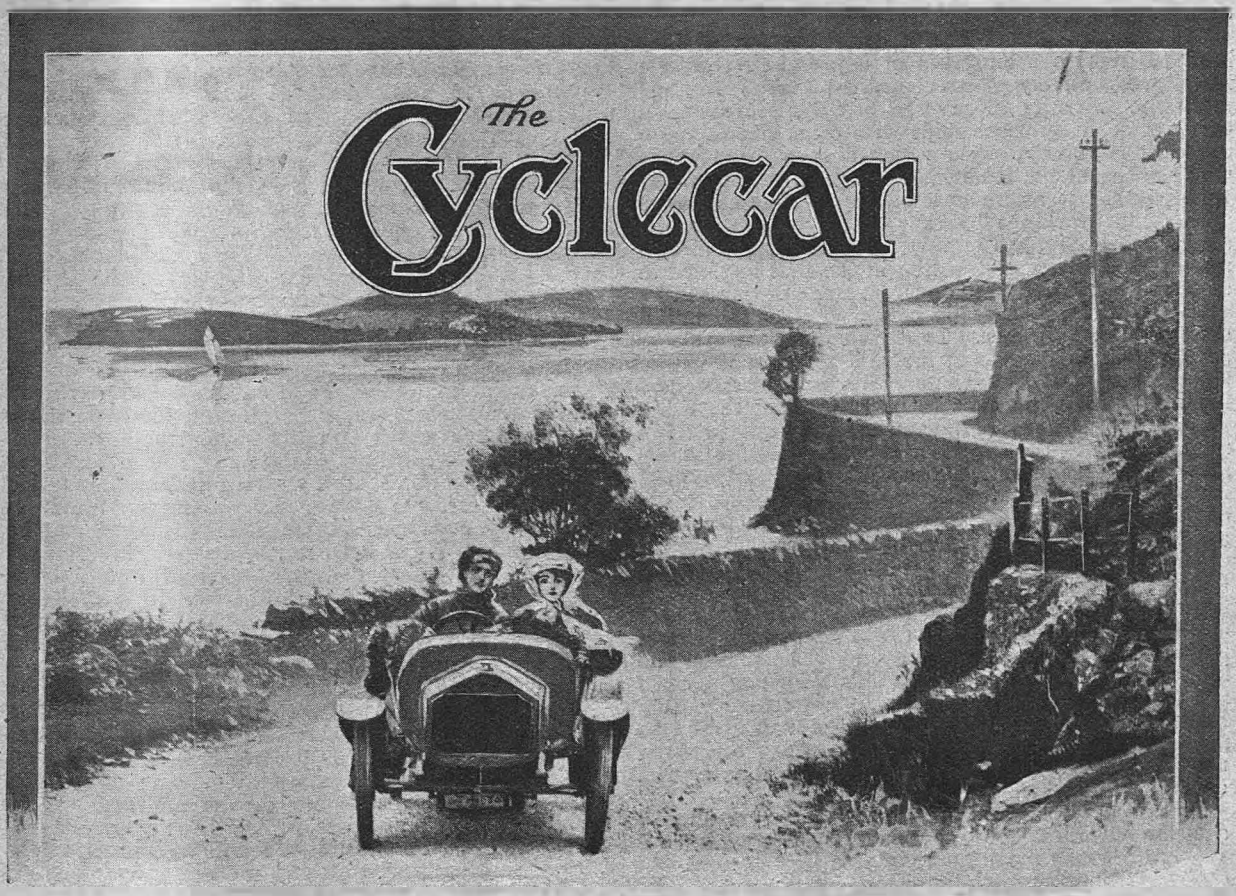


COUNTING THE COST OF A CYCLECAR.

Some Points for Consideration Besides the Initial Outlay.

THERE are three important considerations to be borne in mind when contemplating the purchase of a motor vehicle. These are the initial outlay, the expenses of upkeep, and the housing problem. Each is important in itself. It is perhaps difficult to say which of the first two is the more important. At one time, and that not so very far distant, it was a current rumour that only the rich could afford to maintain and run a car. The spread of the movement practically to all classes, and the informing capacity of the motor Press, have now nearly dispelled the rumour. Most people are aware that a small car, at least, can be maintained for a very little expense. It remains to be proved to them that the cyclecar can be run and maintained at a considerable reduction upon even the modest inroad that a small car makes upon the income of its owner.

To others the difficulty is not the upkeep, but the initial cost. They are satisfied that once the motor is purchased they would have no difficulty in keeping it going. It is the first outlay which is the trouble. To find a sum of £80 to £150 may be a comparatively easy task to many, but to others it presents insuperable difficulty, and these latter are by far the larger class. Amongst them are to be found tens of thousands to whom the cost of upkeep and running would be insignificant if they possessed the car, and for this reason: motoring is usually allowed to supersede other amusements and recreations. With the man of limited income the possession of a car generally acts as a focus for his recreative expenditure. Not wholly, of course. But many other means of spending are concentrated upon the running of a car. Instead of being diffused the expenditure is centralized, whilst the aggregate of enjoyment is easily maintained.

If, then, the difficulty of first purchase can be successfully overcome for the class now under review, there will be an immense access to the ranks of cyclecarists who would otherwise be debarred. Fortunately the remedy is in sight. Several firms of good standing are prepared for quite a modest initial outlay to supply the cyclecar, provided an agreement be entered into for the payment of the balance of the purchase money at the convenience of the buyer. The writer holds no brief for the credit and instalment system. It would be better far if it could be avoided. But since our social and economic relations are as they are, this is the way out for many, and in this connection there is infinitely more to be said for it than against it. The motor vehicle is the greatest builder up of physical and mental energy that has ever been devised. It gets the man and his wife and family into the open air; it provides a new zest for living; it is truly recreative. The motor is not an expenditure; it is an investment giving good returns.

It might be urged that, if a man can pay in instalments after he has obtained his cyclecar, he ought equally well to be able to save the money first of all, and pay cash down for it. This is not in human nature—not as a general thing. The difference is fundamental. In the one case it is mainly a substitution, in the other it is a sacrifice for a future benefit. Most men find it fairly easy to change a good thing for a better, whilst they find it equally

COUNTING THE COST (contd.).

hard to deprive themselves of a present advantage for a prospectively greater future advantage. The man who is going to save to buy a motorcar or a cyclecar in many cases finds that other needs, more urgently necessary, arise which absorb his savings. On the other hand, if he can arrange to get his motor and pay for it as he uses it, he is enabled to do without many things by the process of substitution alluded to above. The very nearness of the attainment of his object assists him in the first instance to accumulate the required first payment of deposit.

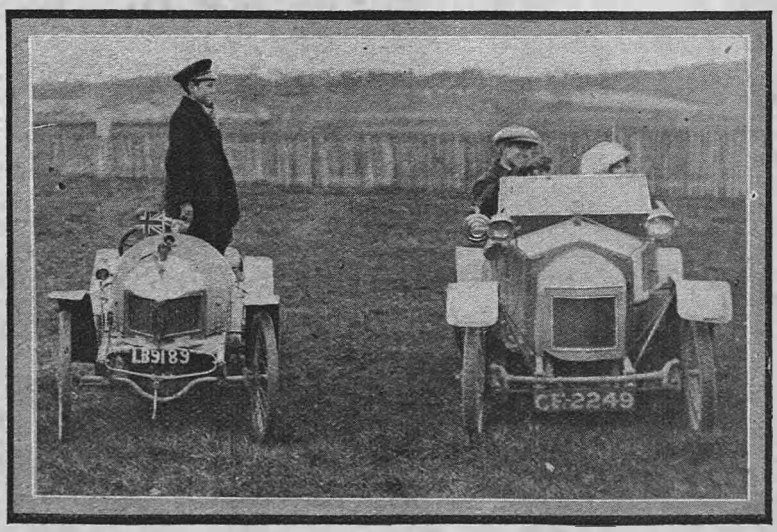
So far, then, it may be conceded that the initial difficulty has been met. The first cost of the cyclecar arranged in this way may be said to place it within the reach of almost everyone with even a most modest income. There remains to be considered the other two items. The cost of upkeep naturally falls into two main divisions—the expenses of running and renewals and the depreciation. Again the actual expenses of running will be determined mainly by the use made of the cyclecar. This has its own compensations, for, as a rule, the larger a man's income the more are his opportunities for leisure. Which is not to say his leisure is actually greater, because it may be that his larger income is directly attributable to the closer application to his business or profession. Be that as it may, the generalization is sound. The smaller the income the less is the leisure. This being so the costs fall accordingly. Instead of a long week-end, from Friday night to Monday morning, the man of limited means has to be content with a Saturday afternoon run and a longer run on Sunday—or possibly the run on Sunday may be all he can manage.

Other considerations now enter. The run may mean a 30 or 40 miles "out and back" taken without a break, or it may mean an aggregate for the week-end of 250 to 300 miles, with hotel and garage accommodation. It is seen, therefore, that as no hard-and-fast rule can be laid down for the initial cost of the cyclecar, so also it is not possible to suggest a weekly or yearly expenditure which will cover the recreation. But enough has been said to prove that the range of necessary expenditure is practically unlimited in either direction. The running cost for a normal cyclecar, say, an 8 h.p. twin, including tax and everything except depreciation, may be taken approximately at 2d. per mile. The weekly cost, therefore, may be anything under this head, from 2s. 6d. upwards per week. A fair average, including an occasional long week-end, should come well within 10s. per week, because unsuitable weather would account for some blanks. The more modestly inclined could, for 5s. per week, secure an immense amount of pleasure.

Depreciation has now to be considered, and it is here that one has to be careful, for so many factors influence the rate of depreciation that this is the most difficult of the three charges to determine. Every machine has a definite life. There comes a time ultimately when it is no longer economical to spend further sums upon it in renewals. It has to be scrapped. But the actual length of that life depends upon the care expended in avoiding unnecessary wear. Faulty driving, neglect of periodical adjustment, of regular cleaning, and of the maintenance of constant and efficient lubrication, will absorb easily two-thirds or more of the effective life of a cyclecar. Neglect to replace a worn part reacts to the detriment of the whole machine. Taken broadly, however, the depreciation rate should not exceed 20 per cent. per annum of the initial cost, and in the best circumstances should be nearer 5 per cent. The difference rests almost wholly upon the user's method and aggregate mileage. To the minimum average of 5s. per week for running, a similar amount might be allowed for depreciation, which should cover all costs under this head.

Housing is the final question. The alternative to the provision of a shed is the hiring of accommodation. The co-operative garage has been suggested, and where this is practicable it is perhaps the best solution. When, however, space is available in the garden—and most houses, rented or owned by the large class to whom the possession of a cyclecar is practicable, permit such use—the individual motor house is the best. It allows the owner greater facilities for overhauling, cleaning and adjusting, if it is absolutely at hand. A mere quarter or half an hour will frequently be devoted to this purpose if the cyclecar is on the premises, that would otherwise be omitted, and it is just this constant care that reduces the costs of maintenance and depreciation. The little adjustment is made that saves the expenditure of some shillings later in renewal. For a few pounds—three or four as a matter of fact—a sound house made in sections and easily fitted together can be purchased. For a little additional expenditure a space in front can be concreted or bricked for washing down. The cost of the house may be added to the initial outlay, so that no further tax on the income has to be made.

Reviewing the position now generally, it may be taken as demonstrated that for 10s. a week the cyclecar owner may derive a great amount of pleasure from his recreation, in addition to the benefits it confers in added physical and mental poise. If, also, he uses the cyclecar occasionally for business or professional uses, it will be found that he is actually the gainer by his investment. In practice it will be found that the sum spent during the year is not really an increase upon the normal expenditure for pastime, but rather tends in the opposite direction. Other sources of expenditure are cut down and that of cyclecarring substituted for them, whilst those directly affected—the family—are benefited in a way otherwise impossible where such previous expenditure, as is usually the case, is limited to the more personal pleasure of the one individual. J.W.F.



Watching for Hamel's arrival at Brooklands aerodrome. The cyclecar on the left is a home-built belt-driven machine, made by Mr. Welham, which, although only driven by a single-cylinder 3½ h.p. engine, took three passengers down. On the right is a Duo.

THE CALL OF THE ROAD.

THE JOTTINGS OF JOHN GILPIN, JNR.

AFTER 3000 MILES—WHAT HAD TO BE DONE.

SOME five or six weeks ago, after a very wet week-end, I had to drop to bottom gear right at the foot of Aston Rowant Hill, which, as those who know their Oxford road will not require telling, is the other side of Dashwood. This is a long winding ascent, not particularly steep—the gradient averages 1 in 21—but it is somewhat steep at the bends. Previous to ascending the hill, I had been running at a maximum number of "revs.," and my passenger was rather surprised at the very unexpected manner in which we had to come down to bottom gear on the easy first slope of the hill. I said nothing, but at the top had a look at the carburetter and found it, as I expected, flooding pretty badly. There was no time to make an adjustment, so I pushed on, and, of course, so long as the excessive flow of petrol could be neutralized by excessive speed, and the engine kept cool by its passage through the air, there was not much harm done. The long series of 10-mile limits in High Wycombe proved too much for the mixture, and, as previously reported, the result was a broken exhaust valve in the front cylinder, which, in 90 degrees engines, is always the one that gets hottest, owing to the fact that the oil does not circulate as freely as in the back cylinder. I mention this to show what a very important thing is proper carburation. Various experiments were made subsequently, with still very erratic running, until the trouble was discovered. It had happened at some time or other that the needle had been very roughly handled; the result was that the little rockers, instead of having free play, occasionally got jammed in the collar on the needle, whilst the needle itself would also occasionally catch on the float. The only cure was a fresh needle, which was cheaply replaced. Now, just to show the difference of efficient carburation, I may mention that a few weeks later I again took Aston Rowant Hill, this time on top gear all the way, the speed slacking off at the top to about 15 m.p.h., but without any sign of the engine knocking. This on a top gear of 4 to 1. The erratic running of an engine is usually traceable to the carburetter, although the magneto will sometimes repay any time spent in investigation.

As I took delivery of my machine in January, and expected, which experience proved correct, to have the worst weather of the winter months before me, I did not have it painted, but took it over in its first priming of neutral grey. Now, after 3000 miles, I have had it painted, and the opportunity to have the whole of the engine and the transmission thoroughly overhauled at the same time was taken advantage of.

Caught in last week's storm. The south of England was visited by a series of the most severe tropical thunder storms last week. The lightning was almost continuous and intensely vivid. Some of our staff had exciting experiences while the succession of storms lasted. The artist has endeavoured to convey an impression.

THE CALL OF THE ROAD (contd.).

At the end of 3000 miles one expects to find a good deal of work to do in any type of motor vehicle, especially one which has been used for business purposes and driven hard in all sorts of weather. There was, however, very little to do. The belts, which according to critics ought to be worn out by now, did not require to be touched; indeed, they looked as good as new. The chains had become quite slack, and had to be tightened. Beyond a little carbon deposit in the cylinders and some slight wear in the slots for the piston rings, there was nothing to be attended to. The compression was perfect; there was no traceable wear on the crankshaft or the big-end. There was plenty of oil in the crankcase, and it was clean and viscous. If there had been anything wrong with "Monogram 555" motorcycle oil, which I use in preference to any other, there would have been a dirty deposit in the crankcase and a considerable carbon deposit. There were one or two small cuts in the tyres, and my encounter with the tragical gentleman in Oxford who shoots across main roads "all-out" led to one of the rubber bars on the near-side back wheel being torn off. As Rom tyres are expensive and worth taking care of, I have had the cuts filled up and vulcanized and the same treatment applied to the rubber bar, and I have what amounts to practically new tyres, for there is very little wear otherwise. What motorcar driver can point to a result like that? The Eisemann magneto was in perfect condition except that the sparks for the two cylinders are of different intensity, a difficulty to be overcome in magnetos for 90 degrees engines. When the armature shaft is twiddled by hand, one terminal gives a fat spark ½ in. in length, the other a thin spark ⅜ in. in length, both quite enough to give very easy starting, and my engine usually starts up on both cylinders be it noted. However, I am looking forward to a trial shortly of one of the new 90 degrees Bosch magnetos with variable ignition. I venture to suggest that, if cyclecars were as badly constructed and as unreliable as some would have us believe, the results recorded could not have been arrived at after a test of 3000 miles.

Some few weeks ago Mr. H. F. S. Morgan joined issue with me over a suggestion that we did not want events in which cyclecars competed against sidecar machines. I hope he will not think me unkind, but if the French authorities persist in their decision that three-wheelers can only compete in the class for motorcycles and sidecars in the French Grand Prix, he will be able to demonstrate the truth of his contention in a very excellent way. At the same time it has never been the idea of the originators of the cyclecar movement that the cyclecar is a vehicle intended to replace the sidecar. It should appeal, and there is no doubt it is doing so, to a far wider field than this, and, personally, I cannot see much use in competing in events the rules and conditions of which are designed to cut down as far as possible the amount of successful motorcycle competitors.

The idea of the belt-driven cyclecar is extremely repugnant to the big Midland manufacturers. However, prejudice against belt drive will take a lot to wear down, and in the meantime it might be suggested they should turn their attention to other forms of transmission without copying the large car. Directly a manufacturer starts out to copy a big car, with a four-cylinder, water-cooled engine, gearbox and differential, and endeavours to produce it at a low price, at the same time conforming with the definition of the A.-C.U., he is faced with very serious difficulties. This was noticeable at the last Olympia Show, where cyclecars that were to be priced at or about £100 went up in price 25 per cent. or more before the Show opened to the public. Some of the makers of the miniature car have experienced very great difficulty with their machines, which probably explains why certain cyclecars that were exhibited at the Show have so far not made their appearance on the road. The engineering skill and factory resources got over the difficulty to some extent, and the higher-priced light cars with water-cooled engines are giving every satisfaction. With all of this, however, there is a noticeable lack of what might be termed liveliness. In traffic one has to be continually changing down, showing that the weight of the machine and the losses in transmission have greatly reduced the available horse-power. On the other hand, the miniature car certainly provides greater comfort for passengers and driver, but having an engineering job underneath the floor-boards, it is only natural that the manufacturers should prefer to turn out the upper story in a style to match with a proper coach-built body. Admirable as these machines are as light cars and filling an undoubted want, there is certainly an opening for something much cheaper, much simpler and much less of an engineering job. If, however, the big manufacturers will not look at belt drive, why do they not give their attention to chains, designing the machine, however, on original lines throughout? What can be done in the way of originality has been demonstrated by Mr. A. E. Parnacott. His model machine has a 499 c.c. F.N. engine; the drive throughout is by Hans Renold chains; its construction in every detail is original and simple; the machine is light; it is easily driven, very economical and has that very rare feature of the very best motorcar practice of separately-sprung wheels. The other day we drove over some of the worst roads in London in this machine at a good speed, yet the bumps in the surface were practically unnoticeable, and the machine was undoubtedly more comfortable than the best light car I have yet been in. It is extremely likely that this cyclecar will be shortly turned out in quantities.

John Gilpin, Jnr.

Forthcoming Events.

May.

9th, 10th.—M.C.C. London-Edinburgh trial.
10th, 12th.—Cyclecar Club Buxton tour and parade.
12th (Whit-Monday).—B.A.R.C. race meeting, Brooklands.
17th.—B.M.C.R.C. race meeting.
17th.—Sutton Coldfield and M.W.A.C. hill-climb.
25th.—Cyclecar Club rally at Brighton.
29th.—Hereford A.C. cyclecar reliability trial.

June.

—.—Cyclecar Club open hill-climb.
4th, 6th.—Tourist Trophy races in the Isle of Man.
7th.—Midland A.C. hill-climb at Shelsley Walsh.
14th.—B.M.C.R.C. race meeting, Brooklands.
19th.—Cardiff M.C. hill-climb at Caerphilly.
21st.—B.A.R.C. race meeting, Brooklands.
21st.—Cardiff M.C. speed trials at Portheawl.
28th.—Cyclecar Club "lobster supper" run, Selsey.

July.

5th.—M.C.C. meeting at Brooklands.
13th.—Grand Prix race for cyclecars, Amiens.
21st to 26th.—Scottish Six-days Trial.

LESSONS OF THE PETROL-CONSUMPTION TRIAL.

Valuable Suggestions for Obtaining Greater Economy.

By Dr. A. M. Low, A.C.G.I., D.Sc.

IT really scarcely seems fair to talk about the "lessons" of a petrol-consumption trial, for to attempt to criticise the results or to point the moral of certain figures seems to take it for granted that the facts have been considered from every aspect in order that the comments may be fair. Now this is quite impossible, and in brief notes such as these, written in a non-technical manner, it is impossible to do anything else but to indicate a few of the broad facts upon which the results rest and to illustrate how deceptive they may be at first sight.

THE FUEL.—Let us begin by considering what we have at our disposal. Whether we are using petrol, benzole, or paraffin, our object is really not very much different, although we may have to adopt very different and special means to secure our results. All these fuels are comparatively easily boiled or vaporized, and we have to get into our cylinders a mixture of vapour and air which, strictly speaking, we can only do by first vaporizing our fuel and dealing with it whilst in a genuine state of gas. This, however, we need not go into, for though it is one of the greatest conditions for efficiency, there is really no attempt at it in the ordinary engine or carburetter.

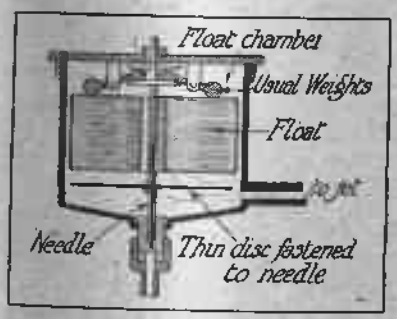


Fig. 1.—A disc fastened to the needle, and just clearing the float chamber, damps the needle vibrations and will effect a great saving of fuel.

