, 65, Northgate Street, Gloucester, priced at 2d. Four circular tours are also appended.
W. G. Nicholl, Lid., havo opened at 50 to 54 , Whitcomb Street, W.C. 2, large, specially desigued premises to atowm-
modate over 100 cars, affording day and night service moderato charges. It is tho firm's intontion to cater cutirely


The new central and commodious premises of $W$. G. Nicholl, Ltd., ot 50 to 54, Whitcomb Street, W.C.
for the demands of motorists in London. Such a central position should render this garage eminently suitable for storing a car during shopping or a theatre visit.
The success achieved by the Stoneleigh three-seater cars in the Royal Scottish Automobiic Club's six days' trial last vear has been followed up in the two days' trial of the Scottish Western Motor Club, in which the three Stoneleiglis entereal, each securing a first-class award.

The body for the racing Bugntti owned by Capt. Austin, and illustrated in our last issue, was buili by Compton, Hermon, Ltd., of Walton-on-Thames, and a fenture of the fitting is that this concern took delivery of the chassis at midday on Monday, April 9th, and delivered the complete car mid day, April isth. The asual stricture relative to conchbuiding delay certainly does not apply to this concern.

It is interesting to note that the New Process oil recently introduced by Alexander Duckham and Co., Ltd., 6, Broad Street Place, E.C. 2, is gaining remarkablo popularity, and has already been recommended by no fewer than 14 wellknown motor firms. Incidentally, all Duckham's motor oils and greasers have recently becn rcduced in price, rendering it and greasers obtain their oils at prices ranging from 6 s . 7 d . to 7 s .7 d . per gallon, according to the various grades.


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 A.B.C. 1922 sports model. in oxcentionally nice condition, $\mathrm{S160}{ }_{5}$. Nown-
 Kingston 1873.

A. 日. C., exceptlonal 1921, Surbiton, dynamo lighting anil rell-tarter.




 A.-C., 1915. 2-senter nnd dickey, f-cylindre engine, 5 delachable whecls
 A.C., 4.santer. 1921, 6 whecls, $£ 25$ extras, now tyres, 2285 , le wes





 A.C. 19212 -senter, double dickey. Etarting andllighling. in exceptionally


 ALBERTS wanted in part cxclange for now 8hp Tabots. Liberal terms
 ALVIS, exceptional bargain, 2-senter, $10-30 \mathrm{hp}$ Alvis, with dickey.



 AMILCAR, 1923, replica of abovo but slightly shop-soilcd sargain,

 Laxed 192才, 5 543-677
 llegent St. SCo 1916 12hp 2-seater and dickey, excellint condition, dynamolight-
 A.V. 1922 runabout, exceptionally, well equipped, sl15. Tull parA.V., 2 aenter, 1920-21, 8 J.A.P, apeedometer, now hool, just ovor-


Ficaders are referred also to "THE MOTOR" (Tuesdays, 4d.), which contanns each reeck many hundreds of advertisements of new and second-liand cars of all kinds.

## SECOND－HAND <br> LIGHT CARS AND CYCLECARS FOR SALE （conlinued）．

A v．Garage，Eleannr Grove，White Hart Lane，Barnes，apecialize in A．Exchange．＂ 543.578 A．V．，8hp monocar．will dickey，special upholstarg，electrio dighting．

 BEBE PEUGEOT，1915，s speeds and reverbe，electric lighting－1i90j 1675 ，are of The Light Car and Cyclecar．＂ 75 or near ulfer． 543 －h90
 Trant
要ELSIZE－日RADSHAW Gordun Watncy and Co．Lid． 31 Brook St．

 BLERIOT－WHIPPET，IUCil havo 2921 Bleriot．Whippet．Mngdyno， Tubei．

BLEAIOT－WHIPPET， 1921 ，stle sharter，reverse gear，perfect condation，
 Bucatti，1ght，10मp filed weh luxurious coach－built bods，double