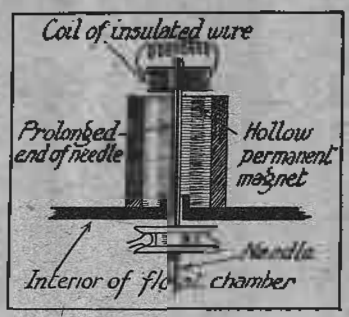


Fig. 2.—A wire coil surrounded by a permanent magnet will check vibration of the needle better than a simple friction device, and its sensitiveness can be varied.

WEIGHT.—In any consumption trial, such as was recently held by the Cyclecar Club, we have all sorts and conditions of vehicles competing, and the results might in many cases be prophesied by careful observance of the machines and their fittings. One might imagine that heavier machines would invariably run less miles per gallon than the lighter, but the "efficiency" of the various drivers varies to such an extent that the weight of the machine has scarcely any effect on the apparent result. It is not fair to make statements on the result of any competition, for the results depend as much on the driver's individual skill, his knowledge as to the most economical speed of his engine, the course, and wind and road conditions. Neither is it really accurate to state that one carburetter shows itself to be pre-eminently superior to any other because some are capable of more accurate adjustment than others, which would possibly give better average results, especially when in the hands of the ordinary user. At any consumption trial many more or less ingenious devices may be observed, one of the favourites being that of the variable jet, operated from the steering wheel, which is certainly an excellent plan in its way. One also very often sees special warming arrangements to counteract the cooling effect on the carburetter and inlet pipe caused by the evaporation of the spirit.

PETROL VAPOUR.—It is very interesting to notice that all these devices are entirely fitted with one object, and that is to enable the engine to draw petrol vapour of more-or-less regular density and containing a reasonable amount of air from the inlet pipe into the engine. Everyone attaches more importance to this than to the direct use of a small amount of petrol, simply because they think it of far more importance to obtain a regular firing mixture. It is often suggested that, to obtain a low consumption, the petrol tap might be turned on and off, quite a sensible suggestion, and one which is worthy of note, for it points to the fact, which is fairly obvious, that the petrol level in the float chamber is always higher when the engine is running than when it is stopped, not only due to the suction of the engine, but because the vibration lifts the needle valve off its seat at frequent intervals.

FLOODING.—This suggests an interesting means of saving petrol, and, moreover, one which is very effective. If we attach a round, thin plate nearly as big as the inside of the float chamber to the needle, altering the weights to make up for it, as shown in Fig. 1, the needle will not be able to vibrate up and down, as the plate, being surrounded by petrol, will act as a damper, often saving as much as 10 to 20 per cent. of the petrol used. Another effective device is to continue the needle, when possible, through the float chamber by means of a steel rod, fastening on to it a coil of wire surrounded by a hollow permanent magnet, which, whenever the float tries to jump, causes a current to be generated in the coil, resisting the rapid motion of the needle, having, in fact, the effect of an oil damper or dashpot such as is used for softening the rebound of springs (Fig. 2). A rubber friction device, if carefully made, will effect the same object. Having considered the effect of getting the petrol into the float chamber regularly, it immediately comes into one's mind that this supply could be regulated on entry to the engine, but that can only be done by the use of a governor or a pump worked from the engine itself. One might point out at this stage that it is most unsatisfactory to place the petrol tank close to the engine, as an appreciable amount of loss will take place by evaporation, as can easily be seen on a hot day.

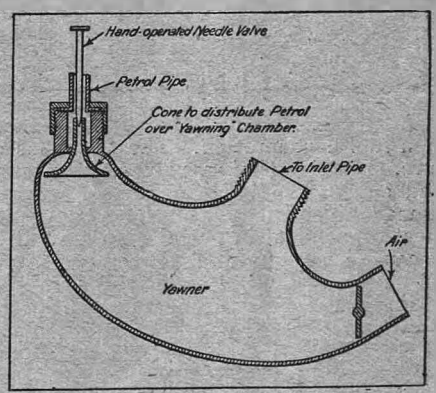


Fig. 3.—A "yawning" carburetter has been tried and gave wonderful results. The control is entirely by the air and petrol valves, and the eddying air absorbs the petrol, forming a perfect mixture.

PETROL CONSUMPTION (contd.).

PIPES.—The petrol pipe itself is with great advantage made flexible, and one might do worse than use a piece of thick rubber tubing on very light vehicles which suffer a great deal of internal vibration. In any case, the petrol pipe should have several vertical coils at each union, and all these joints, together with that of the filter, should be screwed up tight; the addition of a little soap on the joint lubricates it while putting it on, and allows the union to be made tighter without the risk of spoiling the nut; the petrol is unable to dissolve the soap for some time when under pressure. Petrol is extremely volatile, and its vapour will permeate most metals unless they are of good quality and the parts solidly made.

WASTED SPIRIT.—Let us consider for a moment the vehicles in a consumption trial. We see three-wheelers and four-wheelers weighing anything between 4 cwt. and 10 cwt., and very often the heaviest does the best. Now, this is not so strange as might be thought, for the heavier vehicle usually suffers less vibration and has often the larger and more thermally efficient engine, especially if it is a single-cylinder and water-cooled, and the lightest may have a large engine of a high horse-power capable of high speeds, which is one of the greatest causes of high fuel consumption. The questions of back pressure, of engine timing, valve setting, and lubrication, and any of the hundred and one details which go to make up an effective machine, all decide which is the most economical in petrol. To a great extent this is because when one wants speed one must have plenty of mixture, and to do this properly with the ordinary carburetter one must suck through much more petrol than is necessary, because a large percentage of it is never vaporized at all, but simply comes into the cylinder as atomized particles, and passes out only half-consumed, not only wasting fuel, but, if one may be permitted the expression, occupying space which might be taken up by a mixture of gas capable of effective explosion.

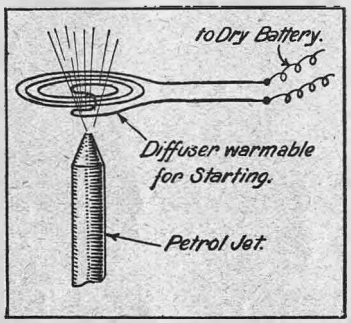


Fig. 4.—An electrically-warmed diffuser or coil of platinum wire enables a start to be made on fuels as heavy as paraffin.

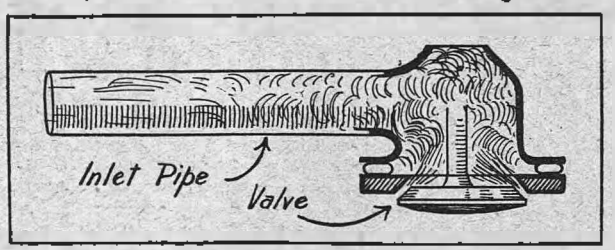


Fig. 5.—The gases surge into and whirl in the inlet pipe as the valve shuts, compressing the mixture and causing rebounding and waste of efficiency.

It is quite surprising how little one can judge from appearances, and most interesting to see how small an effect weight apparently has, for we constantly have the remarkable result of a heavy machine being very much better than one which is about half the weight. We see G.W.K. and Zebra machines, which one would not expect at first sight to be particularly low in petrol consumption, able to beat, for example, the Morgan, which one would expect to do better than its heavier four-wheeled brothers. There is no doubt that the thousands of factors which we are often liable to call chance have a great deal to do with any trial; the skill with which a machine is driven, and, above all, the care with which it is prepared for the event, have a very great bearing on the question; nearly every carburetter wastes a good deal of fuel by its vibration alone, and they also waste petrol by actually allowing it to be blown back instead of taken into the engine, chiefly because the momentum of unvaporized petrol particles is greater than that of the surrounding apology for a gas. It is this that leads to the partial success of the long air pipe and crank-chamber vaporizer, to the attempts to blow the petrol in by the help of the exhaust, by heating it, or by surrounding the inlet pipes with hot air, which may often be overdone and cause attenuation of the mixture. Much of this can be avoided by the use of a controllable jet, but it is only a half-measure. No spraying arrangement can be worked without appreciable local pressure, and this cannot be obtained by pure suction of the engine alone, owing to the comparative lack of pressure on the surface of the fuel.

A "YAWNING" CARBURETTER.—One device which often strikes me as practical is what I might call a "yawning" carburetter (Fig. 3). Now, by this I mean that if one happens to blow gas through a rapidly-increasing aperture, and if the surface is not dry, it will not only act as a surface carburetter, which is an extremely good thing, but it will combine itself with a spray, and the liquid will separate from the walls of the chamber and be propelled forward at lower velocity in a very fine state at reduced pressure. This accounts for the fact that, if one holds a looking-glass opposite one's mouth when yawning, it will become far more moist that when breathed upon in the usual manner, and the moisture will be in an exceedingly finely-divided form without the use of a pressure of more than half a pound per square inch, so we may yet see a yawning carburetter on the market. A wick carburetter is unable to act sufficiently quickly unless of great size, but would otherwise be even better than its surface prototype, which might with advantage be combined with the modern spray in both these forms. It is frequently an advantage to use an out-of-centre, broken, or slightly-crooked jet, as it promotes to a great extent a whirling action of the partially-vaporized mass without the internal friction being correspondingly increased, so that it is open to doubt whether a pure venturi action is entirely desirable. None of these devices would require any special tuning, and it is facilities for tuning and the personal element which ruin the technical value of these consumption and other trials. The personal element, however, is all-important, owing to the possibilities of external tuning, which perhaps only exist for one short afternoon while the competition is taking place.

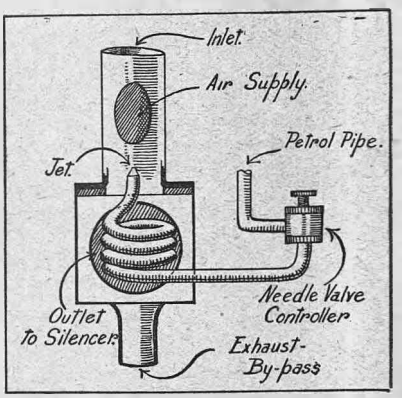


Fig. 6.—If the jet is connected to a coil heated by the exhaust, into which the petrol is run from a hand-controlled valve, a supply of perfect mixture can be drawn in by the suction of the engine.

INLET PIPES.—A point of interest often overlooked is the importance of arranging inlet pipes on cars in a proper manner; now it is often thought that

PETROL CONSUMPTION (contd.).

racing cars and touring cars must necessarily require a very different arrangement, but this is not always the case, and there are many engines which would actually gain to a degree by a reduction of diameter or increase in length of the inlet pipe; it is common to find an old car which is extremely effective in getting mixture into the cylinders. With the modern high-efficiency engine, carburetters are expected to work at high velocities, and therefore variable valves or arrangements for setting the gas in motion in the inlet pipe seem to be frequently necessary; experiments have certainly proved that the whirling caused by the momentum of the gas and the shock of its entry to the cylinders are extremely important in obtaining an effective explosion. All this is because an ordinary engine does not run on a proper mixture of petrol gas and air, and in no other way can real efficiency be obtained.

MIXTURE AND EXPLOSION.—One is willing to put up with a great deal and with a slow explosion if one gains correspondingly by a temporary increase of flexibility, compared with other considerations. When the inlet valve of an engine closes, the gas has reached a high velocity, equal to many feet per second, in the pipe, and as the valve reaches its seat, the poppet valve, by its nature being designed to open and close very rapidly, suddenly stops the flow at one end of what might be compared to a spiral spring. The other end of the column by no means follows suit, but continues to compress the gas in front of it proportionately, and then rebounds back and wastes a large amount of petrol; this also applies to the action of the gas when it first strikes the cylinder walls (Fig. 5). Valuable as this may be in helping what is really not a gas at all to become a fairly rapid explosive mixture, it quite ruins the efficiency of an engine, although such local vaporization and slow local burning may be made use of under certain conditions, especially in engines of high compression. This effect might be used in some cases, when the inlet pipe is plain, to help in the induction stroke of the next cylinder of a twin engine, but this would only apply with any force at one speed, which cannot be too strongly pointed out to those who design carburetters with the one idea of "constant" flow fixed firmly in their minds. In consumption trials one seldom notices any special devices, and attempts to dissolve acetylene in petrol are never in evidence, though it would apparently be very simple to arrange for an extra supply of acetylene from a dissolved gas apparatus. The mixture on an ordinary engine, unless the flow is kept in action by a master vibrator to damp out minor oscillations, is varying the whole time over the widest of limits, and the presence of liquid petrol particles adds to this effect, which is not in any way assisted by the venturi or multiple jet carburetter, unless these are arranged in a special manner. Carburetters which claim to dust the petrol are designed in such a manner in most cases that their proportions would only be correct were they to operate under ideal conditions, and no carburetter can come up to this standard. No part of a carburetter is ever stationary, neither is any part of any machine, but this only serves to show how important the problem is, and it would appear that many of the old automatic air carburetters might with advantage be combined with some modern devices, always remembering that we have, as a rule, a pressure of not more than 15 lb. per square inch to play with.

ATOMIZING JETS.—Jets must not flood all the time, and it is very much to be doubted if a plain arrangement of taps could not be made to reproduce the working of the ordinary float, or whether some much more sensitive apparatus is not wanted. The admission of oil and water close to the jet to assist in cooling and lubrication respectively is worthy of consideration, as is also the suggestion of an electrically or otherwise warmed grid close to the jet for starting and other purposes (Fig. 4). The modern petrol tank is often totally closed, and therefore there should be no difficulty in adding to its pressure or reducing the petrol to a state when it would rapidly be vaporized by removing its pressure either with the help of one side of the piston and the crankcase in a two-stroke or double-acting engine, or by a pump which is separately worked by the engine itself.

A PRESSURE CARBURETTER.—From this it is but a small step to heat the petrol, vaporize it, and use it in a charge of compressed air, but this clearly cannot be done with an ordinary engine, though in Fig. 6 a most useful arrangement is shown which gives a wonderful degree of economy and engine speed. The resistance of the coil prevents blow-back and a pressure feed made with the help of a bicycle valve and pump removes any trouble and enables it to be used on any engine. If the fuel is truly vaporized in this way, an end which no atmospheric carburetter even approaches, its specific gravity is of less interest, and quite heavy fuels can be used without alteration of one part of the apparatus and without the knocking which a heavy fuel may cause owing to deposits in its mass, chiefly due to the unvaporized condition and apart from the degrees of compression. The whole subject has too often been treated from a detailed aspect, and it is of little use in comments on a trial to say that roads were good and windage slight; all this can be rendered of little account by attention to the main issues. It is a subject of the highest importance, for on it depend economy, silence, durability, and pleasant running.

HEAVY FUELS.—It is not necessary to deal separately with heavy fuels or with benzole; the heavier the fuel the greater should be the m.p.g. if it is really all burnt, and the variation of boiling-point of the heavier oils is not such as need alarm except when a plain carburetter is used with paraffin, or shall we say where the boiling varies immensely with the pressure and temperature. If paraffin is used, one obtains a high mileage per gallon, but if the fuel is heated by the engine in any ordinary way, unless it is controlled by a temperature regulator or thermostat, the mixture will be varying practically instantaneously all the time, requiring great skill to obtain anything like perfect conditions. One might in this case again apply the remark that an infinite amount of irregularity is equivalent to regularity, and one might split up the fuel in order to use just sufficient for the engine at any moment—for the flash system is becoming more and more used—and we could then vaporize the fuel directly. The fuel could be electrically heated to an absolutely constant temperature and the pressure might be varied or the fuel brought under a constant reduced pressure by means of a pump forming part of the engine. Paraffin sometimes causes knocking, chiefly because part of its hydrocarbon is likely to separate out, propagating a more instantaneous explosion, nullified in practice by a water or steam injection. The stronger a mixture the longer as a rule will be the time taken for its explosion, as the gas cannot burn with what amounts to an insufficiency of oxygen for complete combustion and when the fuel is not all in the form of a perfect gas.

[The foregoing article is in the nature of a report by the two judges, embodying the observations of both, of the Cyclecar Club Fuel-consumption Trial, held on the 19th April. The judges were Dr. Low and Mr. A. E. Parnacott, who also contribute interesting letters appearing in our "Thoughts and Opinions" pages this week. As economy of running is the keynote of the cyclecar movement, it is hoped that the very considerable amount of space which we have devoted to the subject of carburation in this and previous issues will be reflected in the improved running of many machines.—Ed. The Cyclecar.]

VARYING THE JET.

Improved Carburation. The B. and B. Variable-jet Carburetter.

CARBURATION is of such importance for cyclecar engines, which are called upon to put out a far greater proportion of their available power than in either motorcycle or motorcar practice, that every device for giving efficiency and economy is of the utmost importance. A carburetter adjustment giving too rich a mixture is also badly overheating the engine, increasing the noise and decreasing its power. An extra air lever is decidedly an advantage for the best automatic carburetter, but a still further improvement would be a jet, the size of which could be varied at will.

The advantages of a variable jet are not only to enable experiments to be made, in order to discover the happy medium that best approximates to the average conditions of running, but continually to alter the supply of petrol to meet those conditions as they vary. A carburetter thus controlled would be almost ideal. It could be varied to suit different spirits, altering weather conditions, long ascents and descents, a rise or fall in temperature. The size of the jet could be altered by a touch of the fingers.

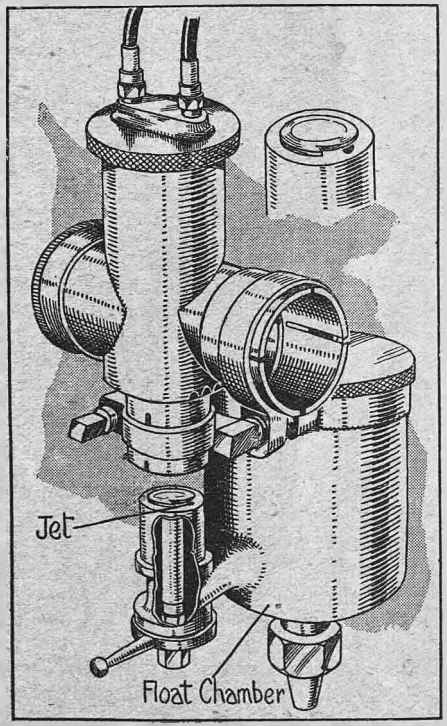
A carburetter that fulfils these requirements, with a jet that can be made adjustable from the steering wheel, is the variable jet B. and B., made by Messrs. Brown and Barlow. This carburetter closely resembles the "straight-through" fixed jet type. No air is admitted from below, six small holes being drilled above the locking collar instead, thus directing a stream of air directly across the top of the jet. This, combined with the main air in the same manner, should have an excellent atomizing effect, even when the largest size orifice is in use.

The variation of the jet is carried out quite simply. The jet orifice is pierced eccentrically through a solid brass extension of the float chamber, the top of which is cut flush. Over this rotates a brass cam, so cut that when turned as far as it will go in either direction, it completely covers the orifice. As it is rotated, the edge of the cam gradually uncovers more and more of the jet, until it is fully open, thus varying its size by infinite gradations from zero to maximum.

As supplied, the jet is operated by hand. There is no reason, however, why a Bowden wire should not be suitably attached to the lever so as to operate it from the steering wheel, when the jet can be varied under way.

It certainly sounds fascinating to be able to vary the jet at pleasure, and the fact that it can be shut off entirely would give the driver a chance materially to cool his engine when descending a long hill, as both throttle and air levers could be opened fully, quite a different arrangement to upsetting merely the mixture by opening the air wide and the throttle a little. It might be argued that when the jet was partially closed the hole would not be circular, thus preventing the proper emission of the petrol. This, however, is not borne out in practice, the semi-circular orifice helping to break up the petrol—thus giving a better mixture, if anything, at slow speeds.

The other features of the carburetter are practically identical with the ordinary B. and B. The petrol is received through a needle valve into the float chamber, causing the float to rise and lifting two rockers working in a collar on the needle. As the rockers lift, the needle is depressed on to its seating and the supply cut off. Thence the petrol flows to the jet, is sucked up by the engine into the mixing chamber, which has a gauze-protected extra air port on one side and the outlet to the engine on the other.



The B. and B. variable-jet carburetter. Inset is shown an enlargement of the device for varying the aperture of the jet.

A long air pipe can easily be fitted, screwing directly on to a boss that in the standard models is covered with a gauze. This gauze is made in rather a novel manner, for instead of having a double piece of gauze set closely together, the two portions are bent away from one another, so that, whilst excluding the smallest particle of grit, they would not at the same time clog up readily.

An excellent point of the B. and B. is its extreme lightness. Detail improvements have been carried out on the throttle and air slides this year. An excellent feature is the polish put on the surface of these slides where they come into contact with the barrel of the carburetter. Fitted with the wheel-controlled jet this carburetter should have a large sale amongst cyclecarists, as the carburetter is an excellent one, and is not prohibitive in price, while its efficiency has been proved.

In the Surrey M.C.C. trial for the Crow Bros. Cup last Wednesday, a G.W.K. was entered and tied with a P. and M. rider for third place.

Owing to the Whitsun holidays, the next issue of The Cyclecar will be published Wednesday evening, instead of morning, and will contain illustrated descriptions of all the holiday events.

Monocars at Brooklands.

There are seven entries for the cyclecar handicap at Brooklands on Whit Monday, including the Carden and the Lester single-seaters. The other entries are a Chota, two G.N.s, an Arden and a Baby-Peugeot. A 100 m.p.h. handicap run on benzole is another interesting event of the afternoon.

A Private Entry for the Grand Prix.

Mr. D. C. Bolton, well known as a competition rider of Rudge motor-bicycles, has entered a four-wheeler for the Cyclecar Grand Prix. The machine, which is fitted with a 1100 c.c. water-cooled Precision engine, is being constructed by Mr. Bolton in his private workshop, and is to be called a Bolton-Precision.

The Cult of the Torpedo Tank.

There is no doubt that a torpedo tank gives a very sporting appearance to a cyclecar. On our front cover this week appears a group of different machines, including a Grand Prix G.N., a tandem Sabella, another G.N., and a Morgan. The scene is Aylesbury, at the stop for tea on the recent Midland rally.

THE LIGHTER SIDE.

Some Amusing Incidents of a Young Pastime.

By JOHN GILPIN, JNR.

"Merely the promptings of curiosity."

EMERGING from a restaurant the other day, outside which I had left my cyclecar for about an hour, I was horrified to see a huge crowd of people blocking out all view of the machine, while two policemen were actively engaged in the almost impossible task of keeping the footway clear. Fighting my way through the throng, and wondering what had happened, I discovered to my no small relief that it was merely the promptings of curiosity. They must have been very imperative, for one gentleman had his head right inside the bonnet, endeavouring to fathom the secrets of tune by peering into the long copper extra-air pipe. Another was twiddling the tap on the top of the generator with some effect, for the carbide chamber was hopelessly flooded, while a third had discovered, and seemed to take as much pride in the discovery as any Christopher Columbus, that by switching on an array of levers he could make the electric lamps glow. I hastily cranked over the engine and drove out of an awed and deeply-interested populace without encountering the very busy officers of the law.

* * *

Perhaps I was fortunate, for another cyclecarist of my acquaintance has been spending the last month or so in the strictest retirement. Not that he has been "quodded," but he very nearly was. He also left his machine outside a restaurant in the West-End of London, and the usual crowd gathered round. Presently a fellow cyclecarist hove along, and, seeing the attention the machine, which he recognized, was attracting, climbed in and proceeded to light a cigarette. Up strode a minion of the law.

"Your name and address," said he, cheerfully.

"What for?"

"Leaving a motorcar unattended."

"Nothing to do with me."

"Are you the owner?" asked the constable.

"Not me," was the reply; "I wouldn't be seen dead with the beastly thing," and accordingly he crawled out and awaited developments.

Just at this moment a gentleman who might have had some remote association with the offending machine, seeing that he carried a starting handle, strolled up. He was speedily acquainted with the fact that the police were looking for the owner, and with the first-accosted pseudo-cyclecarist proceeded to enter into a spirited conversation with the constable on his interpretation of the law. In the course of conversation the two drew further and further away from the offending machine, accompanied by a sporting crowd, scenting cheap post-prandial amusement. Meanwhile someone else—he might have been the owner, or at any rate the responsible driver—sauntered along, calmly started up and drove away before the outraged law could be provided with the

THE LIGHTER SIDE (contd.).

necessary information as to identity to precede a summons. The crowd hugely enjoyed the encounter, but the sequel was no less interesting.

When he returned to his office, our retiring friend ventured to ring up Scotland Yard and inquire the rules and regulations regarding unattended motors.

"'I wouldn't be seen dead with the beastly thing.'"

"How long may you leave a machine outside a restaurant?" he asked.

"It depends upon the police—it is at their discretion.

"Well, do the police allow a motorist to leave his car outside a restaurant while he gets his lunch?"

"Sometimes—*but not in* ——— *Street!*" (Cut off.)

When he got home the timely information was brought that a policeman had called and wanted to have a word with him, and would call at 8 a.m. No breakfast and an unusually punctual appearance at the office resulted. Next day it was his dinner he missed, and for quite three weeks this game of hide and seek was played until the police got tired and desisted from their inquiries.

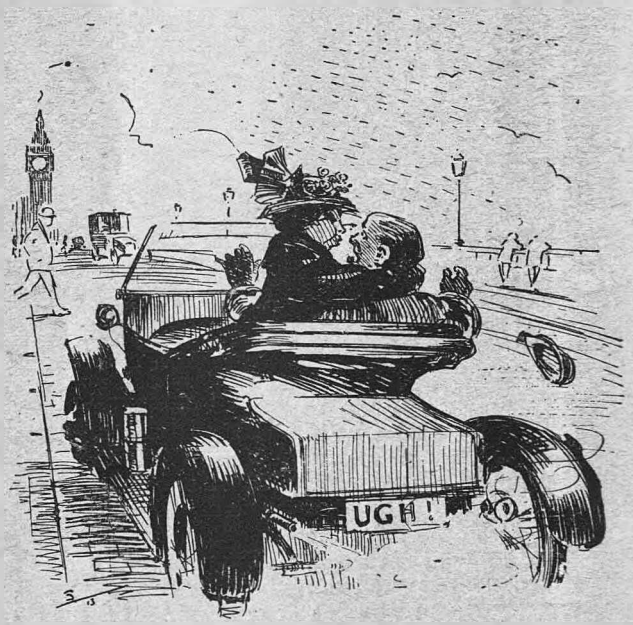
* * *

Wherever one goes the cyclecar attracts extraordinary attention. Once, when I was driving in traffic, the not particularly silent exhaust attracted the notice of the driver of a car in front of me. He turned round, and seemed so surprised that he trod on the accelerator pedal by mistake and crashed into the back of a motor omnibus. In the resulting mêlée that took place I decided to vanish, as it wasn't altogether my fault.

* * *

Treading on the accelerator pedal by mistake is not an uncommon fault. It led to one of my friends being placed in a very embarrassing situation with a lady clasping him round the neck. The lady was driving a car, and, seeing the cyclecar crossing her track, did the wrong thing, crashed into him and landed in the empty passenger seat, affectionately embracing the owner of the wrecked machine.

Another situation, equally embarrassing and not without a touch of humour, occurred to a driver who frequently took week-end trips to the seaside, driving the machine solo. He usually paused for refreshment on both the Saturday night and Monday morning journeys at a wayside inn. A domestic at the hostelry, with much impudence, suggested one Saturday that, as he never had a passenger on the return journey, he might drive her up to town. The driver gave some sort of joking assent, mildly amused at her cheek, and then forgot all about the incident. On Monday morning he called as usual for his rum-and-milk, and lo! the lady was attired in her Sunday best, all prepared for the trip. There was nothing for it but to take her back, hoping to drop her before the neighbourhood of his office was reached. The passenger was a most obvious "slavey," in a most alarming get up, with a huge hat in which a perfect Covent Garden display of flowers fought for mastery in a colour scheme with huge bows of violent-hued ribbons. The lady was delighted with the trip, and on reaching Westminster Bridge requested to be put down, throwing her arms round his neck and giving him a resounding "smack" as the machine slowed up. Without daring to look to right or left, the cyclecarist drove off at a furious speed, and hoped that none of his friends had seen him.



"Throwing her arms round his neck and giving him a resounding 'smack.'"

* * *

An extra outlet for the petrol, if in an accessible position, is very useful for rinsing the hands after probing into the nubian mysteries of chains and dog clutches. This distinctly useful feature did not pass observation at a meeting attended by some bright spirits. While the cyclecarist was busily engaged in the hotel, some wooden sticks were procured and tied on to the tank, on which two dainty towels, that might have been abstracted from an A.A. box, were hung, a small wash basin and a piece of soap rested between the cylinders, and when the owner returned he found his machine decorated with a notice that a "wash and brush up" cost 2d!

THE LIGHTER SIDE (contd.).

In the early days of the movement the engine of one of the first cyclecars exhibited a very great reluctance to fire on both cylinders, and the machine refused to proceed even on the low gear. The agent had just taken delivery, and with the help of his assistant and the intending purchaser was endeavouring to get the machine to his garage. Many hours were spent in trying to locate the source of the trouble, which I believe was due to the mistiming of the magneto, and eventually the assistant was requested to give the machine a start by pushing it.

The driver and his friend climbed in, the engine barked painfully with one lung, and proceeded slowly up the street. On they went at walking pace, drawing nearer to the desired goal every minute. "At any rate she will run very slowly," said the agent in a reassuring manner to the would-be owner. "Oh, yes—and you've got the other cylinder in reserve," jokingly replied the latter. They continued like this for well over an hour. At the end of two miles a choking voice remarked from the back of the machine, "I've had enough!" Looking back, there was the assistant. He had pushed it the whole way!

* * *

When we were preparing to emerge from the garage yard of the Red Lion at Banbury on the occasion of the Midland meet, we were suddenly startled by a deafening report. As one man each cyclecarist rushed to his machine, suspiciously felt each tyre, and the spare wheel as well, if he carried one, and gave a sigh of relief. Then the culprit gave the show away by letting off another of those enervating bombs that the law permits the childish mind to indulge in. The same individual recently dropped one—accidentally, of course—behind a taxicab, and the way that driver slammed on his brakes and rushed to the back of his car was pathetic. However, when people find that their outer covers are still sound in wind and canvas they usually forgive the practical joker.

The following is an incident that happened a few weeks ago. Repairs to the front axle had been carried out, and apparently the work of refitting had been left to the tender mercies of a youthful apprentice. Noticing nothing wrong, the owner of the machine started up, jumped in, and proceeded to drive away in quite Grand Prix style. He fetched up violently at right angles to his direction of progress inside the side door of the garage. Straightening up, and rather surprised at the suddenness of the skid, he gave the steering wheel a wrench to the right and the machine bolted to the left. A hasty examination revealed the interesting fact that the apprentice, in replacing the front axle, had reversed the steering!

* * *

I will conclude with a few scraps of conversation overheard recently. The scene was Brooklands, where Dr. Low was testing his lapometer, which, as those who remarked the illustration in our last issue will know, is remarkably like the domestic egg-timer in appearance. Somebody evidently appreciated this, for as he held it up a voice from the crowd was heard: "And I'll have mine lightly done, please!"

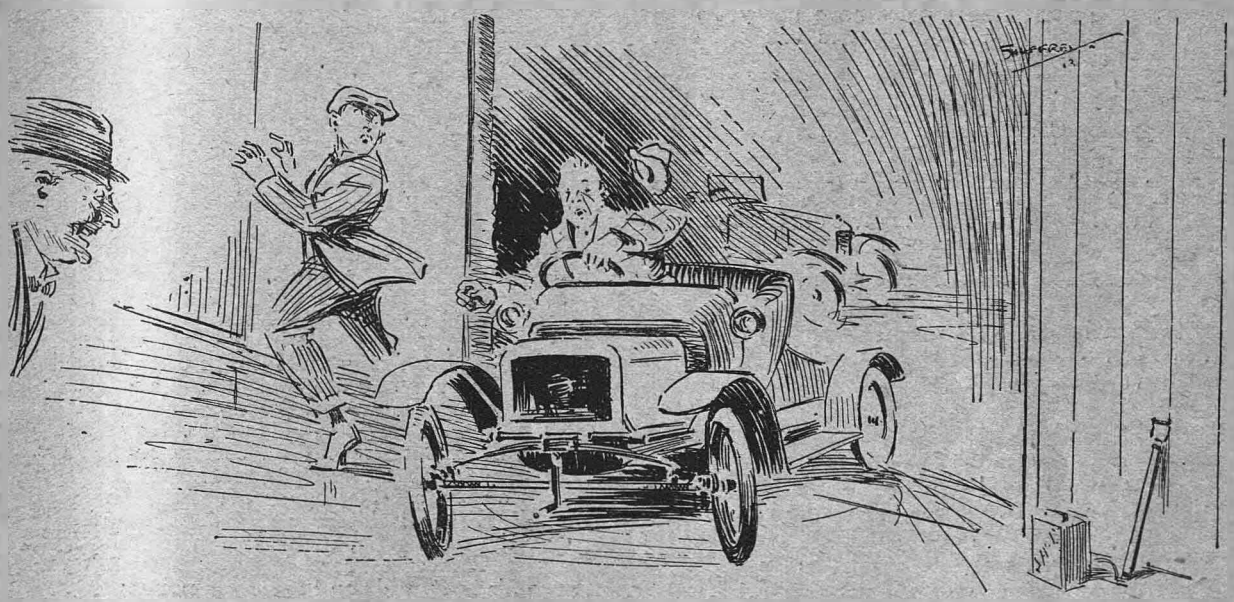
* * *

Driving in the City the other day, one of our staff failed to observe the policeman on point duty holding up the traffic near by a well-known tailoring emporium, and his machine nosed up in advance of the uplifted hand.

"Hi! come back!" cried out the outraged representative of the law. "Do you take me for one of those dummies?" jerking a thumb in the direction of the elegant models in the shop window garbed in "our 30s. lounge suits."

"No," was the reply, "I can only see your boots."

The constable was still working it out when the traffic moved on, and no doubt some of the readers of The Cyclecar are likewise busily engaged. When they have recovered they might send along a few yarns for the delectation of others.



"He fetched up violently at right angles to his direction of progress inside the door of the garage."

THIRTY-ONE ENTRIES FOR THE CYCLECAR GRAND PRIX.

The Machines that will Meet in the Race. The Exciting Nature of the Course.

(From Our Paris Correspondent.)

AS the list stands at present, there are 31 entries for the cyclecar section of the French Grand Prix, to be contested at Amiens on 13th July. France, with 18 machines entered, is well represented, for every firm of importance is to be found on the list. The 13 English machines, however, do not represent adequately the cyclecar industry of the home country. The expenses of taking part in the race are rather high, but there is the compensation that this race is the only officially international one of the year. All other events are put on foot by subsidiary clubs, whilst the Grand Prix is under the direct control of the Automobile Club of France, and will attract a bigger crowd and excite more interest than all other French races combined. It is quite possible that the list of 31 competitors will be further increased, for, under the rules, entries made by post before the official closing hour will be accepted. The day following the closing of the lists is a holiday in France; thus these late entries have not yet been made public. Further, late comers can enter at double fees until the end of May.

Three-wheelers.

The Sporting Commission appear to have made the mistake of providing too many classes for the cyclecar race. Under the rules, cyclecars of 750 c.c. and 1100 c.c. are admitted, as well as sidecars of 500 c.c., 750 c.c. and 1000 c.c., thus making five different classes of machines, all of which will race together. The uselessness of these five divisions is shown by the fact that no machine has been entered in the 750 c.c. cyclecar class. In the 500 c.c. sidecar class there are only two entries, a B.S.A. entered by Messrs. Brown Bros., Ltd., and a Regal Green; in the next class a Clyno with sidecar is the only machine; in the 1000 c.c. class there are six machines: a Morgan to be driven by Mr. W. G. McMinnies, a second Morgan entered by Mr. N. F. Holder; and two other Morgans, one of which is to be piloted by Mr. H. F. S. Morgan, the two others in this class being a René-Gillet and an N.S.U. According to the rules of the Union Motocycliste de France, which are adopted for the Grand Prix, a three-wheeler is not a cyclecar; thus the Morgans have to run in the sidecar and tricar section, and are limited in engine capacity to 1000 c.c., instead of 1100 c.c. This is really of small importance, for all the machines race together and the attention of the public will be directed to the winner without any consideration of class distinction.

The Cyclecars.

In the true cyclecar class there are 22 entries, of which six are from England. Bedelias head the list with three machines, which will be fitted with the usual twin-cylinder air-cooled engine. Violettes have also three, and Mathis, a car manufacturer from Strasbourg, has entered one machine, which is declared to be a small four-cylinder on car lines. Ronteix has entered a machine carrying a four-cylinder water-cooled engine (62 mm. by 80 mm.). The Noel cyclecar, with a twin air-cooled engine, and the Du Guesclin, a four-cylinder water-cooled type, are also entered. Automobilettes will be represented by two machines. It is believed that these machines will be the standard type, but it is possible that one of these will be changed for a four-cylinder model of 59 mm. by 100 mm. bore and stroke. Each machine, however, will have the standard belt drive. Super has entered one machine, with Maurius Leveque as driver. This is a Bedelia type with a twin-cylinder engine of 74 mm. by 120 mm. bore and stroke. La Roulette is another new make of similar design, two models of which have been entered.

The English representatives are two G.N. machines, two Duos, a Bolton-Precision, and a Marlborough. The latter has been entered by an amateur, Mr. F. H. B. Samuelson, of Thirsk, Yorks. Finally, a Sphinx, known in England as the Globe, has been entered. It is probable that this machine will be fitted with a four-cylinder engine. Although the 500 c.c. and 750 c.c. sidecar machines ought not to have much chance against the 1100 c.c. cyclecars, they will afford the opportunity of making comparisons between the stability of the respective types.

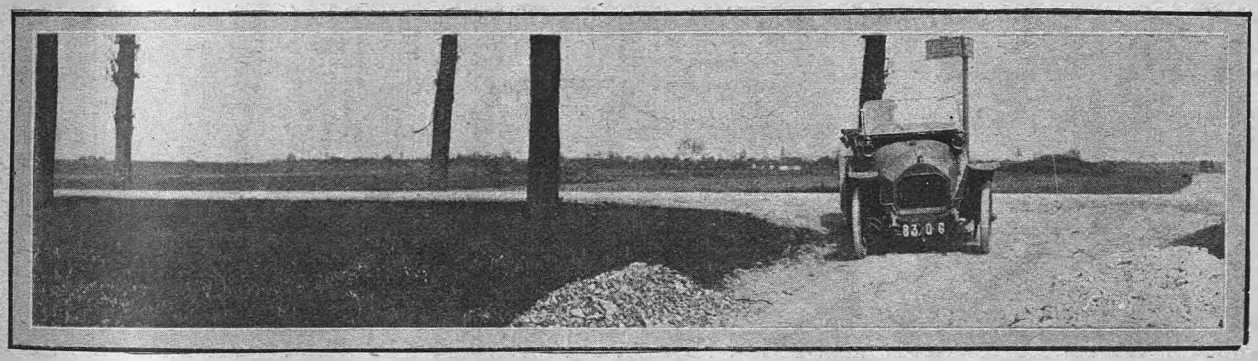
Round the Course.

A considerable amount of money is being spent by the Racing Board of the A.C.F. to make this year's Grand Prix attractive to both competitors and the general public. A few days ago we took the opportunity of running out to Amiens, and found the work of preparing the course in a very advanced condition. Headquarters are less than three miles from the city of Amiens, and the grand-stands are not more than a mile and a half from the tramway terminus. For the cyclecar race a triangular course, forming a part of the larger one to be used by the big cars, has been prepared. The distance round this small course is just a fraction under 11 miles, and the cyclecars will have to go round 15 times. Roughly, the two main legs of the course are five and four miles in length, the base of the triangle being nearly two miles in length. The two main roads will also be used by the big cars on the previous days, but the base will only be used by the motorcycles and cyclecars. Thus the corners will not be cut up. The novelty of the arrangements lies in the disposition of the grand-stands and the tyre pits. As the two main legs of the course are practically parallel for half-a-mile and less than 200 yards apart, they have been united by a slightly curved cement-surfaced cross road with the tyre pits on the inside and the grand-stands on the outside. To prevent the occupants of the pits being isolated, a tunnel has been built under the cross road, the approach to it being down steps. This cross road is practically 200 yds. in length, is 26 ft. wide on the curved portion, and 40 ft. wide on the straight bit opposite the main stands.

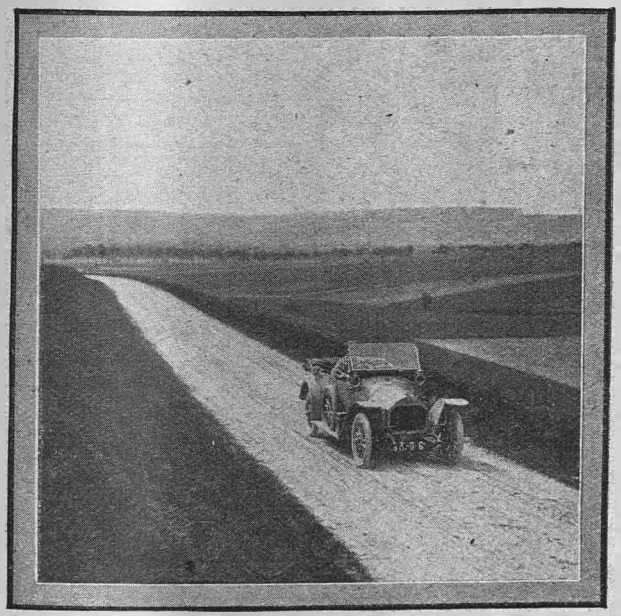
Leaving the grand-stands, the competitors enter a dead-straight road of an undulating nature. Suddenly there is a sharp turn from the main straight road to the cross road forming the base of the triangle. Under its official classification this is only a "chemin vicinal," or about a sixth class road. Compared with the national highway it is narrow, although not so much as to cause any inconvenience to a couple of cyclecars. The entrance to the road is slightly on the down grade, thus facilitating the dash of the drivers, whilst most of the road is also slightly downhill. What will doubtless strike English visitors as curious is the entire absence of hedgerows or trees, this lane being really an open path.

On the day of the race some protection will be afforded, the corners being barricaded and soldiers placed at intervals on the open portion to keep back the spectators from the course. The longest leg of the course is wide, has a number of easy bends, and a couple of sharp turns under the railway. These will call for some practice, but they cannot be considered of a dangerous nature. There is only one village on the cyclecar course—Boves—which has a very wide main street. It may be assumed that the road surface will be excellent, while the fairly level nature of the course should allow of high speeds.