 545－h969
BUGATTI，1921－2 16－valve filled wilh superb 3 －seat boat body，

 CALCOTT Mare 10.5 ，minchasecl sept， 920 ， 2 －seater，royn blue，
 CALCOTT，bargain，guananteed late 1922 Calcott． 10 hp ．2eeater and
 CALCOTt， 1919 10hu， 2 －seater．dubble dickey．dymamo 1 ax paid year 130 zinneas． 13 Keladrick Mews，Sultb liensingion station．Kenamg， $545-593$
 CALCOTT，1922，10hp，tax paicl．paint hellotrone，separate mag
 CALTHORPE，apecial tase，recently orerhauled by makers，aluminium
 zz2－989
 CALTHORPE， 1922 ，saloon，upholstered Bedford cord，self－starter，dy
 Broad St．，Birmiughnm

CALTHORPE，1922，2seater，with clouble dickey seat．dymamo and
 CALTHORPE 1920 bports A－senter，electric lighting and startung．very complete equipruent，ownor－drivell．mileage 8．500，Rond yred，just re－ livoly，a bargain，£175．Allen，Albourse，near Massocks．Suseex．

CALTHORPE， 99 guinens，exchanges，delerred payments：1914－15， 4 pater，doublo screct． 5 detachable one－man hood，electric lamps，mart Seabridge， 35 Hansler Rd．．Easi Dulwich．Telentone．Sjdenham 24462.
CALTHOAPE，4－seater，1921，de luxe model，dynamo Hghting ferl


CALTHORPE 1922 de luxe 2 seater，dickey 6 electric inmps．starter



## SECOND－HAND <br> LIGHT CARS AND CYCLECARS FOR SALE （continued）

Carden omcial Repair Depor
We have taken orer the while of the repairs and ale of epare parts trum the Carden Engineering Co Manygreat imprurements ${ }^{2}$ Carden car－Lea！apriagins，sight－feed fubrication，aide curtaink domed mud．
 CARDEN， 2 －senter， 1921 molel，electric light，ppeedometer and clock， 1／good condition and running order，C35；trina given if desired．The iphone，Willesden 2297． CARDEN， 1921 motel 2－seater，in practically nem condition E55；
 CABDEN，1921．splondid 2－scater，sompletc．hood，BCreen，lamps，firedio－


 CARDEN，1921，perfect，sptedometer，elfctrlc lighta，all accessaricas，re－ CARDEN 2－setter，1921，good running order，hood，screen，electric
 CHATER LEA 2 －scater，dickey，w．c．， 8 bp ，sew engine by Chater Lea，
 CITROEN COURe， 1 I 21． 104 hp ．£275．W．B．G．and E．Co．， 202 W． 2zz－396
 citroien，1921．4－seater，dynamo lighting and slarter． 4 new istes． plus 2 apare whels，with $1 y$ res，coroplete side cortains．to open with
 CLULEY， 1921 model，10hp． 2 －apater，dynamo fighting．exceelingly
 COVENTRY－PREMIER 1922 ， 4 wheeler， 2 －suater and dickey，sids screens，zovometer dynamo lighting，sparo wheet and tyro in goou


COVENTRY－PREMIER，1922．2－seater，dickey zeat，dynamo lightiu sut epeedume＇er．bulb born naintwork wod，licensed to December，in reallj first－class condhtion throubtrout，e145：part exchange arranged Carabride．
$543-418$
COVENTRY．PREMIER，1922，late，double dickes，speedometer，tas paid，nearly new， $\boldsymbol{P 1 3 0}$ ．Jaries，wer Alexandera， 482 Harrow Ral． COVENTAY－PREMIER，2－seater，1922．4－wheeler，dynamo，fully equip ped，£1J0．J．Hebdeu and Sons， 149 St．Jame St．Burnley．Ted 488 COVENTRY－PREMIER 19228 bpp 2 －seater， 5 detachable wheels，dynam lighing．tax paid for 192 J excellent condition and appearance．size W．6．＇Phone，IIamwersmilh 1325．
COVENTRYPREMIER 1921 8hp J－wheeler，with spare whel，dynamo


COVENYRY．PREMIER，1922，practically，new．A－wheeler，double dickey
 Keusington．
$543 \mathrm{k}-109$
CROUGH．F．OC．It．hare 1921 Crouch，completely overhauled．bargain： CROUCH 1923 all－weather model，only shop－wiled，a largain＇at $\boldsymbol{f} 190$ exchanges．delerred accunt it desjred．All new ruadela on show．Lambs
 CROUCH 2 ceslinder． 1922 model，double dickes－scal．licensed to Jnne．



 perfect condition，any examination，\＆500．Trevisla．The Grove．Couls－ Surrey．Phone，Purley 1171 543－1880


 EMSCOTE，1920．f95．2－seater，Jynarno lighting．Bhr J．．．P．engine． periect onbuition：terna，excbange Minanl ENFIELD noube Casy＇s Motor Nart．Lid 9hy A－cylinder，riynamo
 S．W゙3．Keusington 2194.
ENFIELDALLDAY，turing 4.5 －acater，all－wather body，leather up－ practically new．shecial sports engine．Continental type radiator fitied


$\because \mathrm{p}$ －

## SECOND－HAND <br> LIGHT CARS AND CYCLECARS FOR SALE （conlinucd）．

ERIC－CAMPBELL， 1921 ，all－aluminium body，fully cquippel，excellent 100 RA．Phone，Muscum 7600 ． 543.441 ERIC－GAMPBELL， 1922 ，all－aluminium borly specdometer，extras taxed，perfect，f150： 1921 ditto，as new，$£ 130$ ，taxed．James，orer FIAT．1921，tax fiz，fitted with fine English $4-5$－seater boty，paintet dark manre， 3 borns，bocd，side curtaine，all apares，excellent condition， any examination or trial．£ 350 or nearest cter．Tomlinson， 110 Padi－
ham Rd．Burnley．
C．N． 1920 ，dsnamo．splendid condition，$\varepsilon 90$ cash，or $\varepsilon 1816$ deposit
 C．N．． 1921 dynamo lighting．speedomeler， 2 spare wheels，polisherl Phone 444
C．N．，1922，2－seater and dickes＇，dy＇namo lightiag，spare wheel，painted
 ．also 246．52 Dians． 1 and clock，special Vilesso enginc．Cox－Atmos carburetter．complete with Epecial cam wheal，guaranteed orcr 70 m．r．h．．．hendsome special alu ninium body．the wholo car in first－class condition throughout $\frac{\varepsilon 150}{} 15$ C．N．，absolutely unsciled，hood，scre？n，speedometer，dyamo lighting． fpare whecl，fi 65 ，bargain：call，no lettés awsuercd． 15 Repenta
P43－h890 G．N．．1921．Iegere，excellent condition，aluminium bods，rear and apare wheels 700 hy 80, Sanchum，side zcreens，dynnmo lighting，electric Klaxon．epeedameter，adjustabio exhaust tappets，new hord，icensed to
June 30 ih．floo：letter in first instance．Southeomb May， 34 Gower Place，W．E 1 ． 543 －h891 C．N．，1920－21，dsnamo，speedometer，clock，extra oil to rear cylinder， Dison rariable ict．tyres good，thoroughly good mechanical order，
quantity of spares． 880 ．Mitcheli，Brewery，Chard．Somerset． 545 －h912 C．N．1922，perlect outfit，unscratched．£120．James，over Alexnnders，
482 Farrow Rd．Paddington． G．N．， 1921 model at $£ 115$ ；superb condition；exchangea，deferred pay－
 Stow Good Green，N．22．
W43－462

 C．N 1921，de luxe，dynamo， 5 detachablo wheals，filly equipped，new
condition，spares，fi2 10s． 47 Ieigh Rd．，Finst Iam． G．N．， 1921 （October），touring，dynamo，alumininm discs，clock，Klason， several extras，splendid condition，£85． 4 Bertram Rd．，Ifendon． 543 k 93
 $\begin{array}{ll}\text { C．N．，exceptional condition and appearance，shock aboorbers，} 1922, \\ \text { brabes and cylincler hmds，adjustable tappets，jus orerhauled，} & 195 \text { ，}\end{array}$ Croydon．Box No．1693．c．o．＂Tho Lighi（ar and Cyclecar．＂ $545-\mathrm{k} 32$ C．N．，belt drive，well kept，sood order， $\mathcal{E} 30$ ，or exchange． 5 Stamford
Brook Rd．，Hammerzmith． C．N．，Lato 1920，dynamo，dickes，specdometer，clock，eplendid order，
£68，or oxchange．$\overline{3}$ Stamford Brook Rd．，Hammersmith． $543-621$ G．N． 1922 model，dynamo lifhting．dickey seat，in exceedingly nice
 G．N．Cass＇s Motar Mart．Itd．3920－21 10hp，dynamo lichting，etc．，
 G．N．， 1920 ，drnamo，tax paid，any trial，e70．Garage， 12 Cornwall G．N $543 \mathrm{klo2}$ G．N．de laxc，exceptional 1922，dynamo lighting，spare whect，dickey，
unsoiled condition．several extras，tax paid， 2120 ；exchanges． 24
Balliol Rd．，North Kensingion．
G．N．de loxe，exceplinnal 1921－22，dvnamo lightinc，кpare wheel， heaullful conditlon，e80：exchanges．Hillier， 127 St．Mark＇日 Rd．North
K43
 C．N．， 1921 electric， 3.000 miles only，good condition，any reasonable G．N．Godirey and Earl for rellable second－hand cars
C．N．，late 1920，dynamo，rery smart，in cream and black，splendid con
C．N．，1922，special towing molns．with Legero rngine，dynamo，polished Godirey and Ear with door and dickey，exceptionally Iast， 135 suineas G．N．，1921，standard，grey，dynamo，very good order，s．s72．Godfrey and
C．N． 1921 torier，electric lighling， 4 lamps，spare whecl，specdometer