PHOTOGRAPHS OF THE GRAND PRIX COURSE.

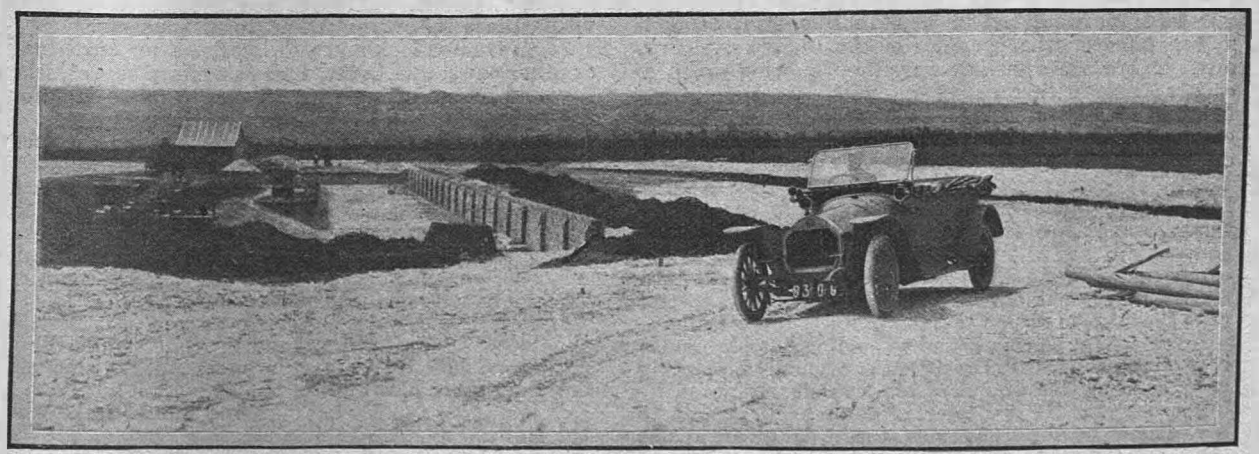


The entrance to the short side of the triangle. The photograph was taken last week.



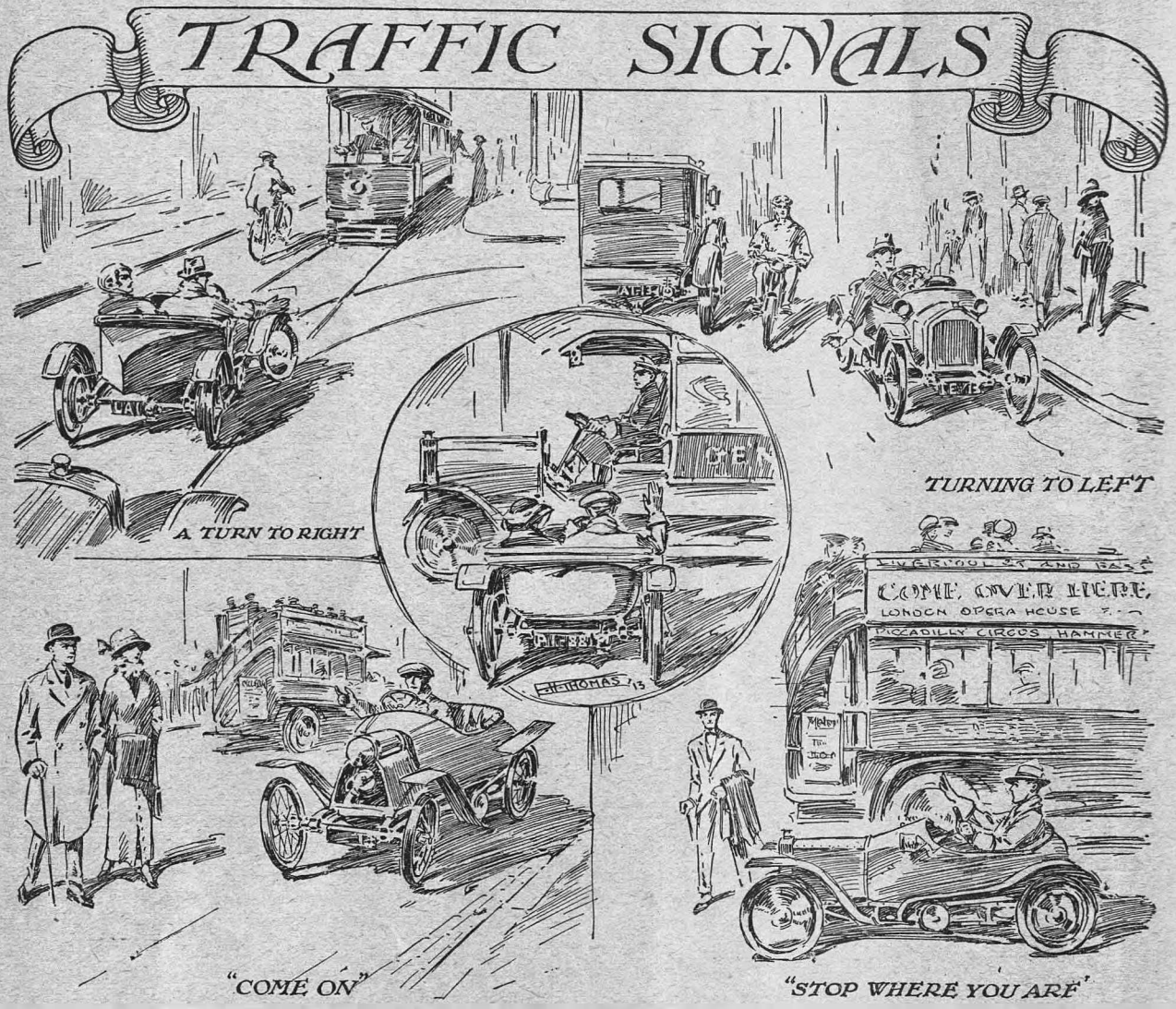
The portion of the course to be used exclusively for cyclecars. Though narrow, there is ample room for two machines abreast.

The tunnel under the Grand Prix course at the grand-stands, now in course of completion. This allows communication between the tyre pits and the stands.



The present condition of the tyre pits and the banked road in front of the grand-stands.

TRAFFIC SIGNALS



IT is always better to learn when young than to wait until one is older. Therefore it will be to our own advantage if we cyclecarists (or should it be devotees of cyclecarism) learn our lessons in road etiquette before we become hardened sinners like so many of the older road users.

I refer particularly to signalling one's intended movements to other people on the highway. How often do we see a large covered car slowing up in a country lane with an arm extended on either side, holding up all traffic until it eventually turns into a carriage drive? Or, again, if there happens to be no one on the seat beside the driver, an arm held out on the "off" side when it is intended to take a left-hand turning. Of course, it is better to do both these things, which are very confusing, than to make no sign at all, but why not do something that can be easily understood? It is no more trouble to get into the habit of making an intelligible movement, and once learnt, the action is done quite automatically.

A cyclecar is so small, and so seldom has high sides or a folded hood, that the driver can usually be plainly seen, and any movement of his arm clearly noted by other drivers. It is better to confine all signals to the driver as different men tackle a given traffic problem in a different way, and the passenger cannot always know which is going to be adopted by the man at the wheel. The following seem to me the most rational signals, and, failing a generally-accepted rule, they appear to be good enough to go on with.

Turning to the right or pulling up on the right—Hold out the right arm horizontally. Turning to the left or pulling up on the left—Wave the traffic on with a pendulum action of the right arm, as if inviting those following behind to a "dust-up."

For a traffic block and slowing down for cross-roads or other dangerous spots, such as a sharp corner, when it would be inadvisable for anyone to pass—Hold out the right arm with the forearm vertical.

Now as to little precautions that make for a reduced list of accidents in the course of one's driving.

When it is seen that a pedestrian is trying to cross the road, if it is the driver's intention to let the foot-passenger cross first he will save time if he will beckon to him to come on and then give the "slow up" signal for other vehicles behind him. The same precautions will apply to traffic met at a cross-road.

If it is the driver's intention to get past first, he should put up a warning hand in front of him, like a policeman holding up traffic on the other side of a crossing, after blowing the hooter.

It is a moot point what sign one should make when the frolicsome little vehicle starts a "gaby-glide" on greasy tramlines and one best left to the brainy holder of the 5s. driving licence, but the above signals will cover most ordinary contingencies. F.T.

B20

The Cyclecar

Wednesdays—1d.

Conducted by Edmund Dangerfield.

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Cyclecarists will look forward with interest to an account of the Whitsun tour of the Cyclecar Club, the success of the cyclecars in the M.C.C. London Edinburgh run, and other holiday events. Full illustrated descriptions will appear in The Cyclecar next Wednesday, but the issue will appear in the evening instead of the afternoon. Readers should ask for it at the same time as they purchase their evening paper.

NOTICES.

Letters.

Editorial Communications should be addressed to The Editor, "The Cyclecar," 7, 9, 11, 13 and 15, Rosebery Avenue, London, E.C.

Letters relating to Advertisement and Publishing Departments should be addressed to The Manager. Subscriptions should be forwarded to the Manager (rate, 6s. 6d. per annum, or pro rata).

Press Times.

Important Late News and Photographs can be accepted up to first post Monday morning for insertion in the following Wednesday's issue.

Advertisement Copy, Blocks, &c., should come to hand by Wednesday morning to ensure careful attention and allow time to submit proofs, except when an earlier time is specified.

Return of MSS., &c.

Drawings, Photographs and MSS. not suitable for publication will be returned if sufficient stamps are enclosed for this purpose, but the Publishers cannot hold themselves responsible for the safe keeping or return of contributions.

Copyright.

Advertisements of Cyclecars for Sale, new or second-hand, Sundry Announcements, and Rates for Advertisements, will be found amongst the end pages.

Topics of the Day

IT would be very advantageous to cyclecar manufacturers if the Auto-Cycle Union would issue a definition of a cyclecar that goes beyond the present vague indication of chassis weight. The "chassis" is an indefinite term and might be held to include several parts that would make it very difficult to bring the weight down to under 6 cwt., or 672 lb. At the same time that would exclude a number of small cars from cyclecar competitions. A definite pronouncement upon this matter is very desirable. It might be advisable, and we think it would, to include every part of the machine not added by a coach-builder, also including mudguards. Petrol and oil tanks should certainly be included, and likewise tyres. One reason we include mudguards is that, under the definition, the machine, if its total weight exceeds 7 cwt., can only be classed as a cyclecar if the body is readily detachable to enable the chassis weight to be determined. This could hardly be said to be the case if the mudguards had to be detached from their supports. Bonnets, dashboards, and underscreens, when fitted, should be included as parts of the chassis as the components are more the products of an engineer than a coachbuilder.

A "Chassis" Definition.

* * *

IN the short period since its inception the Cyclecar Club has proved itself to be a very active body. Its development is a matter that every cyclecarist should have at heart, and perhaps as its membership, which is now about 100, increases, it will be looked upon—in view of the clashing interests of associations catering chiefly for motorcyclists—as the responsible institution of the cyclecar world, or even the governing body of the sport. At present it is holding meetings and "rallies" of cyclecarists in many parts of the country, carrying out various social events, lectures, concerts, runs, and organizing cyclecar trials. It has been the means of bringing together many possible purchasers of cyclecars, and a smaller but enthusiastic band of actual owners. To any reader contemplating the purchase of a machine we cannot conceive any sounder method of getting just the information desired on the reliability of different machines than by joining the Club and turning out to a number of fixtures. Branches of the Club should be formed in the Midlands, also in the northern and western counties; and we shall be pleased to act as the medium for the formation of other cyclecar clubs.

The Cyclecar Club.

* * *

HAPPENING, the other day, to point out a car to a well-known engineer and remarking that it was not fitted with a differential, we were rather surprised to hear—from an engineer—that such a refinement was quite unnecessary. According to our friend, who is quite an authority, the differential is a feature that might be eliminated from motorcar practice, and its inclusion is based on a fallacy. Since the beginning of the cyclecar movement we have driven a number of machines that are not fitted with a balance gear without noticing any difference in the steering, the driving, or the wear of tyres. It is quite a common fallacy amongst those without practical experience to condemn the simple type of cyclecars because of the absence of a differential, which is supposed to put undue wear upon belts and tyres, and to make it difficult to take corners. As a matter of fact, the life of belts and tyres on this type of machine is remarkably long, as we have proved by our own experience, while corners can be taken with far greater ease, and there is not that same tendency to skid which is directly promoted by the differential. The attention of designers is directed to this very important point, for we feel sure that, at any rate for a light type of car, the expense and weight of the differential could be saved with advantage both to the manufacturers and to the user.

The Unnecessary Differential.

THE CYCLECAR WORLD.

Notes, News and Gossip of The New Motoring.

CHIEF EVENTS OF THE WEEK-END.

M.C.C. London-Edinburgh Run.

The Cyclecar Club Tour to, and Parade at, Buxton (St. Ann's Hotel).

Light up next Saturday 8.33 p.m.

London-Edinburgh.

There is an entry of 18 cyclecars for the journey of 400 miles in 24 hours.

They are nearly all of the miniature car type—see page 637.

An enlarged clutch, with a deeper travel on the flywheel, is an excellent feature of the last batch of Humberettes.

The road between Petworth and Chiddingfold is in splendid condition, and is one of the safest and finest roads for speed in Surrey.

How will the small four-cylinder cars entered for the Grand Prix Race compare with the cyclecars and sidecars for speed and reliability?

The words of wisdom appearing in these pages seem to be appreciated by the leading Continent technical journals, judging from the extracts they print from week to week.

A four-seated Chota cyclecar is to be made. The two rearmost passengers sit Irish jaunting-car fashion, whilst the Sociable position is adopted for those occupying the front seats.

The numerous hills in the vicinity of Llangollen, where the Mersey (Liverpool) M.C. is holding a Whitsuntide rally, are shown in a map which appears in the current issue of "Motor Cycling."

In the present showery weather it is well to remember that Cape cart hoods are apt to rot if left to dry when folded up. Always put them up when the machine is left in the garage for the night.

Mr. Harry Long informs us that he has obtained 90 miles to the gallon on benzole, and notices an entire absence of "knocking," and the best result on petrol has been an average of 70 m.p.g.

We recently heard some cyclecarists complaining that the oil that was offered them was thinner than usual. It must be remembered that, as the weather gets warmer, the viscosity of lubricating oil becomes less, and it will therefore flow more easily.

The road from London to Westerham, via Catford, Lewisham, and Bromley, must be one of the worst within a 30-mile radius of Charing Cross. The tramlines to Lewisham are bad enough, but the surface of the macadam after leaving the latter place is indescribable.

"Tête-Rouge's" arrival at Westerham caused a great sensation. The members of the club, who were busily engaged at tea, caught the reflection of red paint, imagined that the whole street was on fire, and rushed to the windows of the King's Arms. Someone suggested that the owner had forgotten to have "G.R. Royal Mail" painted on the sides.

One prominent member of the Cyclecar Club was quite perturbed when his low gear, which he thought was 9.6 to 1, turned out to be 11 to 1. As a matter of fact, we hear that the former figure is correct, and we should advise the owner to test the gear himself, as some "cooking" took place in the calculations when it was measured at Petersfield.

Rally at Buxton.

The headquarters of the Cyclecar Club will be the St. Ann's Hotel.

Messrs. Wood, Keiller and Wilberforce are entering G.W.K.s for the Scottish trial.

We are the first journal to publish details of the Grand Prix entries, which, 31 in number, promise an exciting race on the 13th July.

Hoods appear to be fitted to the majority of cyclecars. It is surprising how a hitherto quiet machine suddenly becomes noisy when the hood is put up.

Harry Long has completed 3000 miles on a Chota cyclecar without belt trouble, and with a petrol consumption working out to nearly 60 miles to the gallon.

Mrs. H. F. S. Morgan is most anxious to accompany her husband in the Grand Prix Race in France. Unfortunately, however, lady passengers are not allowed.

As we were negotiating thick traffic in London, a policeman looked at our cyclecar over his shoulder and said: "If you little chaps would only grow more, we should be able to see you better."

The A.-C.U. competitions rule regarding passengers on cyclecars has been amended in regard to track records and races, when a passenger need not be carried unless specified in the rules of a race.

"Reading The Cyclecar each week soon makes me tired of the motorcycle papers," writes a correspondent, who adds: "The clearness of the illustrations in The Cyclecar is one of many excellent features."

"There is no doubt that the cyclecar is coming and coming fast," says "Motor Age," of Chicago, "but the main idea must be to aim for the cheapest design that will do the work and do it all the time, frills being left off."

Some of the spectators at Westerham on Saturday imagined that a sudden storm had burst upon them when a certain four-cylinder machine went up the hill. Certainly the noise on the low gear was somewhat reminiscent of a hurricane.

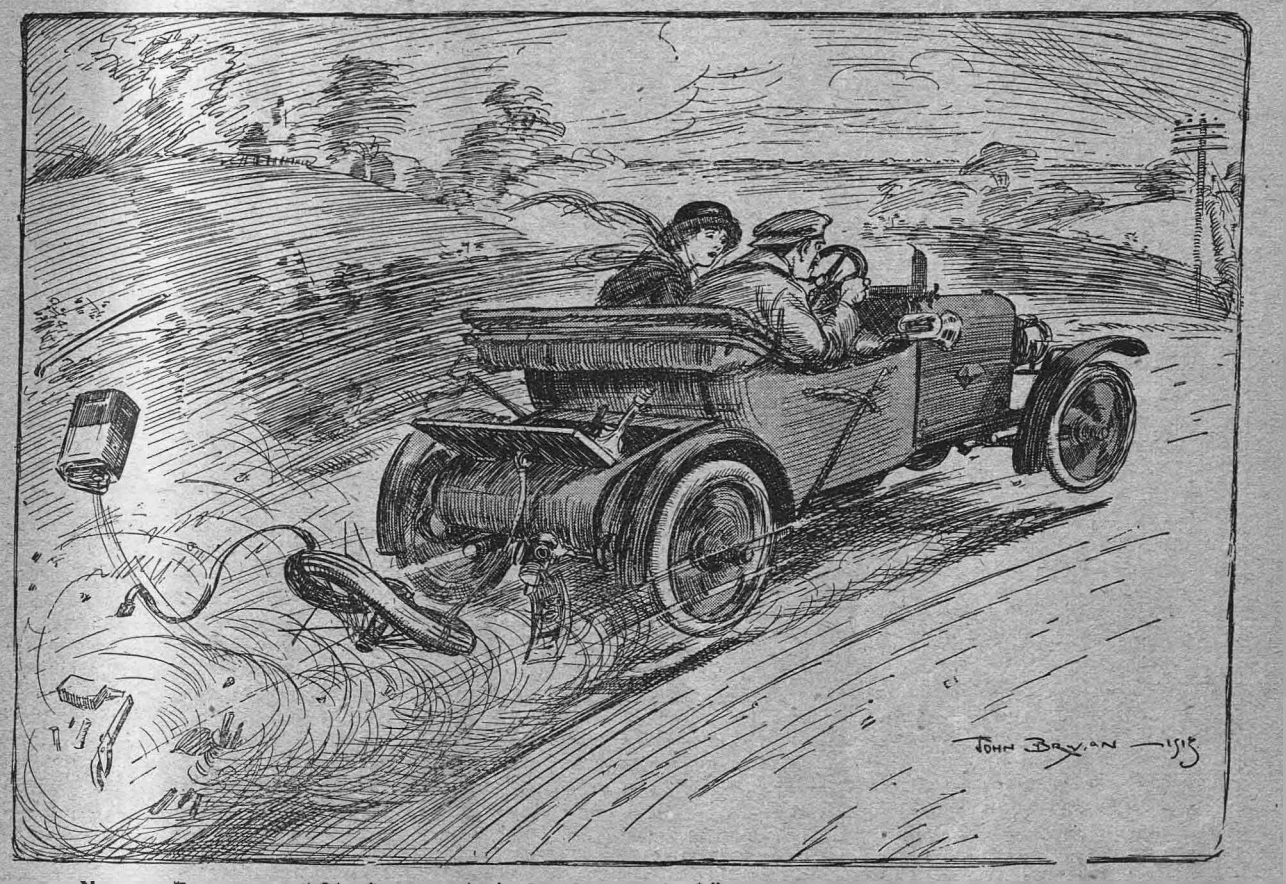
"It will be noticed that the radiator is well behind the front axle," says an American journal, reproducing an illustration of an air-cooled cyclecar that appeared in one of our advertisement pages recently. Perhaps it is under the rear mudguards.

Mr. Frank Thomas caused much amusement on Saturday by borrowing a lady's bicycle fitted with an Auto-wheel, which, by dint of much pedalling and a shove from various members of the Cyclecar Club, he got to the top of Westerham Hill.

Cyclecarists appear to have caught the craze of naming their machines. Amongst the well-known machines are "Hitchy Koo" and "Hitchy Koo II," "Tête-Rouge," "The Jabberwock," "The Deuce," "Ki-Ki," "The Streak of Dawn" and "The Comet." Suitable names are not easy to find.

We recently had the doubtful pleasure of persuading two small-sized new covers to fit on the rims. The covers, though marked 26 in., would scarcely have fitted comfortably on 24 in. wheels, the result being that the tube was nipped. It is a great pity that tyre manufacturers economize in this direction.

Should an enthusiast wish to test the springs on his machine, a lap round Brooklands "all out" will soon discover any weak points in the suspension. Both at the beginning of the railway straight and at the fork, the bumps are so severe that it is almost impossible to remain in the driving seat "at speed."



Nervous Passenger: "Oh, George, what's that funny noise?"
Blissfully Ignorant George (hogging it): "That's nothing; it's the spark jumping across the plug points!"

RALLY TO BUXTON.

Special Invitation to Midland and Northern Cyclecarists, Motorists and Motorcyclists.

All interested in the cyclecar movement should make a point of reaching Buxton on Whit Sunday where, at the St. Ann's Hotel, the Cyclecar Club will be in force. It is hoped to repeat the success of the Stratford-on-Avon rally.

The London party will meet at Barnet, which is 11½ miles from the G.P.O., London, and leave there sharp at 9 o'clock on Saturday morning next, the 10th May. The road is then by Dunstable (33), Hockliffe (37), Newport Pagnell (50¼), Northampton (65¼), Market Harborough (82½), Leicester (97½), Loughborough (108½), Derby (125½), Matlock (143½), Haddon Hall, Bakewell (151½), Buxton (163½), the figures in parentheses giving the distances from London.

Lunch will be taken at Market Harborough at one o'clock sharp, and this will be an excellent point for Midland motorists to join in. Buxton will be reached about six o'clock, for dinner at seven o'clock.

On Whit Sunday there will be two circular runs in the lovely country of the Peak district, and between two p.m. and three p.m., should there be sufficient support, a parade round Buxton will be organized. This will be an excellent opportunity for Northern readers to learn something of cyclecars. Members of the Club are only too willing to give all the information that is in their power.

The return journey will be made on Whit Monday, starting in the morning, taking lunch at Market Harborough and tea at Dunstable (The Old Sugar Loaf Hotel). There are no difficult hills on the route selected, yet the drive down will be in the nature of quite an interesting trial. The speed will be well under 20 miles in the hour, eight hours being allowed for 152½ miles. Inclusive terms have been arranged at Buxton for members of the party, viz., 25s. for single rooms, 42s. for double rooms, inclusive of everything. Those readers not members of the Club who wish to join in can do so by communicating with Mr. Frank Thomas, 172, Belsize Road, London, N.W., from whom further particulars of the tour can be obtained.

The London-Edinburgh Trial.

Two cups for cyclecars are being offered by the Motor Cycling Club in their annual Whitsun London-Edinburgh run. One cup is offered for the best performance of a cyclecar in the single journey, and the other for that accomplished in the double journey to London again. No driver can take more than one cup, and both cups are to be won outright. The start will be from the Gatehouse, Highgate Hill, at 9 p.m., Friday next. The return journey will take place on Whit Monday, the start being at 12.30 a.m.

The Shelsley Walsh Hill-climb.

Entries for the open hill-climb at Shelsley Walsh on 7th June, promoted by the Midland A.C., close on 31st May. There is a class for cyclecars. The climb will commence at 4 p.m., and preliminary practising on the hill will entail disqualification. Full particulars and entry forms may be obtained from Mr. C. P. Type, Borough Buildings, John Bright Street, Birmingham. A formula, taking into account weight, time, and horse-power, will be used, and the cyclecar with the best result will be awarded the Bird silver cup.

CYCLECAR CLUB MEET AT WESTERHAM.

THE weather conditions were again unfavourable during the week-end, but the Cyclecar Club's meet at Westerham was quite a success, notwithstanding heavy showers of rain. At 3 p.m. there were only a few machines at the top of Westerham, but others joined in later on. Several members ascended the hill, amongst them being Mr. A. Frazer Nash, on his Grand Prix G.N., Mr. W. G. McMinnies on the single-seated Morgan "The Jabberwock," Mr. A. P. Bradley driving a Duo, "The Deuce," Mr. Douglas Rothschild on a Globe, Mr. E. Burke driving a four-cylinder Sizaire-Naudin car, and Mr. R. F. Messervy on a Duo chassis. As the hill had no terrors for some of the drivers, a move was made for Saltbox Hill, which was approximately four miles away, and as the well-known test hill is exceedingly narrow a local motorcyclist, mounted on a Douglas, volunteered to take the party to the foot of the hill by a circular route, which, he informed them, terminated in a ploughed field. However, his piloting was scarcely a success, as the "circular route" ended practically at the same spot as it commenced, but the ploughed field portion was traversed, with the result that "The Deuce" broke a leaf of one of its springs. The first to go up Saltbox was "The Jabberwock," and Mr. McMinnies took the hill slowly, in order to obtain a grip, as the surface was exceedingly loose. He got up well, and his single driving wheel scarcely slipped at all. The Grand Prix G.N. then made an onslaught on the gradient, without a passenger, and the driver sitting on the tail. In endeavouring to drive thus, he brought the machine to a standstill near the start, as the gear slipped out. He soon restarted, however, and went up well. Mr. Bradley then piloted "The Deuce" up slowly, while Mr. Messervy ascended the hill at a good speed.

Tea at the King's Arms was the next item on the programme, and the hotel yard presented a busy appearance with cyclecars going in and coming out. Mr. A. E. Parnacott, who had driven over in his cycar, joined the party here, while many other members put in an appearance for tea. There must have been quite 25 machines parked in the yard, including four Morgans, one being "Ki-Ki," which is fitted with a racing tail, while another had its cylinders covered with wire netting, the object of which was not discovered. There were also drawn up two G.W.K.s, one belonging to the Rev. E. P. Greenhill, while the owner of the other was Mr. V. Wilberforce, three Duos driven respectively by Messrs. L. F. de Peyrecave, Mr. A. P. Bradley and Mr. R. F. Messervy. three G.N.s, namely, Mr. Nash's Grand Prix machine, Mr. A. C. Armstrong's Tete-Rouge, which made its appearance for the first time in its true colour—Post-office red—and Mr. Higgs's "Hitchy-Koo II," four A.-C.s, Mr. Welham's home-constructed machine, and several others. Outside the hotel a very smart-looking motor lorry belonging to Messrs. G. N. Higgs waited. This van has been built to convey broken-down cyclecars to "hospital," but, needless to say, its journey down to Westerham was wasted, for it returned home empty. Westerham Hill was once again the scene of activity. Mr. Parnacott, on his machine, which has a 499 c.c. four-cylinder F.N. engine, ascended slowly but surely on bottom gear. Mr. Nash on his G.N. and Mr. Messervy then had a little "dust up." The former led at the start, but he slackened down until Mr. Messervy, on his Duo, drew level. Both then went up "all out," the Duo easily out-distancing Mr. Nash. It must be remembered, however, that Mr. Messervy was on a chassis, while Mr. Nash was running one of his cylinders minus a tappet rod, the inlet valve working automatically instead of mechanically. Mr. Armstrong's G.N., "Tete-Rouge," took the hill well, after a stop at the bottom with a choked jet. The Globe, piloted by Mr. Rothschild, made a very good ascent, while "The Jabberwock" literally flew up in what must have been the best time of the day. Several other machines, including Mr. Wilberforce's G.W.K., "toyed" with the gradient. Quite a large crowd of spectators had gathered at various points to watch the ascents. The cyclecars performed well; Westerham Hill was not too much for any of them.

A Derbyshire Freak Hill.

Cyclecars in the East Midland Centre A.-C.U. Trial.

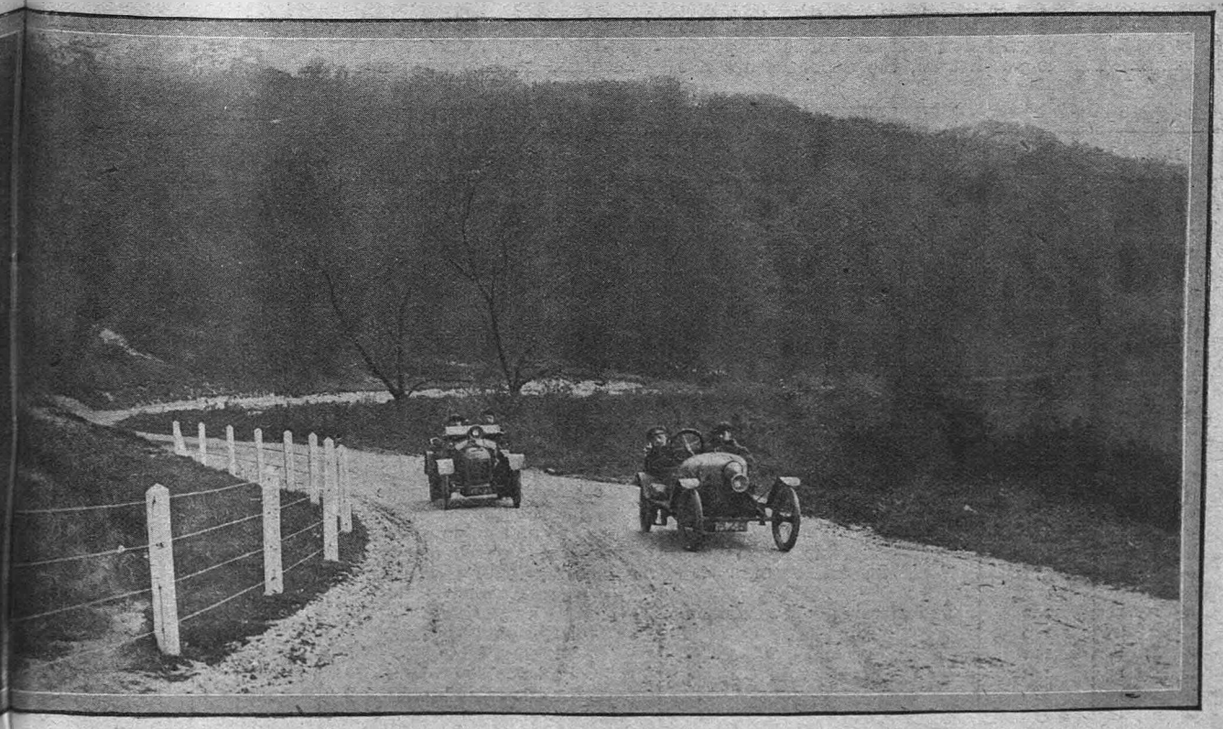
The East Midland Centre A.-C.U. half-day trial, which was run from Nottingham, last Saturday, attracted eight cyclecar entries. These were a G.W.K., a Humberette, a Swift, a Singer, a Calthorpe, a Premier and two A.-C.s. The course, which was principally in Derbyshire, was not at all severe, with the exception of one hill, where the cyclecars were sent up a freak hill in the back streets of a town. Without warning the competitors were suddenly waved up a rough narrow track of 1 in 3, between a row of houses. The best ascent that we noticed was that of Mr. J. W. Griffiths, on a Swift, while Mr. George Simons's G.W.K. stopped near the top, and was cleverly passed by Mr. L. J. Belcher's Humberette, for the track was very narrow, and what width there was was principally occupied by the spectators. The Humberette just failed to reach the summit, however. Mr. P. Joyce's Calthorpe, which was fitted with the new Calthorpe engine, underestimated the gradient, and also stopped near the top. An A.-C. had to be assisted most of the way up. Miss Shipside, on her Singer, arrived at the hill very late, owing to having missed the course. She made an excellent climb. Of the eight cyclecar entries, the only three to finish to time were Mr. J. W. Griffiths (Swift), Mr. L. J. Belcher (Humberette) and Mr. G. Simons (G.W.K.).

SOUTH HARTING HILL VISITED.

Splendid Surface and Fair Gradient.

DURING the week-end a few members of the Cyclecar Club visited Harting Hill, near Petersfield, with a view to determining its suitability for the open hill-climb on 28th June. The result is that in all probability the event will take place at this venue. To reach the hill from London, the Portsmouth road is followed through Kingston, Guildford, Godalming, Hindhead and Petersfield, and at the latter place, after passing through the town, a sharp turn to the left has to be taken. A winding and rather narrow road then leads to the village of Harting, where the hill really starts. A very gentle gradient leads to two forked roads, each of which has an average gradient of about 1 in 7. The right-hand road is short and straight, but the left-hand one, which has more twists in it and is longer, is more suitable for a hill-climb, and has been selected for the event. The surface is in splendid condition, and the bends are not abrupt. If, however, any competing machines can go up at a good speed, these corners will have to be taken cautiously, as, on one side, there is a steep bank, while a swerve on the other side will bring any competitor down a grassy slope having a gradient of about 1 in 1½. The length of the hill is about 1¼ miles, and the steepest portion is about a quarter of the way up, so that fairly fast times will probably be recorded. Mr. McMinnies' Morgan, "The Jabberwock," ascended the hill on top gear at a terrific speed, while Mr. Nash's G.N. also made a fast ascent. Mr. Armstrong's G.N. made an ascent of the hill with a gear of 7¾ to 1. Mr. Bradley's Duo, heavily burdened, went up on a gear of about 11 to 1. Although on this occasion rain had fallen the previous night and morning, the surface was not greasy in the slightest, so that there is no necessity to fit Parsons chains or other similar contrivances.

Searching for Kentish hills. Mr. R. F. Messervy makes a fast ascent of the Saltbox, near Cudham, on a stripped Duo chassis. 824



The venue of the Cyclecar Club's open hill-climb. The first steep bend of South Harting Hill. A G.N. and a Duo going up. 825

3000 MILES IN FOUR WEEKS.

Remarkable Test of Reliability on a Chota—No Belt Trouble—Nearly 60 Miles to the Gallon.

SINCE The Cyclecar was founded we have done a great deal to prove to the public that the simple type of cyclecar, for those who cannot afford the first cost and maintenance of the more expensive light car, has everything to recommend it. We have urged the claims of belt and chain drive—the former more than the latter perhaps because chain-drive demands a very well-balanced, smooth-running engine, preferably a four-cylinder motor. We should not have put forward the merits of the simple type of cyclecar if we had not had sufficient experience to prove that such a machine would meet the requirements of those with a slender purse to whom economy of running is of vital importance, but we have waited an opportunity to demonstrate the reliability of this type of cyclecar. The opportunity has now occurred. Mr. Harry Long, as announced in a previous issue, has been driving for the past four weeks a cyclecar of this description. In his business—he is a printer—Mr. Long covers great distances on various machines. Previously he used a bicycle, covering nearly 13,000 miles in 1908, and over 23,000 miles in 1909 and over 25,000 miles in 1910. In 1911 and 1912 he has used a motor-bicycle—40,000 miles was his record for a year. Now he is driving a Chota cyclecar, which has many features to recommend it, notably the long belts run over big pulleys, and a very excellent system of change-speed gear. During the time he has been using the Chota, to make his experiences all the more valuable, he has kept, at our suggestion, a very careful record of all troubles that have befallen the machine, without withholding a single detail, while to prove that the distances have been covered, the signatures of witnesses to the times and places have been taken. His experiences are given below and make most interesting data. This is not a trial, the expenses are not defrayed by the manufacturers, and Mr. Long holds no brief to conceal anything. The details given are just the log of an ordinary driver using the machine nearly every day in the course of his business. He has driven in all kinds of weather, over every description of road, and included many steep hills in the course of his ordinary running.

The Chota cyclecar is fitted with a single-cylinder air-cooled Buckingham engine. The drive is thence by two chains to the countershaft, one for each speed, and the final transmission is by long belts running over exceptionally large pulleys.

We give a tabulated account of his running during the first four weeks, and the most interesting fact is that the belts did not require shortening until 1946 miles had been covered. The adjustment was chiefly made because the chains were slack and their adjustment decreased the tension of the belts. The petrol consumption works out at 59.4 miles to the gallon over a mileage of 2790.

In a conversation with Mr. Long last Thursday he informed us that he had nearly completed 3000 miles, and with the exception of the belt adjustment referred to above he has experienced no trouble whatever with this part of the transmission. The Stanley belt fasteners are the identical pair fitted in the first place. The Michelin tyres of 650 mm. by 65 mm. are wearing magnificently; in fact, only one puncture has been recorded, and that was due to a large nail. Mr. Long attaches great importance to the care of the transmission system. Every day he brushes over the driving chains with graphite and oils the belt fasteners. He has had his engine cleaned of carbon deposit once, and on the whole has been very free from trouble. He was out last week in the thunderstorms, and when attempting to drive from Lichfield to Coventry came across the floods. He

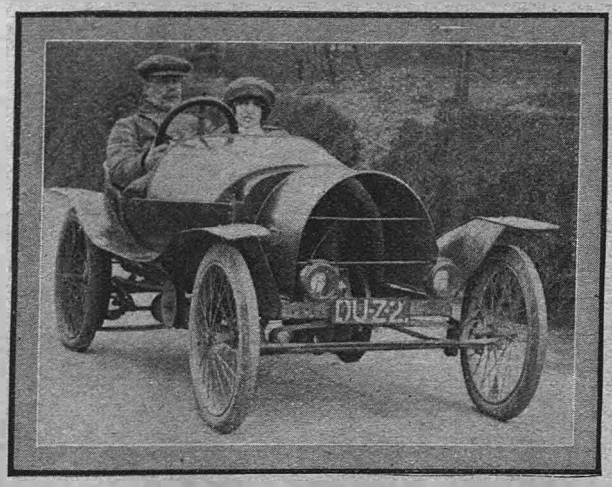
TABULATED ACCOUNT OF MILEAGE AND INCIDENTS.

Date.	Daily Mileage.	Weather.	Incidents.	Total Mileage.	Petrol Used.
					Gallons.
April 4th	120	cold, but fine	none	120	
„ 5th	135	cold, but fine	plug sooted twice	255	
„ 6th	128	cold, but fine	plug sooted once	383	
„ 7th	120	cold; showers	brake cable broke	503	
„ 9th	152	cold and damp	exhaust union came loose three times	655	
„ 10th	167	rainy	petrol pipe broke; plug sooted once	822	12¾
„ 13th	114	cold, but fine	union nut broke off exhaust pipe; new link inserted in high gear chain	936	
„ 14th	120	rainy	none	1056	
„ 15th	70	rain part of day	plug sooted once	1126	
„ 16th	128	rain part of day	low gear clutch stuck once; plug sooted once	1254	
„ 17th	126	showers all day	plug sooted once	1380	10¼
„ 18th	80	showery	exhaust union nut broke	1460	
„ 19th	154	heavy rain all day	no trouble	1614	
„ 21st	120	fine	no trouble	1734	
„ 22nd	135	fine	puncture in offside rear tyre	1869	
„ 23rd	77	fine and warm	shortened belts by 1½ in.; engine cleaned	1946	
„ 24th	162	fine morning, wet afternoon	no trouble	2108	12½
„ 25th	140	rain all day	brake out of order	2248	
„ 26th	114	rain all day	no trouble	2362	
„ 28th	122	heavy rain	brake cable broke	2484	
„ 29th	110	—	throttle cable broke	2594	
„ 30th	115	—	lost two bolts on front axle	2709	
May 1st	81	—	no trouble	2790	9¾

3000 MILES IN FOUR WEEKS (contd.).

negotiated a watersplash 2 ft. deep successfully, but on arriving at another he was advised to turn back, as it is likely that he would have been completely submerged, and so instead of 26 miles he had to cover 41 miles by making a circuit to avoid the flood area.

His machine is geared 4 to 1 on top and 8 to 1 on low, but he would prefer a lower top ratio in order to enable him to climb 1 in 10 hills on it. He has not yet met a hill he could not get up on the low speed. The worst hills he has been up so far are the one at Parbold, Lancashire, with its gradient of 1 in 5, and Dunmail Raise in the Lake district. His fastest run has been from Coventry to St. Albans, which was covered in 2½ hours. Mr. Long is using Continental belts, Sphinx plugs, Michelin tyres, and Price's oil, and has found the cyclecar a great convenience to him in the course of his business. The last week has been remarkable for the amount of rain. It has rained six days out of seven, and sometimes Mr. Long has been drenched to the skin. Up to 3rd May, Mr. Long has covered 3150 miles. He anticipates completing the first 5000 on 14th May. It will be seen from the table on the previous page that his troubles have all been of a minor nature that could be corrected in a few minutes.



Mr. Harry Long and his daughter, who accompanies him on all his trips, with the Chota cyclecar, which he has driven, in the course of his business, 3000 miles in a month.

Calthorpe Wins a Hill-climb.

There were four entries for the cyclecar class in the Lancashire A.C. hill-climb, which took place at Waddington Fells last Saturday. The four-cylinder Calthorpe made fastest time, and also won on formula, but the L.M. put up a very good performance on speed. The Swift climbed slowly, but surely, but the Enfield Autolette appeared to be in trouble, for the engine was knocking continuously. On formula the result was:—1, Mr. G. W. Hands (Calthorpe); 2, Mr. L. M. Cunningham (L.M.); 3, Mr. C. Inglefield (Enfield); and 4, Mr. J. S. Cordingley (Swift).

The big twin Chota engine of 1500 c.c. will be running on test this week.

Last week we received quite a number of requests from readers to register the names of their machines. Should two readers send up the same name, only the first one received will be registered.

Insurance is a vital matter that concerns all motor vehicle users, and it is also one of the most complex subjects in connection with motoring. In "The Motor" this week will be found an article entitled "The Newest Ideas in Motor Insurance."

Entries for the London-Edinburgh.

Eighteen cyclecar entries have been received for the M.C.C. London-Edinburgh run, which starts from the Old Gatehouse, Highgate, on Friday next. The first cyclecar is timed to start at 10.21 p.m., and the r at half-minute intervals. The entrants are:—Messrs. B. Allan Hill (Humberette), R. R. Rothwell (G.W.K.), W. Cooper (Humberette), C. M. Keiller (G.W.K.), R. F. Messervy (Duo), R. B. Pullin (G.N.), A. T. Tamplin (G.W.K.), J. R. Brown (Crouch), Sam Wright (Humberette), G. N. Higgs (G.N.), H. F. S. Morgan (Morgan), L. Martin (Singer), W. A. Bruce (Chater Lea), B. Howlet (A.-C.), E. Arter (Marshall-Arter), J. Frankenstein (Singer), J. T. Wood (G.W.K.), and A. D. Walker (Singer).