G．W．K． 19212 －seatar with dickey，excellent condition， 2140 cash ，or s29 deposit nnd 11 payments ni f10 12s．，less．rebate；exchanges
entectained．Service Co．，273－274 IIigh IIolborn．W．C． 1.
zzz－184
G．W．K．，1921，4－seater，done 5.000 miles，perfect order，complete in every detail，any trial or examination，deal．chean finmily car，f125，
bargain．IIomes， 11 llillcrest Ave．，Golders Green，N．W． 11 ． $543-h 915$
C．W．K．， 1920 tax paid，many extras，\＆i20．Rev． 371 Earlsdeld Rd

G．W．K．，4－seater，new engine．In perfect condition，repainted．f 135
P．， 31 illgh Town Rd．Maidenhead．

## SECOND－HAND <br> LIGHT CARS AND CYCLECARS FOR SALE （continued）

iwk or hire purchase．The iaght Car Co．， 331 Euston Rel．，Lundon $543.6 \overline{3}$ है G．W．K．， 1914 ，with dickey，excellent condsion，nol been 0,000 ，ro
 C．W．K．，late 1922，IO1ヶp，A－rylinder，2－scater，with sunk dickey，Irapsoys

 GWYNNE，1923，4－cylinder light rar，chummy body，oclistarter，£218． Denman Motor Agency，4 Denaman Pi，Piccadills Circus．It E45－675
 View 12 Regent St．＇Phonc，Regent 829.
HANDS 1922 JOhn 2－seater and
 HILLMAN cars，Onicial repairers，London digtrict，J．C．Brgilie，Lul， 94 n Cheyne Walk，Chelsea，London，S．W 10 Telephone，Ki ingeusi
3200 ．Sll spare parts in stock．Well－cquipped works． 546.412
 HILLMAN eports，purcbased 1921，complete with electricnl equipment，

HORSTMAN， 2 －3seater，dickey，amall mileage，illoes：caluso ealu，Clig near ulfer． 54 Upper Íwes Iid．，Brighton．
HUMBERETYE Spare Paris Dept．IRepairs，replacementa，overhauma
repainting．Inquisies invited for accond－hand cars．
 London．
zzz－5995
 Streatham 159.
HUMBERETTE，smart 2－scaler，dickey 1913，fiown，Stepucy spare：
 HUMBERETTE，engino fittrd with new pispanm，cylinder，bushec，braly
repainted，excellent order，f 38 ．Ma：on＇s Garage，Ietchworth，Hiluls HUMBERETYE，modernized，a－c．twin，J．ow bods， 2 －speed and reverac， HUMBERETTE，1914，w，e，new genrs，tyres and hood，einging re． bushed，any examination，licensed，C55 55 Rectory Jane，Pimining 5450 HUMBERETTE， 39 gufncas：exohanges，2－scater， 8 hp ，air－conleti，wire