As a step towards making competitions more interesting, the Surrey M.C.C., says "Motor Cycling," limited gear ratios in a trial they held last week.

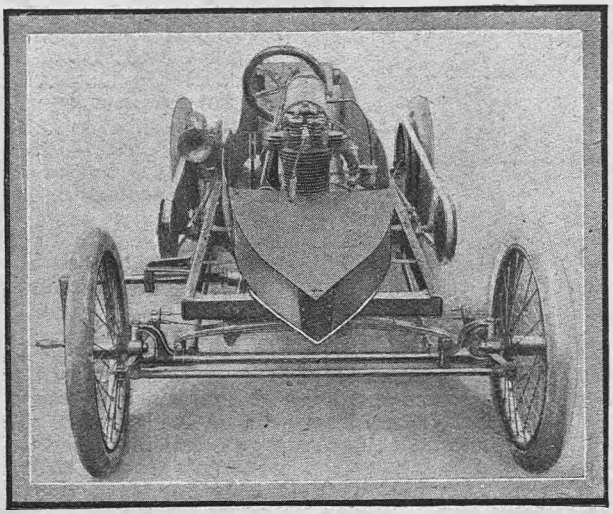
We understand that the reason why no G.W.K.s have been entered for the Grand Prix is that their weight cannot be reduced sufficiently to get them inside the limit, which is some pounds less than that laid down by the A.-C.U.

Climbing in pouring rain. Mr. C. Inglefield (Enfield Autolette) ascending Waddington Fells, near Clitheroe, in the Lancashire A.C. hill-climb on Saturday.

NEW CYCLECARS AND COMPONENT PARTS.

Another Single-seater—The Chota.

THE vogue for single-seated cyclecars—the motor-bicycle on four wheels—which we predicted in No. 1 of this journal would come in time is receiving considerable attention from manufacturers. We have already described the Dew, the Carden, and the Lester. One of our staff also owns a single-seated



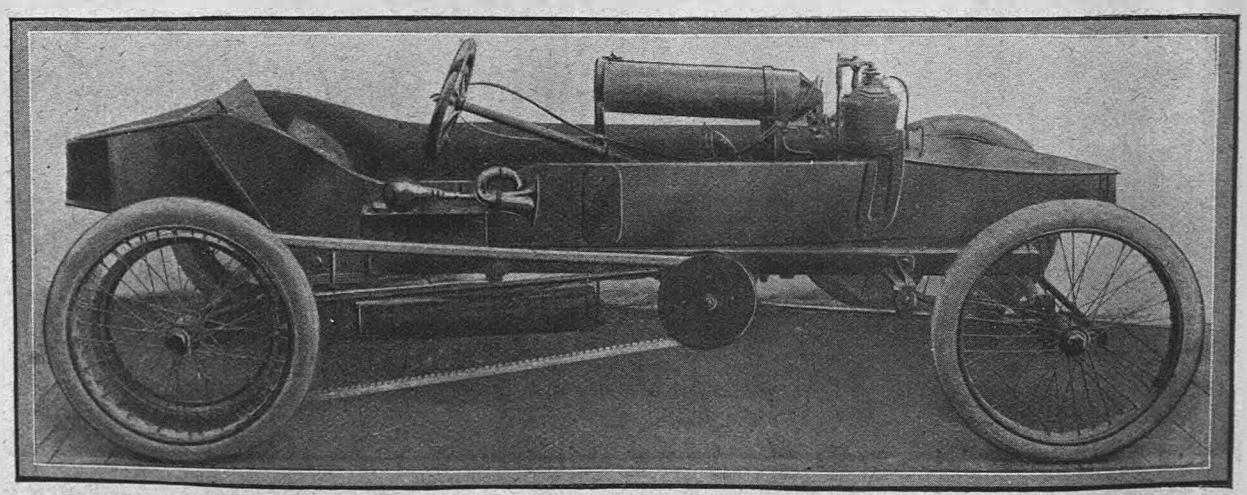
Front view of the Chota single-seater.

Morgan. The latest introduction is the Chota, the power unit being a single-cylinder Buckingham engine of 750 c.c. capacity. The bodywork is built very low to the ground. The front part of the engine is protected by a snub-nosed prow of wood, whilst the rear portion of the body also tapers to a point. The combustion chamber of the engine is set so that the air can play freely around it, and, except for the unusual design of the body, this cyclecar follows standard practice with long belts over big pulleys.

The machine has shown a surprising turn of speed on the level, and will shortly attack Brooklands records. Some little trouble has been experienced owing to the belts coming off the front pulleys, but this has been overcome by allowing the belts to "bottom" further, so that the upper parts of the flanges act as guides. The Chota is made by Mr. J. F. Buckingham, the Buckingham Engine Works, Spon Street, Coventry, and is moderate in price.

The Grand Prix Morgans.

FOUR Grand Prix Morgans have been entered for the big French race in July. They will all be fitted with water-cooled engines of under 1000 c.c. capacity. Thus, if they have to compete in the side-car class, the engine capacity will not debar them. Messrs. H. F. S. Morgan and W. G. McMinnies will drive 90 mm. by 77½ mm. overhead valve J.A.P.-engined Morgans, whilst Mr. Holder is putting his faith in a water-cooled Blumfield twin. The fourth driver will handle a water-cooled Precision, which may be of the Green type. The Morgans will probably be the lowest built machines on the road. The chassis have been lengthened by 11 in., so as to allow the seats to be transferred from the top of the gearbox to each side of the propeller shaft. The wooden bodies are so constructed that the weight of the driver and passenger is still carried on the gearbox, although the passengers are sitting four or five inches lower than before. The steering column is very much raked, and is supported on the dashboard, in front of which is a large torpedo tank for petrol and oil, the filler caps of which will probably be spring-held and of large diameter, so as to facilitate filling up. A wedge-shaped radiator, the design of which has not yet been definitely settled upon, will be fitted in front of the petrol tank, thermo-syphonic cooling being relied upon. It is also probable that double petrol pipes will be fitted between the carburetter and the petrol tank, so that a reserve will be available should one break. The engines and magnetos will be protected from flying stones by a gauze screen arranged in bow-window-like form in front of the motors, but the details of these fittings have not yet been decided, although it is probable that one of the Grand Prix machines, fitted with an air-cooled engine, will be running in the London-Edinburgh trial, merely to test its frame and stability. The lubricating arrangements on these machines will be interesting. It is probable that the foot control oil pumps will be fitted in connection with the Best and Lloyd's semi-automatic drip-feed system of lubrication.



Side view of the new Chota single-seater described on this page.

A New Engine for Cyclecars.

The Twin-cylinder 8 h.p. Illston.

A NEW cyclecar engine is being built in Birmingham by Messrs. Illston and Son, Ltd., the manufacturers of the well-known Wulfruna lightweight engines. The new engine is rated at 8 h.p., the bore and stroke being 85 mm. by 95 mm., giving a cubic capacity of 1078 c.c., which brings it within the cyclecar class limit. The engine possesses several interesting features, one being that the carburetter is connected direct to a large tee-piece and thence by straight pipes to the inlet domes, thus making a perfectly air-tight joint. The ends of these pipes are fitted with oval flanges, as in car practice. The cylinders are cast of a special mixture, and are designed to retain a perfectly even bore at varying temperatures, while large radiating fins assist in keeping the engine at a low temperature. The valves are of large area and section, and there should be little liability of their breaking. The inlet valve is of the overhead type, and is placed directly over the exhaust valves, as on the Rudge engines; consequently, the cold gas entering the cylinder tends to cool the exhaust valve. There are no joints in the combustion head, and the inlet valve, together with its spring and seating, can be completely removed by simply unscrewing the locking nut; this also exposes the exhaust valve, which can then be easily removed. The pistons are original in design, as it is so arranged that they are always covered by a film of oil, which is supplied to them through the sides of the cylinders; a projection is also cast on them so that this supply of oil can never flow freely into the crankcase. By this arrangement it is ensured that the cylinder walls will be properly lubricated, and the manufacturers claim that this system is much better than the ordinary splash, where often only one cylinder gets lubricated, with the consequence that the other partially or wholly seizes up. The oil needed for the crankcase and timing gear is obtained by suction from grooves at the bottom of the cylinders: these grooves are kept supplied by the pistons themselves. There are two piston rings fitted to each piston, and the gudgeon pins are fitted with phosphor-bronze bushes of generous dimensions, Hoffmann roller bearings being fitted to the main shafts. The crankcase is well designed, and the timing gearcase is of good size, allowing easy access to the timing gear. Each valve has a separate cam, and there is no complicated arrangement of cranked levers, as the four rocker arms are of a straight type, and they are all carried on one spindle, thus making the valve timing an easy operation. All the tappets can be adjusted, and are automatically lubricated. The big-end is fitted with the caged pattern Hoffmann roller bearings, while all the wearing parts are made of special steel, and are case-hardened and ground. A special bench-testing apparatus has been installed for the testing of these engines, and they are expected to develop about 15 h.p. on the brake. At present a variable-jet B. and B. carburetter is fitted and a Best and Lloyd semi-automatic lubricator. The manufacturers are Messrs. G. H. Illston and Sons, Ltd., 89, Gooch Street, Birmingham, and delivery of the engines will shortly commence.

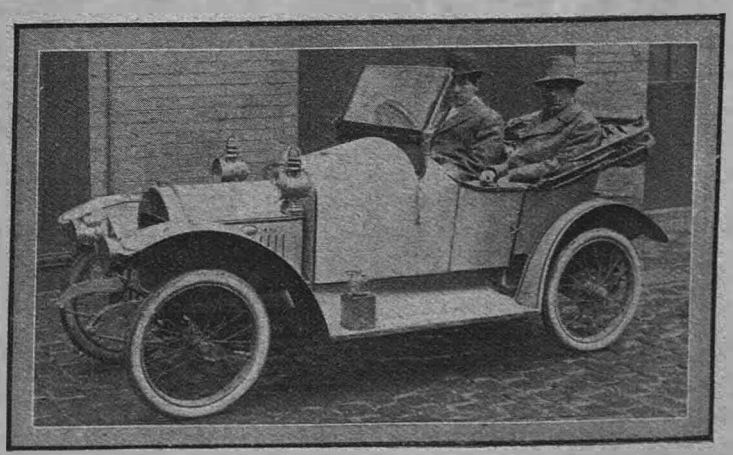
The Manufacture of Cyclecar Radiators.

THE various stages in the manufacture of cyclecar radiators are interesting to follow. The Coventry Motor Fittings Co. are specializing in radiators for cyclecars, and the following notes are based on observations at their works. The frame is first made, and holes are drilled to accommodate the copper tubes, which are provided with either round or square gills, and, after these gills have been attached, the tube is dipped in solder. When the tubes are fixed in place in the frame, the radiator is painted. This used to be accomplished by hand, but was a slow operation, or by dipping, which was not economical. The modern method, however, is to spray the enamel on in an air blast, by which process the radiator is painted in a couple of minutes, and the enamel penetrates into all nooks and crannies. The brass radiator tops are cut from brass sheets, and pressed to shape, being then soldered on to the frame. The radiators of the Singer, Morris-Oxford and Invicta light cars are made by this concern, as well as the radiators of many well-known cars.

A SUCCESSFUL TOP GEAR TRAFFIC TEST.

A CERTIFICATE has been issued by the R.A.C. of the performance of a 6.8 h.p. (R.A.C. rating) Globe car, which was entered for a top-gear traffic test by Messrs. Globe Cars, Ltd., of 37b, Duke Street, Manchester Square, London, W. The single-cylinder engine had a bore of 105 mm. and a stroke of 120 mm. The weight of the machine was approximately 10½ cwt., while the total running weight with passenger and driver was approximately 13 cwt. A two-seater body was fitted, and the size of the wheels was 700 mm. The ratio of the top gear was 4 to 1. The route followed was between Russell Court, St. James's, and Bow Bridge, via Pall Mall, Cockspur Street, Trafalgar Square, Strand, Fleet Street, Ludgate Hill, St. Paul's Churchyard, Cannon Street, Queen Victoria Street, Mansion House, Lombard Street, Fenchurch Street, Whitechapel Road, Mile End Road, and Bow Road. The length of the double journey was 11.6 miles, and the distance covered totalled 79 miles. During the trial there were 112 stops for traffic, and each time the machine was started it was driven away on top gear only. The average speed, taking the running time only into account, worked out at 10.7 miles per hour.

This is a very creditable performance, and Messrs. Globe Cars, Ltd., are to be congratulated on the result of the trial. It demonstrates very clearly the flexibility of the engine and transmission, and proves that a Globe car is one of the simplest to drive.



The Globe car leaving the R.A.C. garage prior to the successful top gear traffic test under official observation.

CYCLECARS AT THE RATE OF 70 A WEEK.

How the Wonderful Output of Humberettes is Made Possible—Interesting Engine and Transmission Tests.

THE ordinary man can have little conception of the enormous amount of work and organization necessary to turn out 60 or 70 complete cyclecars every week. On seeing the complete machine all spick and span in the showroom he does not think of the hundreds of different parts of which it is composed and of the processes through which these parts have passed before they were put together. It is only brought home by making a tour of such huge works as those of Humber, Ltd., where over 2000 Coventry men are employed in producing Humberettes. They are going through the factory at the rate of 70 a week, and the following is a brief outline of the systematic organization and processes which make such an output possible.

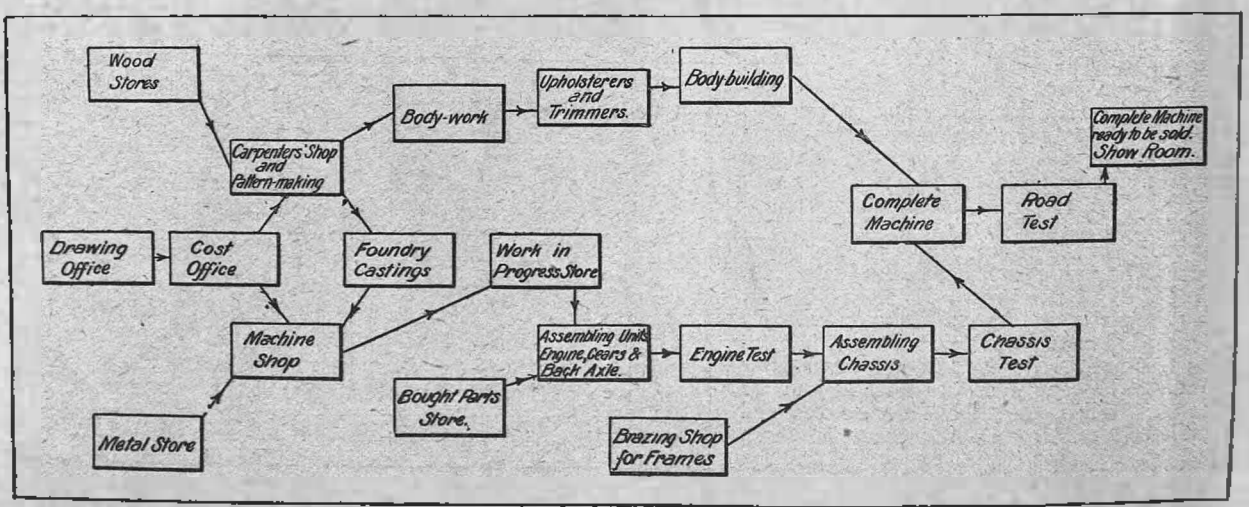
The beginning of all things in motor works is seen in the drawing office, a large, airy room, on the desks in which blue prints, compasses, rulers and other instruments of the draughtsman's art are scattered. It is here that the new model is conceived. The designer puts his idea on paper and draws out not only the complete machine, but every one of the different component parts, and determines in his specification whether the part in question must be cast in the foundry, made in the machine shop, or bought outside. As soon as the design is approved in the Cost Office, the workmen in the machine shop and in the coachbuilding and pattern-making departments are provided with the blue prints. The carpenters produce the patterns and core boxes, which are then handed over to the foundry, who cast rough pieces of metal of iron, steel, brass or aluminium, according to the specifications on their blue prints. The foundry is a dusty place, where dozens of men are seen kneeling in sand filling in the moulds, and occasionally pouring liquid metal into the completed ones.

We now visit the machine shop, where the engines, gearboxes, clutches and differentials and numerous small parts are made. On first entering this shop the visitor is staggered by the tangled skeins of shafting which stretch away in every direction as far as eye can see. There is row upon row of machines grinding and hewing the metal to the proper shape and gauge. At each group of machines stands a blue-overalled mechanic intent upon his work. The noise in the shop is considerable, and we had to shout in order to be heard. All the parts made in this shop are then taken into the Works in Progress department, commonly known as the W.I.P. stores, from which the assemblers and fitters can order the necessary parts. These men build up the engines, back axles, gearboxes, etc., and mount them up on to the tubular frame which has come through in the meantime from the brazing shop. Before the engine is fitted into the frame it is taken to the engine testing shop, where it goes through a brake test, and has to give 11½ h.p. before being passed. The engine is coupled direct to a vane rotating in a casing which contains water. The flow through this casing is controlled by screw-down valves, and the work done by the engine is absorbed by the friction of the vanes churning up the water in the casing.

When the engine has been fitted into the frame and the chassis is ready, it is taken to a second power-testing plant, where the rear of the frame is raised from the ground and clamped into position, leather belts then being used to transmit the power from the back wheels to another shaft that drives the electric dynamo from which the h.p. is determined. It will be seen that this is practically a test of transmission, and as gears are changed frequently during the trial, it is easy to see whether it is running smoothly.

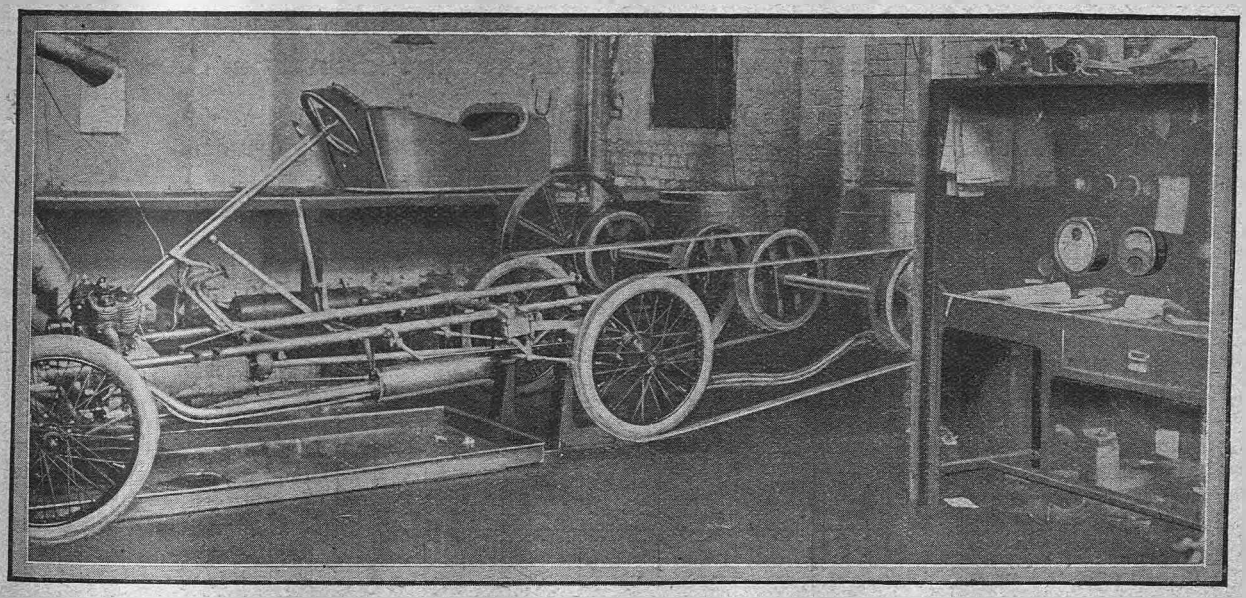
In the meantime the carpenters have been busy on the bodies, which are made of wooden frames and metal panels. As soon as these are completed they are passed on to the upholsterers, who put in the cushions, and then the body is ready for the painters. After this it is fitted on the chassis, and the third and last test on the road is undertaken. The machine is taken out by the tester, who makes a note of any parts which are not found to work satisfactorily, and these are attended to before the machine, with its new tyres, finally goes up to the stock or showroom.

The very complete system of testing Humberettes struck us as being particularly good, as these tests are one of the features of the manufacture of these wonderful little machines. With the engine test, back-wheel transmission test, and road test, it should be impossible for any machine to reach a customer in an unsatisfactory condition. The diagram on this page gives an idea of the processes which take place in the manufacture of Humberettes.