 owno：suddunly called abroad， $21 ? 5$ ．Peake c．o． 11 Glouccsinr ive
Oxford． JOWETT， 1915,2 －rater．Lood condition，eylinders just rebored，neve pistons and piston rings．sparo whecl，speckemeter．$£ 75$ ．Gircon，flnlla－
way Clough，Wale，Cheshire．
KINGSBURY JUNIOR light rar 9．5．twin，water－cooled， 1919 ，chassiy complete，no body， 5 tyres，A electric lamix，make good syorts ear，wi
corivert to lifht wadesmans irolley．Reat genuine offer．Belmont．Dibjer，
 LAGONDA．Screral good accond－hnnd cars for sale．Full darticularm
and prices from Lagonda，Lid．． 195 Mammeramith lzd．，London，W． 6 ． LAGONDA，C65，2－3－seater，in excellent condition：terms．Midland Garage， 303 Broad St．，Birmingham． LACONUA coupe， 11.9 electric lighting and horn，epare wherf，tyre。
specdometer，perfect condition．tax and insurance pald，$\underset{\Sigma}{ } 120$ ．Flencher． specdometer，perfect condition，tax and insurance paid，$£ 120$ ．Fletcher．
105 Iigh St．，Iewlsham．S E．
$543-h 2^{2}$
 LAGONDA coune，${ }^{11.8 h p}$ domonstration，snilad，oulv done 900 miles，
£200．W．B．G．and E．Co， 202 Wcatminster Bridge Rd．Mop 6187 ， £20．W．B．G．and E．Co．， 202 Wcotminster Bridge Rd．Hop $6187, z_{z z .498}$ LAGONDA， 1920 model．4－senter，dynamo lighting，atarter，excellent mechanical condition，licelmed to cnd of year，all tyres thoronghly good，
$£ 135$ ．Autocars，Ltu．， 15 Woodslock St．，Landon，W．Mavfair 263i． LAGONDA 1922 conpe， 11 bp ，self－startor，dynamo，with dollho sunken dickey，${ }^{n 5}$ new in every $x$ ny，only short mileage，cost E395．Accent
195 suineag． 69 St．Paul＇s Avenue，Willesd？Grcen，Jondon．E43－k92 LA PONETTE， 72 guineas，exchangr．s，delerred payments，precty little 4－seater，9hp， 4 cylinders，inmous Chapuis－Dornicr enginvi，gate changer． hood，double scrmn，powerfuk smart，cconomical．Seabridge， 35 Tlansi．
Itd．，Fast Dulwich．Sydenham 2452． LITTLE MIDLAND，1921，excellent order，price 280 ．Welford．St． LITTLE MIDLAND CAr，new，late 1922，slightly shnp－solled．fnr anle will accept 8100 ，in perfect order．Willlams aud Sons，New Tredegar MARLBOROUGH， 1915,10 hp， 2 －senter，dvnamo，dotechablo whechs，
 NARSEAL，E165（new）．axcopting for 100 milea；all nlumindum
 MARSEAL 1923 coupe，C．A．V lighting．starting．ctc．，run about 6017


## SECOND-HAND <br> LIGHT CARS AND CYCLECARS FOR SALE (continued)

MATHis, 8 hp, 2 -scater, slartor, lightiag, Hoenged, cose 2260 last Surrey, harily usca,


 MERRALLBROWN, 1920, Coventry-Simplez engine, detachable whels,




 MORGAN ipecialist. James and Co. (Sheffield), IAtd, 263 Ecclemall
 MORGAN. Inan Cins, Weymouth, mann Dorsel agent. Trade aupplied. MORGANS. It.: Anivial agent, ecrace depot, apare part stockise.

 MORGAN, de lun, late 1920 wr, 8hn, spedameter, clock, f95.
 1920, good orilur, £80 весures. Fabry 59 ,h915 3-h910
 MORGAN ing lux"; 1921 , water-cocoled, dvnawo lighting, spectometer.