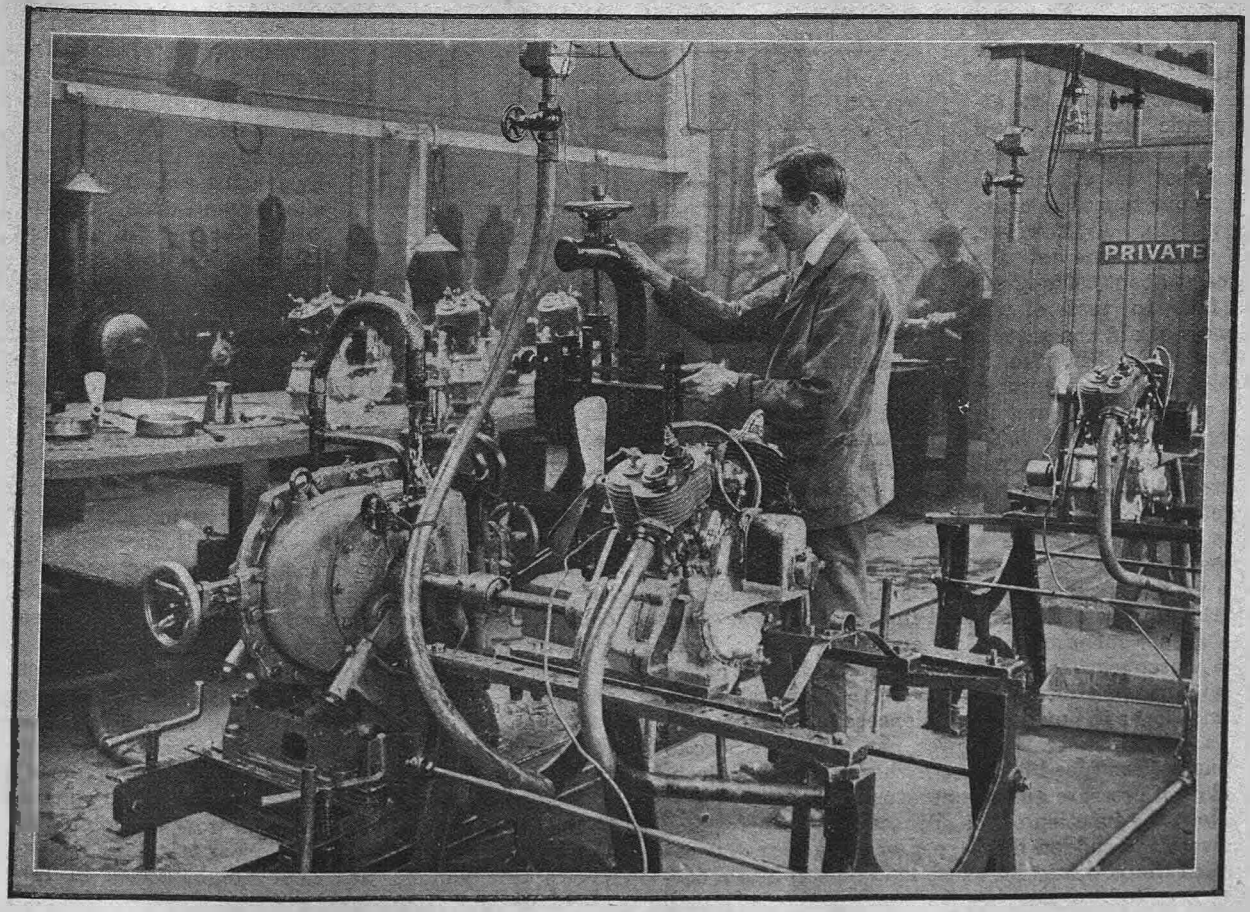


A diagram of the excellent and well-organized scheme by which it is possible to turn out 70 Humberettes a week. The work is all the time progressing in one direction, towards the showroom.

ENGINE AND TRANSMISSION TESTS OF THE HUMBERETTE.



The transmission tests to which every Humberette is subjected are most interesting. The photograph shows how the back wheels are jacked up and drive through long flat belts to another shaft, which is in turn connected to a dynamo, from the electrical output of which the horse-power developed at the road wheels can be calculated.



A Humberette engine on test. Water is contained in the receptacle on the left and revolving fans with variable blades are driven through it by the engine; by this method the horse-power can be determined. Each engine must give over 11 h.p. before being passed. Note the cooling fan which is very necessary during the test.

OBTAINING INCREASED POWER.

How Greater Efficiency may be Obtained from the Engine, Transmission and all Frictional Parts, with More Power on Hills and Greater Flexibility at Slow Speeds.

By A. W. JUDGE, A.R.C.Sc., Wh.Sc.

Part VII.—Losses of Power from the Exhaust Arrangements.

THE remaining influencing factor upon the power and efficient running of the engine unit as a whole to merit attention here is that of the exhaust and silencing arrangements. A preliminary survey of the chief factors involved will be necessary before turning to the more practical issues.

Firstly, let us direct our attention to the explosion stroke of the engine and study the behaviour of the exploding charge. The actual combustion or explosion of the charge is finished soon after the piston has started to descend, and as a net result of the extremely high temperatures evolved, the burnt products expand rapidly, pushing the piston down until the exhaust valve opens, and the pressure falls from about 45 lb. (in the average case) to the square inch above, to atmospheric pressure, and this fall in pressure causes the gases to expand to about four times the cylinder volume. As, however, the temperature of the gases at about 500 degrees C. falls to that of the silencer or air, the gases contract in volume by about a half. Further, the piston, during the exhaust stroke, pushes the burnt gases out of the cylinder into the exhaust pipe, and in so doing gives to them a velocity of at least 7000 ft. per minute at ordinary engine speeds. As a net result of the above three causes of pressure, temperature, and velocity acting together, and occurring 2000 times per minute in the case of a twin engine working at 2000 r.p.m., the pressure inside the silencer and the temperature both rise as the speed of the engine increases, as shown by the heights of the vertical lines in Diagram 42 at the speeds mentioned below on the horizontal line. The consequence is that, as the rapid discharges of gas keep occurring into the silencer, the exhaust gases cannot leave the engine and silencer fast enough, and so a falling off in the power per explosion stroke occurs as the speed becomes higher, due to the accumulating pressure and temperature.

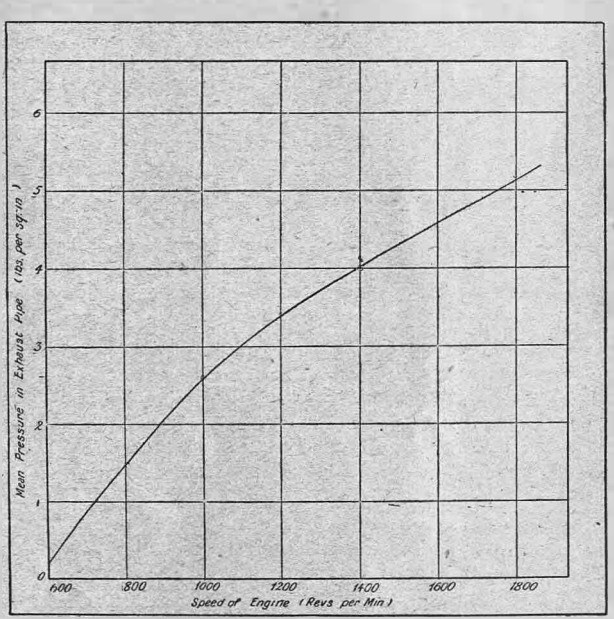


Diagram 42.—How the pressure in the exhaust pipe varies with the speed of the engine.

Now, the function of the silencer is to transform or convert the sudden discharges of the exhaust gases (which would otherwise cause loud noises) into a continuous discharge or into a large number of small discharges into the air. It is quite easy to stop this noise by a nearly endless variety of silencer devices, by interposing baffle plates, perforated plates and contorted paths which tend to break up the large discharges which cause the atmospheric vibrations that we interpret at our ears as noise, but the crux of the trouble is that in our endeavours to prevent the noise we also prevent the exhaust gases from flowing out as quickly and efficiently as possible, resulting in back pressure in the silencer, the effect of which is similar to that of a brake upon the engine in its results, and so must be eliminated as far as possible in the manner suggested later.

Commencing with the temperature factor first, it will be agreed that, in order to allow the gases to contract as quickly as possible after leaving the exhaust port and valve, these should be cooled efficiently. Hence one of the first requirements in silencer design is to provide a large surface of cooling area. In the cyclecar this may be effected, as is often done, by placing an ample-sized silencer and exhaust pipes where the rush of air can carry off the surface heat, just as in the case of air cooling of the engine.

The diagram previously given (Diagram 15—see THE CYCLECAR, 9th April), in the article upon engine cooling, shows how an exhaust pipe and silencer can be placed in a direct current of air and efficiently cooled. In those cases where the silencer is placed in some boxed-in position away from any air circulation, the provision of radiating fins and artificial circulation will considerably improve it. In motor-boat practice, water-cooling of the silencer and exhaust pipe is sometimes resorted to, and occasionally the injection of water into the silencer, in order to cool the gases properly and to silence them more effectively, and this practice answers quite well.

Next, the pressure of the gases in the exhaust should be kept as low as possible by allowing ample volume in the silencer for quick expansion and gradual discharge into the atmosphere. As a rough guide to the size of a suitable silencer for a given cylinder of an engine, it may be taken that the silencer volume should be at least three times the working volume of the cylinder (in the A.-C.U. silencer trials for motor-cycles this volume was about eight times in the standard comparison type). As few baffle plates and restricted paths as possible should be allowed in the silencer itself, to avoid back pressure.

Finally, the velocity of the exhaust gases should be

OBTAINING INCREASED POWER (contd.).

reduced as quickly as possible after leaving the cylinder, as it is the high velocities which give the large frictional losses at the surfaces, bends and restrictions in the pipes, and manifest as back pressure in the silencer. The best methods for reducing the high velocity of the gases are by cooling them as quickly as possible, so that a much smaller volume results to be dealt with at the silencer outlets, and by allowing the gases to expand directly after leaving the engine, so that by the time they reach the silencing arrangement proper their velocity is relatively so much lower that the baffles, etc., have a greatly reduced effect upon the back pressure. In fact, if the velocity of the gases is reduced appreciably near the engine, a

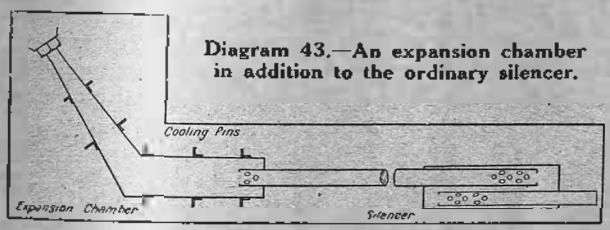


Diagram 43.—An expansion chamber in addition to the ordinary silencer.

badly-designed silencer box, with its numerous restrictions and tortuous passages, can be used, which will give good silencing and little back pressure.

One of the simplest methods of reducing the gas velocity near the engine is suggested in Diagrams 43, 44 and 45, which show respectively a single separate silencer pipe provided with an expansion funnel leading into a cylindrical box or expansion chamber, and thence to a simple silencing arrangement, and the last-named diagram illustrates a principle made use of upon racing cars, which is effective, but rather less silent than is generally required. Another method of cooling the gases and reducing their velocity is by causing them to discharge tangentially into a cylindrical chamber, and at an angle, so that they take a spiral path around and along the surface of the chamber, and so come into contact with the maximum possible cooling surface. This should prove

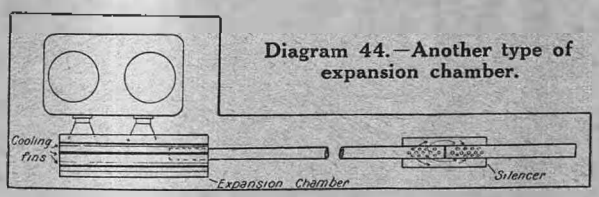


Diagram 44.—Another type of expansion chamber.

a very efficient form, as illustrated in Diagram 46. Next, the sudden discharges of exhaust gases at fairly high pressures should be transformed into one continuous discharge, or series of small discharges, by means of a suitably-designed silencer, provided with a minimum of baffles and perforations.

The body of the silencer itself for the best cooling effect should be as thin as practicable, but not thin enough to cause those metallic vibrations noticeable upon some car engines, but a minimum of thickness can be attained if suitable webs and fins are judiciously disposed, to serve the double purpose of staying members and cooling fins. A thick casting or silencer body has a greater capacity for holding the heat, and opposes any tendencies for rapid dissipation and cooling of the gases, so should be avoided.

When considering the flow of the exhaust gases, the chief point to be aimed at is to get rid of the gases in the cylinder as quickly and as efficiently as possible, so that the earlier remarks upon suitable valve seating shapes, tappet clearance, port areas, etc., are equally applicable in this case.

The question of suitable valve timing was not mentioned, as it is assumed, with good reasons, that the maker has experimentally determined the best timing,

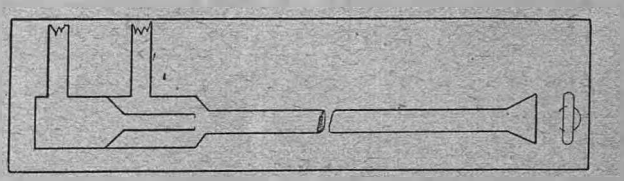


Diagram 45.—Expansion chamber and silencer used on racing cars, which is efficient, but noisy.

and cam profile to suit the conditions of running for which the engine is designed. Some attention, however, is needed upon the subject of sudden changes of area in the exhaust passages between the cylinder and exhaust pipe, and of bends in the exhaust pipes and passages. In the former case, a contraction in area is equivalent to an increase in the back pressure, and, similarly, is a sudden or acute bend in the pipe, for, as with water, the gases impinge upon the bend, and an appreciable resistance is set up, equivalent to a back pressure, so that as straight an exhaust pipe as possible is the best. It is common when running engines on the bench to see the bends in the exhaust pipe become red-hot before other parts,

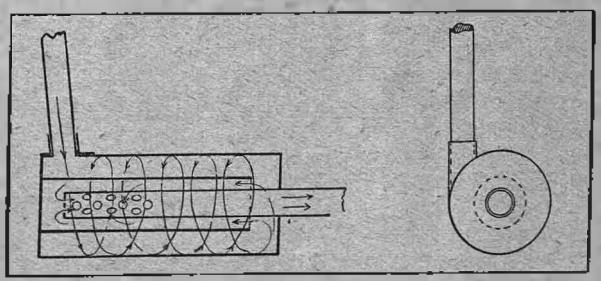


Diagram 46.—Giving the exhaust gases rotary motion.

with poorly-designed silencers, showing that the gases impinge very rapidly at these bends. The actual degree of roughness of the surfaces inside the cylinder ports, exhaust pipe, and silencer has also a resisting effect to the flow of the gases, which in some cases is appreciable, as tests have shown. The effect of abrupt bends, changes of section, and sharp corners, etc., is not only to create a resistance to the flow of the exhaust gases, but also indirectly to oppose the engine's power by preventing most of the gases from leaving the cylinder on the exhaust stroke and thereby affecting the purity and degree of the incoming charge owing to dilution by the exhaust gases.

As regards multi-cylinder engines, a few words upon the subject of their silencers should be of interest. Tests have conclusively proved that it is much better to have a separate exhaust pipe and silencer to each cylinder than a common discharge, and from measurements of the back pressure in the two cases, no doubt is left as to the advantage of the separate exhaust arrangement. This will also be evident from the fact that

OBTAINING INCREASED POWER (contd.).

in the common exhaust arrangement there are four times as many discharges of exhaust gas in the same time for a four-cylinder engine as in the case of a single-cylinder, so that the silencer has to deal with four times the volume of gas in the same time. Also if the car engine is required to deliver its maximum power at some given speed, there is a certain practical length of exhaust pipe which will give the best power effect at this speed. The exact dimensions and length of pipe which give the best results can only be arrived at, in any given engine, by testing the running with different lengths of pipe and by a few variations in the diameter. It is quite probable that this suitable length effect is somewhat similar to the "scavenging" of the exhaust in gas-engine practice, by using a suitable-sized pipe. The inertia of the exhaust gases tends to leave a vacuum in the cylinder.

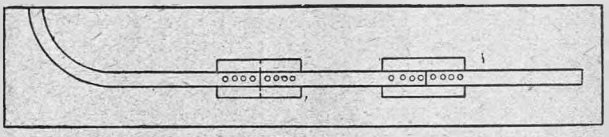


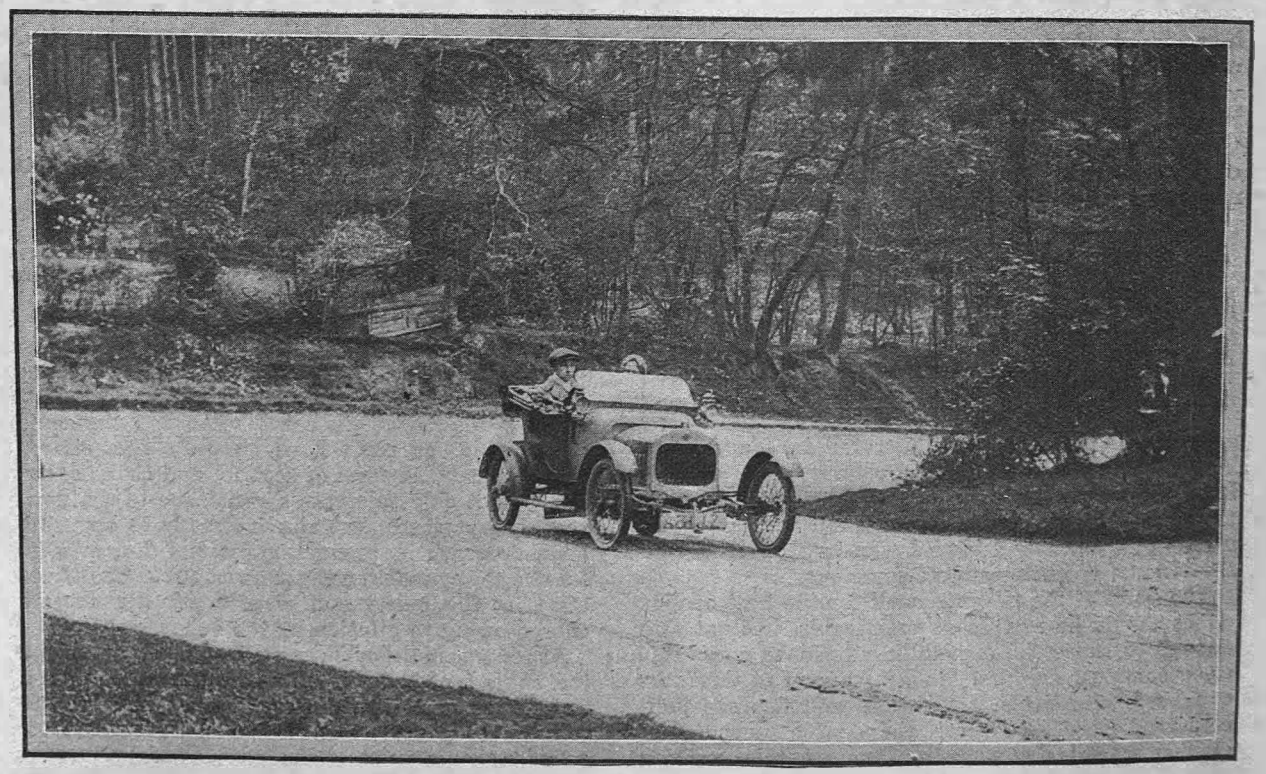
Diagram 47.—Two silencers placed in series.

Before concluding the subject of the exhaust, which it has only been possible just to touch upon, a few practical hints may be of service in maintaining existing silencers at their best efficiency. One important precaution is to keep the whole of the exterior of the exhaust pipe clean, and free from oil and mud. Further, the cooling surface can be improved by giving a thin coat of lampblack paint, as in the case of the cylinder, or a thin covering of graphite. The interior of the silencer should be examined occasionally, and the soot and burnt oil removed from the baffle plates and perforations. The exit end of the exhaust pipe should face rearwards, so as to take full advantage of the fact that the pressure in the stream of moving air is less than in the still air, and this creation of a partial suction tends to diminish the back pressure. Often an existing silencer and pipe can be improved by placing another silencing box or expansion chamber in series with it, either between it and the engine or behind it, as suggested in Diagram 47. By doing so it is possible to remove, or drill out, some of the baffles in the original silencer, and still attain the same degree of silence with less back pressure.

No matter how good a silencer may be, there must always be a certain degree of back pressure existent, and the problem is to reduce the amount of this to minimum dimensions. The final consideration is the importance of efficiently cooling the exhaust pipe and silencer, and, of course, more particularly the exhaust part of the cylinder itself, so that every advantage should be taken of the rush of air when the car is moving to utilize this for cooling the whole exhaust arrangement, remembering that to obtain best cooling results as large a surface as possible of the exhaust pipe, etc., should be exposed to as great a volume of swiftly-moving air as practicable.

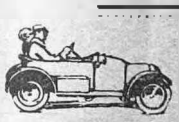
(To be continued.)

Next Week: The Transmission—the Loss of Power between the Engine and the Road.



SPRING ON THE RIPLEY ROAD. An Enfield Autolette making for Brooklands turns off the main road, which just now is a picture of vernal tints.

THOUGHTS AND OPINIONS.



"The suggestions of to-day may be the realities of to-morrow."

HOW WE WASTE FUEL.

Mr. A. E. Parnacott Puts Forward Some Interesting Facts.