 MORGAN $\quad$ G P Phonc, Museum 7600 . $543-42$
 MORGAN, 1922. Grand 11rix. M. . G. taxed for year, dashboard, stewart trip, hoad envelope, standard equipment, tyres sood, periect
thronghout, 120 niler $6 . j 0$ or week-ends. Hacon, 10 The Broadway,
London Rd, MORCAN, Bhp, I.N., , 1914 manve, mechanically perfect, tully equigped, any Lrinl. ©50; excharige coubination 19 Pardoluer's Way $54 . \mathrm{k} 1 \mathrm{~B}$ MORGAN de luxe, 1920 water-enoled, specdometer and full equipment, Hge. Wealrstone, Milldesex MORGAN, family, 1922 , water-cosled J. A P., dynamo bigheing, epedio2500 cost over c220 has yeir, will aceept sis5 or near. Mrecellan mononaurs Rd.. Jliclams Part. A. MORGAN, G.P., 8hp, wi,c. J. Ap, 1916. dymmo, new head, 5eer's lax,
 MONGAN, G.P., MA.G., narly 1921 , electrics, new tyres, 220 extras,
£90. Ball, Tardebigce, Worcestershire. MORGAN. 1922 standard, I. A. : a, ec., specdumeter, Jeft tube, fully 13atn
MORGAN de lace, 8hp J A.P. n.e., perfect nrder, ncessories $\quad$ or olfery MORGAN, 1921, G. P, 10Lp MA.G. ongine, No, 4775 , dellvered Demeter, fush, milcace 900 o nutomntic Amac carburerter. trip speed rear lamps, disc wheeld, all tyres 700 by aO top-holo condition. Stepney rear with. Jell inner tube, Aron fronta, liappa spring galcora, Klaxou. inaide mat, petrol can earricr, hemmet, acnt atr cushion corers (Dunhills) lor all lampy and genorator, brass fiblinga, colour maure, full kit of
 whalo exnrtly as turned ont by worka, carolully drisea and well looked lant, powertul, andl coonomical: nny trials with plesantre; seen landon it desired: geniline private owner: price \&130, all inclusive. Writo
Morgan, c.o S. D. Eidards, Now sagent, Brighton Ru., Coulsdon, Surrever Morcan, 1921, Do Luxa, water-cooled Sports M.A.G., drnamo lightMORGAN, Grand Pris August 22nd 922 w.
 MORCAN 1922, Grand I'rix, MA.G., speedometer, dises, tax mid,
f 150 , MORGAN, 1921 , do luxe, speedometer, olock, tax naid, $\subset 110$. Maudes,
100 Gt . Portland St., London, W.1.

## SECOND-HAND <br> LIGHT CARS AND CYCLECARS FOR SALE (continued)

MORCAN, 1921 de iuxe, 8-10hp, J.A.P enzine Fater-moled. I.ucai
 MORGANS, 1922 mandard model, a.-c. J.A.P. equipped, perfent order, MORCAN, family morlel. 1923., w.c. J.A.P.. dynamo, miteag.. 100, MOHGAN


 MORCAN, Grand 1'rix. 1923. grey, latest Arzani eqgine, wabr-conled. Lucas electric lightiug. speedomeler, disc shoels, tax paid, really sood order, owner busing bigger car. 1150 or near olfer. Box No. 1696 . co.
MORRISOXFORD, 1914, I.ucas dynamo lighting, 5 lamps, licenaed to Jane, price $\mathbf{2 9 0}$, any trial. Welford. Nt, Jamea St., Brighton. 543-506 MORRISOXFORD, 1914, 2 -seater, recently completely orerhauled, in pleadid running order, newly painterk, new hood and aida curtaina,
 MORRIS-OXFORD, 1914-15, 2-searer de luxe dickes, dy口amo, excel-
 MORRISOXFORD coupe de luxe. wití dickeg, recently overimaled. 5 new tyres, derachable wheels, CA.V. dynamo lizhting, interme lighting,
 NEW HUDSON, 1922 , hep-soiled only, not regintered, what offurb, or
 PALLADIUM 1922 lighe 12 de luxe, 2 -seater and double dickey, electric starling. lighting. speenomeler, 111 accessories, absolutely parlect.
s 320 . K.J. Motors, Bromleg. Phone 1727 .
 hauled. $\mathbf{f 7 5}$ : exchange combination. 4a St. Johna Wood Rd., London, W
PREMIER 1922 4-wheeler, dickey, dynamo, choice of 2 , Prices fromp Phone. Maseum 7600 . RHODE, 11.9 hp 1922 coupe. Mebes and Mebcs (Est. 1893), The Original Light Car Specials to offer from atock painterl maronn C. A.V. jonamo lighting and starter, opeedometer, clock, dash hmp, step mase, cat cover, Beldam tyrea, pring gaiters. etc. whole of car in new condition, haring done approximately 3.000 miles. 2275 . open eo ex-
amination by A A. R.A.C., etc.; delerred paymenta arranged. 144 Ge.
Portland St. RHODE cars. Sccond-hand. Mebes and Mebea. Southern diatributora Rhode cars, have an all-weather 1923 model, painted Royal bluc, and yne wings, 5 lamps. grease gun system, ete., at E270. See below. RHODE, 9.5 hp . $1923^{3}$, occasional 4 -scater, painted grey, dynamo light ger and ses tax naid for year, new concition ehroughout amall miteage
 144 Gt. Portland St. W.1. Yhonc. I.angharo 2230 . $543-492$
 RHODE, 1922, 4 seater (Chummy), dynamo, tax paid December, car repainted, \& lo5. Garage, $\frac{12}{2}$ Cornwall Terracu Mew. N.W.1. rear Baker
RICHARDSON light cars. Spare parts in stock. Richardson'a, Mill
RICHARDSON, 1921 electric lightink, in excellent condition, e65. RICMARDSON 2 -seater with dickey, electric, llghting, Epeciometer, repainted, perlect condision, s70, or oxcbage combinatiun. Newnhatu, 223 RICHARDSON, June, $1921,8.9 \mathrm{hp}$, electric lamps, new condition, 700
miles, tax paid, 5100.58 Mansfeld Rd, liford. RILEX, 192.3, 11 hm , z-seater, double dickes, all-wiathor hood, mileazu
 BILEY ust
Hiley used cary wagted and for salc. Lewes Mutor Works, Lewes. 529 RILEY, 1922 mordel, 4 -seater, complete, tyrea almose ncw, in excellent
 ROVER 8, 1921 dynama, geod condition, recently repainted, 595. ROVER, 1921, 8hp, splendid condition, tax maid, a hargain, e110. Wilkins, Sitnnson, opnesite Olympia, Lonton
 ROVER 8. 1921, tax paíd, speedometer, sido winga, special cooling luga,

 ROVER 8, 1921, speedometer, sound order, f115. Smith and 11 unter, 77 Gt. Portland St., W. 'Phone, Langham $2363 . \quad 543-517$ ROVER 8. 1922, Lucas electrio horn awirel searcblight, Michelin
lyres, petrol carrier, full equipment, aplendid condition, $\boldsymbol{E 1 2 5}$ exchangea, easy paymenta. Aliber Garage. Thornselt Kd., Farlateld, S.W. Phine,
543-58i ROVER 1923 model, 4 -seater Chummy bodr, dynamo lighting. many


## SECOND-HAND <br> LIGHT CARS AND CYCLECARS FOR SALE (continued)

nover, 3921 . 8hp, 2seater, dynamo lichting, spare whel, sperdometer. Ract., Thornen Hlsth.
 ROVER S, 1923. with dickey scat fitted by makers, still in the agent's
 ROVER, 1921.8 Shp, 1922 erankshalt, Nonnectung rods, excentional me
 relier Villas, Brighton. $54 \mathrm{~J} \cdot \mathrm{k} 21$
 tmail and in splendid condition AOVER Eights bought for cash. Best prices given. Maudes: 100 GI RCVER, 1922, splondid condltion. ycar's tax, £127 10s. Belox
 RQVER 8, 1921 , 2-scatcr, all Rood tyres, tiex paid December, speedo meter, double oiling sjatem, x110; also
 ROVER, 1921. 8hp, dynamo lichting, spare wheel, sido screcns, mirer
 miles onls, $£ 125$; exchanges. Hillier, 127 S:. Mark's RJ., North ken.
ington.
 SALMSON 1922 de laxe, excellent condition, $\boldsymbol{E} 152.7$ Exbibition Rd.
S.W.
543 SALMSQN, 1922, de lure, dickey, dynamo, starter, specdometer, mileage

SALMSON, 1922, Intest model de luxe, side curtains. double dickey, dynamo ins rred, tared December, perfect throughout, £165. K J. Molora
Bromby. Phono 1727 .
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every way, price $£ 150$. Weliord, St. Jamea St. Brighton. $543-504$
 Iriction drire, hood and ecreen, Lucas aynamo lighting, sparc wheel. This
 Gren, London. N. W-
SiNGER 1914 2-seater, double dickey, excallent condition, dsnamo lighting, nearly new evres, spare wheel, sereral extras, recently over9 Clilden Rd, Twickenham. 543 -g523 SINGER, 2seater, excollent running order, dynamo lighting, 5 detac
ahle whesk, well tyred. £ 95 . 17 Cranmore Way, Uuswell Hill.

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 SINGER, JObp, 2-seater, dynamo lighting, new Micbelln Cable tyrce,
 SINGER, 1920 model, 2-seater, dynamo and starter, Excellent condi-
 Euston Rd. London. SiNGER, lato 1919 . dynams lighting. spectometer, spare whecl. excel-
lent condition. flo 6 Jiarket St. Oxford. SIA GER, lato 1921 , 2-seater. doublo dickey, lizhting and starting, per-
fect condition, mileago negliglble, as new, $\dot{\&} 165$. Captain Reeres park fect condition, Wellingborough.
Rd. SINGER, 1923. 2-aeater, all-weather, starter. 26 St. Paul's IVd. Wes-
tox-super-mare. SINGER racing, 10hp, outside oopper exhanat, original T.T. model, sery Garage, Litl., 18 South Bruton Mews. Jiayiair 4282 . Bruton Mows
SINGER, 2-cater and dickey, dynamo, taxed, rery quiet ongine $\mathbf{~ 2 7 5 ,}$
or exchange. 3 Siamford Brook Rd., Hammersruith.
SINGER, 2-senter and dickey, 5 delachablo whecls, 5 lamps spares,

SINGER 1917 2-eeater, dickey, drnamo lifhting, speedometer, lax anil

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ton Rd., S.W. 3 Kensington 2194.601
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painted, tax paid, 2120 .
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 STANDARD, 1920, suaranted pertect, a:y test, repainted, new ewnal)

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STANDARD, $8 \mathrm{hp}, 1923$ model, licensed to the end of the yatu, rus
 STANDARD, 9.5hp. 1920, long wheclbace, all-wenther 2-seatur, dynamu
 STANDARD 1920 2-senter, all-weather, dickey, starter, linhting, of
condition and appearauceas new, $£ 195$. Vivian, 33 Spenser St. Viroti STANDARD, 2-sester, dickey, 2919, good condition, £120 A-cher,
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 STANDARD. Cass'g Motor Mart, Ltd, 1915, 9.5hp, 2-scater and dickey,

STELLITE 1Ohp 2-ecater, in perlect condition, $x 120$. Smilh Mulors,
Lid. Ifigh Rd. Goodmases, fondon.

 STELLITE, 2-seater, double dlckes, 3 -speed model, Lucas dynamo lighting, fully equipped, etc. perfect condition, $£ 105$. 2 Grevilio 1'I , Nonth
Kinsington. 2946 Western.
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 STONELEIGM (built by Mesurs, Armstrong), still under guarantec,

 SWIFT coupe, £125. Royal blue, $10 h \mathrm{p}$, Acylinder, dynamo, apare whecl, $_{\text {completely equinped. } 10 \text { Dover Terrace, Ricbmond. }} \begin{aligned} & 543-h 89 \overline{3}\end{aligned}$ SWIFT, $10 h n, 1921$, doubla dickey, starter and lighting, perfort
 SWIFT, 10hp, 1920,
Smith and Huater, 77
Gt. Porthand Sit, SWIFT, 1920 dynamo liphting, guaranteed periect, 200 mile trial
pleasure, rensonablo ofler. MIall, 54 Maygrova Ru., Brondesburv. SWIFT, 1920, 10hp. 2-seater, dickey, dynamo, tax paid year. 130
guineas. guineas
SWIFT, 1920-21, lohp, 2-acater, sunken doublo dickey, alarting and laghting tax paid year, 145 Guineas. 13 Kendrick Mcwa, Suuth Kens-
ington Station. Kenslngton 7276 . SWIFT, 1915, ShD, elecctric lighting, horn, sjecdoneter, etc., fully
 SWIFT, 52 Euineas exchangns, 2 -geater, 9 bp, 2 cylinders, 5 detachables, hond, sercen, limps pullg well, any examlation and trinl. gea-
bridge, 35 Ifansler Rd., East Dulwich. Sydenham 2452 . $543-612$ SWIFT, 1916, IOhp, with specint J-scater cloverleal coupo bods. eclf-
 SWIFT, 1921, IOhp, dynamo lightlng and startcr, dickey acal, fino
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