I have as yet nothing to sell in the way of carburetters, but having met with financial success with carburetters in the past, "John Gilpin, Jnr.," may be correct in anticipating that some notes by me will prove interesting and perhaps useful. In my opinion, the subject of carburation is far and away the most intricate in connection with the design of motor vehicles, and, whereas in the past, as fuel was so cheap, the matter could be more or less neglected it now becomes, as I have heard it remarked, "a burning question." Burning is the combination of the combustibles, comprising the fuel, with the oxygen of the air, and as definite proportions alone can combine, it is essential for maximum economy; that is to say, if the maximum of energy is to be derivable in the form of heat from this combination, there should be throughout the whole range of engine speeds that small excess of oxygen found necessary in practice for good carburation. If, as is invariably the case at certain engine speeds, the fuel is in excess of the oxygen, clearly fuel must be wasted. Fuel has to be paid for, but the air is as yet not even taxed. The conditions under which this burning takes place demand the practically instantaneous combination of the fuel and oxygen. If, therefore, the fuel carried into the cylinder by the air is in the form of a spray made up of globules, it is clear that a comparatively longer time interval for complete burning is required than if the fuel was vaporized, for the outside of each globule of fuel only will be ignited at first, and however rapid evaporation may appear it requires an appreciably longer time than if the globule was infinitely small. In other words the more intimate the mixture the better the carburation and the less the time required to inflame the whole of the charge. If the fuel is gasified before it mixes with the air then, unless the air is sufficiently warmed, condensation, with a consequent formation of appreciably large globules, takes place. It would therefore appear that it is only necessary to admit hot air to the engine, and though the petrol engine is more economical with warm air passing through the carburetter it is not easy to warm air quickly, and the result of admitting air which is too hot is that the power of the engine falls off for various reasons. It may therefore be taken as an axiom of good carburation that the air should reach only such a temperature as is essentia to quick and complete inflammation and combustion of the charge. Extremely good results have been obtained by causing the drop of air pressure in the induction pipe to open a valve, somewhat like a piston, uncovering tangentially-arranged slots, similar to those in steam turbines, but the valve only uncovers a sufficient length of the slots to have a definite drop of pressure in the induction pipe. It will be seen that the extent to which these tangentially-arranged slots uncover is a measure of the amount of air drawn in, and it is therefore only necessary to connect this valve to a tapered needle valve controlling the supply of fuel to get the correct proportion of fuel and air. The fuel is not sucked from the orifice, but flows under the pressure of a constant head regulated by a float. The tangentially-arranged slots form a kind of curtain, circular in plan, within the top of the cup of metal, which cup is jacketed with some of the exhaust gases in such a manner that the bottom portion is appreciably hot. The incoming charge passing through these slots swirls round and round in the cup with the consequence that the heavier particles or globules of fuel settle on to the inside of the cup where they are scrubbed by the incoming air making their way in a more or less helical path until they have reached the surface hot enough to evaporate them when they pass, intimately mixed, from the centre upper portion of the cup through the throttle valve and induction pipe to the engine. It has been found that when the carburation is almost perfect the engines are quieter running and, what is very important indeed for the life of the engine, the rapid gyration of the charge separates the foreign matter from the air so that the sharp road grit or dust is found at the bottom of the cup instead of finding its way into the engine and wearing away the bearings.

Penge. A. E. Parnacott.

Cyclecar Bodies.

Having read the articles in the issues of The Cyclecar of 16th and 23rd April referring to cyclecar bodies, we should like to point out that we, as coachbuilders, have been building cyclecar bodies for some time, and have built some hundreds. Your contributor under the heading "Cyclecar Bodies" in the issue for 23rd ult., writes about job carpenters constructing cyclecar bodies. We regret to say that there is more job carpentring done on large cars at present. A cyclecar body of simple design, well built, and of good finish, can be turned out at a reasonable price, quite as well as a large car body. If a customer wishes for something different to the standard he can obtain it, even if he desires a miniature cabriolet, at a price that would compare favourably with larger car bodies, taking into consideration the difference in size. What we wish to point out is that some of the cyclecar bodies being built are equal if not better in quality to those fitted to good class cars.

London, S.W. Meade and Co.

Transit to the Isle of Wight.

I quite agree with everything "Quadrant" says in a recent issue of The Cyclecar. If the cyclecar organizations could obtain lower rates they would be doing service to a great number of cyclecarists, both in the island and on the mainland. The present rates for crossing are:—(1) Cowes-Southampton, 15s. and 2s. 6d. pier toll; (2) Yarmouth-Lymington, 10s.; (3) Ryde-Portsmouth (tow boat), 10s. and 1s. landing toll. No cyclecarist would ever wish to cross twice by the latter route. Tourists in the South of England, who would like a day's run in the island, and island drivers who would like a day's run on the mainland, would think twice before they paid 35s. for the double crossing by the Cowes route. I would like to see lower rates by routes 1 and 2, and some means of boarding the Ryde-Portsmouth passenger steamers. Will the Cyclecar Club and the A.-C.U. take the matter up? It is in matters of this description that the various organizations might justify their existence.

Brading, I. of W. J. Edwin Bonn.

THE ALLEGED CARBURETTER.

Dr. Low Explains the Ways in which Petrol is Wasted.

I am sending you herewith some notes based on the recent fuel-consumption trial of the Cyclecar Club. [Appearing in another part of this issue.—Ed. The Cyclecar.] They were written some time ago, and confirm the very pertinent remarks of "John Gilpin, Jnr." There is no doubt that the ordinary alleged carburetter wastes about one quarter of the fuel, not only in the actual leaks but in the way it attempts to prepare the mixture. We have our air compressed in the cylinder, and, instead of putting in a proportion of petrol, we suddenly squirt into the air a lump of petrol, which, naturally, has to be far too big to enable us to get anything to fire at all. The carburetter is surely a much-trusted and humorous proposition; we open a can of petrol in one corner of the room, light a match in another, and if it explodes we say we have secured a perfect mixture. Our machines misfire if cold, when warmed slightly we say the mixture is perfect, but what happens when they get hotter? And what happens when petrol "level," temperature, and wind, are varying independently all the time? Do we really think the "mixture" is constant, and will the explosion flames really attract themselves into one? Now, it does not follow, because you have a certain amount of air in the cylinder, that a definite amount of petrol is required because one wishes to have explosions of different speeds for different conditions, and this might be done not only by admitting the petrol slowly, but by varying the total amount admitted. There is no doubt that, running in the ordinary way, the conditions are never correct at all, and even if they are approximately right for five minutes, they are varying in the most absurd manner the whole time to such an extent that one cannot seriously regard any form of carburetter from a scientific point of view. The amount of vapour given off by any amount of petrol depends upon its pressure, temperature, and dryness; that is to say, whether it is more or less a "perfect" gas, or whether it contains liquid fuel finely divided in suspension. Apart from the need for plotting curves and finding out how much petrol vapour we have under given conditions, and apart from the fact that we know a certain definite proportion of air is required to burn a definite amount of petrol, as air contains a fairly constant amount of oxygen—we know that even the atmosphere varies in composition, and, therefore, in any cylinder, and especially at high pressures, a mixture can be local, corresponding to the burning of a gas jet in a room. The speed of combustion is one of the greatest factors determining efficiency, and the faster the gas can be allowed to expand the higher will be the efficiency, although the power might not be given off in such a manner as would conduce to overall efficiency, and it frequently pays to have a slow-burning explosion, as in the familiar example of climbing a hill "on top" at low speed. Now we can see from this very roughly what amount of petrol is required for a vehicle, although one must assume definite transmission losses and a definite amount of thermal converter and dissociation losses in the engine. It is useless to mislead people by telling them of various complicated formulæ, for no fact is itself complicated, and it is both simple and accurate to state that the ordinary engine uses, under working conditions, quite 25 per cent. more petrol than it is at all necessary. Wonderful tales of petrol consumption should never be doubted, for the various conditions which have to exist for such consumption may have all been present by a lucky chance at the time, and this is the keynote of the absurd condition of modern carburation. In consumption trials definition is useless; but it goes without saying that the skilled use of controls and variable gears enables advantage to be taken of running conditions to alter carburetter and gear to suit each moment of driving. So different and so many are the factors controlling the present happy-go-lucky carburetter, that comparisons are not possible between systems, but, under the same conditions, a water-cooled engine is almost bound to be more efficient than the air-cooled variety, because of the terrible way in which the petrol is used. How can one help regarding the carburetter—unless it has some means of really producing a regular gas—as being other than on a par with the automatic inlet valve? Why, we spend hours adjusting the needles to 1-64 in., with the help of a magnifying glass, and then subject the whole bag of tricks to terrific vibration, and imagine that, because our engine fires perfectly, we are getting a perfect mixture! A perfect mixture is almost unknown except as abnormal, and it is hard to see how the atmospheric carburetter can last much longer. A. M. Low, A.C.G.I., D.Sc.

An Easy Starter.

I have been driving an A.-C. for nine months, and I am very keen about it. I obtain much help from The Cyclecar, and have been interested in the various letters published concerning the amount of petrol consumed on an A.-C. Since the price of petrol has gone up I am sure the quality has gone down, for frequently now I can only obtain 20 to 25 miles per gallon, whereas I used to manage over 30. I have only just had my first breakdown—the chain coming off and breaking some spokes. It was caused by the fearful state of a road near Wandsworth Common, which was such a mass of holes that it was impossible to steer between them. My machine has been fitted with an easy starter by Messrs. Robinson's, of Great Portland Street, and it answers very well, being a great improvement in every way.

London, S.W. (Miss) Mary Smith.

[Heavier spirit should give greater mileage to the gallon, so we should look for other causes of wastage than this. We should suggest taking the machine to a firm making a speciality of tuning up cyclecars, such as Messrs. G. N. Higgs, who, no doubt, would increase the m.p.g.—Ed. The Cyclecar.]

B36

A Reliable Windshield.

With reference to the remarks on windscreens in the "Notes and Queries" page of 9th April, may I draw your attention to the Discus patent windshield manufactured by Motor Equipments, Ltd. The principle is on the multiple disc clutch, there being no loose springs or parts to wear or break.

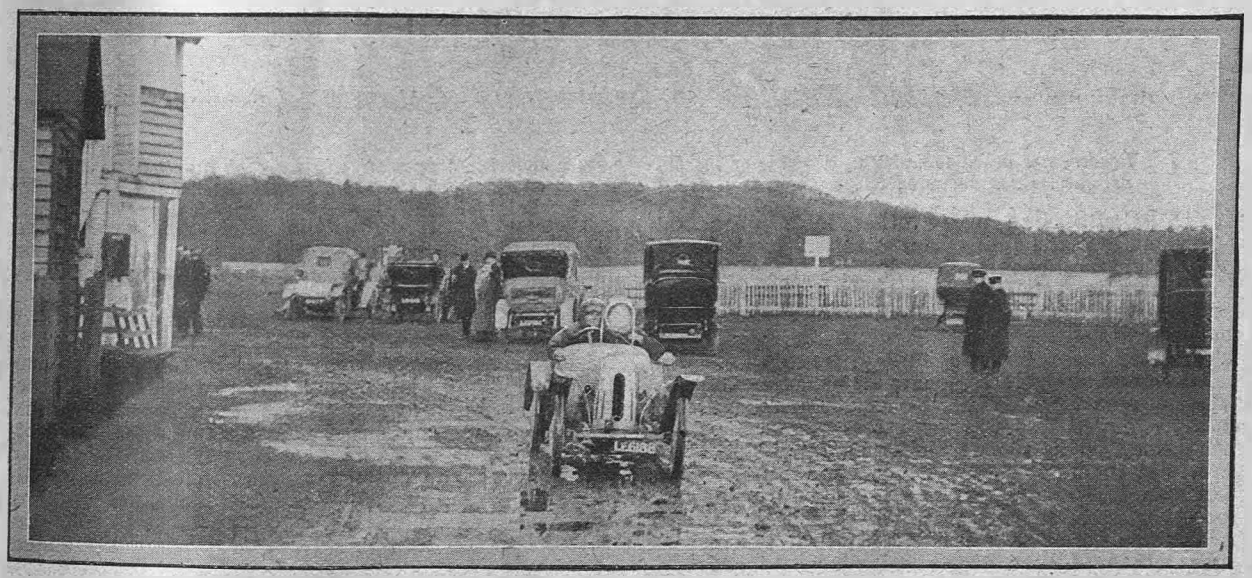
Birmingham. One Who Has Tried Them.

Extra Air Lever for Automatic Carburetters.

I have followed closely the question of the automatic carburetter as set forth in The Cyclecar, but have not noticed reference to anyone using a foot-controlled carburetter of the single-lever variety, plus an extra air valve, Bowden-wire controlled from the dash or steering wheel. This, it seems to me, ought to be a successful method of overcoming the inadaptability of the automatic carburetter.

Cambridge. Islay F. Burns.

[A Duo, belonging to a member of the staff, is fitted with a Solex carburetter, plus an extra air lever, with excellent results—greater economy, more power, and quieter running. See the "Notes and Queries" page.—Ed. The Cyclecar.]



Leaving the flying ground at Brooklands. The cyclecar (a G.N.) has a novel bonnet.

Slow Running with a Pilot Jet.

A few weeks ago you published a description of a pilot jet which Messrs. G.N., Ltd., are fitting to B. and B. carburetters. My G.N. is one of last year's models, with a J.A.P. engine, and I could not get it to run slowly in neutral, so I sent the carburetter up to have a pilot jet added. I have now got it back. The engine starts at the first pull, runs slowly without "petering out," accelerates better than before, and what surprises me is that I am now able to climb hills on top speed, three up, which I could not ascend before without changing down. David M. Park.

Greenock.

Mr. A. W. Judge Replies to Another Criticism.

Replying to the comments of "S.O.N." (Luton), from an engineer's point of view, I gather that he has not tried any of the questioned methods, since from my personal experience they are all quite practicable and satisfactory. In the first place, the spring tensioning collar is quite unassociated with the flat end of the valve stem, and so does not in the least affect the clearance between this and the tappet. It may be news to "S.O.N." to learn that it is quite easy to solder a piece of tinned iron, or steel, to a hardened tappet top, and further that the writer has run a racing type engine on the road for over a year with pieces of steel soldered to the tappets of both valves without the slightest tendency for them to become detached. A change in the compression, by fitting a brass liner between the crankcase and cylinder necessitated the above alteration, and it was found that the wear between the soldered tappets and the valve stems was taken up by the lowering of the valves due to the operation of "facing up" in the lathe in the above case. This was, of course, more by accident than by design.

Referring to the method of taking up the wear in the brasses, "S.O.N." evidently understood that the material of the connecting rod and its cap was to be faced up with the brasses. This is wrong, as most makers provide the liners he mentions of different thicknesses to effect the necessary adjustment. My somewhat brief remarks referred only to the brasses, it being assumed that the usual means of adjustment of the cap and connecting rod were provided. "S.O.N.'s" description of the method of air pressure equalization in the crankcase of the four-cylinder engine is interesting, and it is worthy of note that the opposite principle of crankcase compression in the case of a horizontally opposed twin is being tried for obtaining forced induction. A.W.J.

How to Reduce the Cost of Upkeep.

Although I have never owned a motorcycle, or had any inclination to do so, I have for some time been considering the purchase of a cyclecar. Naturally, when considering anything new, it is advisable to go fully into particulars regarding initial cost, upkeep, etc., and I have read "Motor Cycling" for some time and taken The Cyclecar from No. 1, both of which have been extremely interesting. I also paid a visit to Olympia, where I inspected most of the models, and although the initial cost appears reasonable, I have serious doubt regarding upkeep, especially as the price of petrol appears to be always rising, and apparently no one can say to what price it will go. Now, I notice that a vast petroleum field has been discovered in the Argentine, and it struck me directly that there was an opportunity for motorists. Surely amongst the motor, cyclecar, and motorcycle owners a company could be floated with capital, say, of £50,000 to buy up an oilfield, purchase the necessary plant, and work it to advantage. There cannot be less than 200,000 people who use petrol in the United Kingdom, and if a company was formed (shares of 5s. each), it would give everyone a chance to hold at least one share, which should entitle the owner to purchase petrol at, say, 10d. per gallon. If every shareholder (no matter how many shares he held) was entitled to one vote only, and the scheme could be worked on a co-operative basis, all profits being utilized to reduce the price of petrol, there would be no gambling in shares and the present petroleum monopoly could be ignored, which would bring in thousands of new motorists who now hold aloof through the uncertainty of the cost of upkeep, which increases almost every day, owing to the ever-rising price of petrol. W. G Marsh.

Maidenhead.

[The distributing of the spirit is the great difficulty, involving enormous capital. It is useless to be in a position to buy petrol cheaply unless it can be obtained readily everywhere. An average mileage of 40 to the gallon, which is usually exceeded by the majority of cyclecars, makes the cost of fuel a very small item.—Ed. The Cyclecar.]

NOTES AND QUERIES.

Selected Replies to Interesting Questions.

Readers are asked to write on one side of the paper only, and to use a separate slip for each question. All queries are answered by post, and a stamped addressed envelope for the reply should be enclosed.

CYCLECARS, like every other motor-propelled vehicle, occasionally run erratically. Even if the engine does not actually stop altogether, it sometimes gets out of "tune." As the majority of cyclecarists are undoubtedly new to the ranks of motoring, any little derangement in their machines may perplex them, and the cause of trouble they will probably find difficult to locate. It may be only a matter of adjustment, which an expert could speedily remedy, whilst others with less experience in "tinkering" with the machine may make matters worse. It should therefore be remembered that THE CYCLECAR invites its readers to communicate any trouble, whether it be ever so trivial, when it makes its appearance. The services of a well-known engineer, Dr. A. M. Low, are at their disposal for highly technical questions. No fee is asked, and queries, whether simple or abstruse, will be welcomed. Special attention is given to questions dealing with the selection of a machine, and as the staff of THE CYCLECAR are all practical cyclecarists, having driven most makes of machines now offered to the public, they can give valuable and unbiassed advice to readers on the choice of a cyclecar to suit any special requirements. All queries should be written on one side of the paper only, and a stamped, addressed envelope for the reply enclosed. Legal and touring information is also supplied.

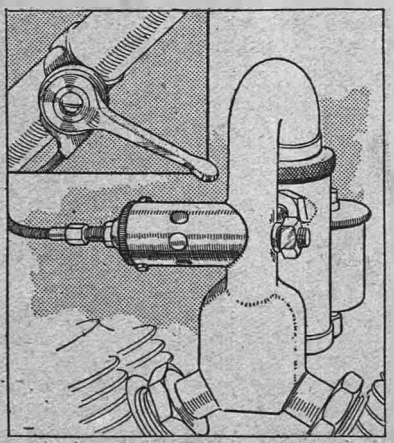
* * *

TOO MUCH PETROL. STARTING-UP difficulties appear to be prevalent at the present time, but in most cases the cause of trouble seems to be trivial. A lady reader, "A.M." (Crediton), has a machine fitted with a variable-jet carburetter, and complains that the engine seldom starts easily. When it refuses to fire, if she takes out the sparking-plug, she finds it quite wet with petrol, likewise the top of the inlet valve. It is, of course, obvious that too much petrol is entering the cylinders, the most likely cause being an excessive amount of flooding when starting. Sufficient air is, perhaps, not provided, and, therefore, the suction simply draws unvaporized petrol into the cylinders. Petrol vapour is only explosive when mixed with air—15 volumes of air to 1 of petrol vapour is an average proportion giving good results. Some carburetters require the extra air port to be opened a little so as to enable an easy start to be made, and as "A.M." appears to be troubled with too rich a mixture, a slight amount of extra air may effect a cure. We presume that our correspondent partially reduces the size of the jet when starting.

* * *

VARIABLE IGNITION. A QUESTION asked by "C.F.P." (Bristol) shows that he has not grasped the object of varying the ignition. In an ordinary internal-combustion engine the explosion takes quite an appreciable time to occur. When the engine is running slowly, the spark will be timed to take place when the piston is at the top of the compression stroke, but when the engine is running fast, with the same timing, the explosion would only take place when the piston was well down the explosion stroke, and a good deal of power would be lost. The ignition is therefore advanced so that the spark may occur before the dead centre, although the charge will only be exploded just after the piston has reached its highest point in the cylinder. There is also a certain amount of "lag" in the electric current, which at high speeds has to be taken into account, although at low speeds it has no detrimental effect. Take the case of a magneto with fixed ignition. If it is timed to give a spark at the correct moment at low speeds, say, when starting up, at higher speeds the explosion takes place too late, and an enormous amount of efficiency is lost. On the other hand, if it is timed correctly when the engine is running fast, a backfire may occur when starting up. Strange to relate, however, several magnetos give every satisfaction with fixed ignition; in fact, very few makes of large cars fit variable ignition as a standard. This is partly due to the general carelessness of drivers, who rarely use the ignition lever to the best advantage.

AN EXTRA AIR VALVE. MOST automatic carburetters are extravagant with spirit, and it is often an advantage to fit an extra air valve. It is sometimes found that, owing to atmospheric and other conditions, an extra amount of air can be given, with a corresponding increase in power. Even with a two-lever carburetter, under certain circumstances, it is impossible to give enough air, so that an auxiliary air intake is useful. When "coasting" down hills, too, the air valve can be opened and the engine effectively cooled. One of the neatest of these fitments is the Bowden extra air inlet, which is so constructed that a very gradual adjustment can be made, and as the opening is controlled by a Bowden lever mounted on the steering wheel, or other convenient place, the trouble of manipulation is reduced to a minimum. The actual valve is really a piston working in a tube, around the circumference of which several holes are placed. By moving the lever the piston slides, and gradually uncovers the holes, through which air can pass. The extra air inlet should be placed in the induction pipe between the cylinders and the carburetter. A $\frac{3}{16}$ in. hole should be bored through the induction pipe, and round it six or more other small holes should be made, but these should only go through one wall of the pipe. Through the large-sized hole the projecting bolt, which is fixed to the valve, should be passed, and, having placed a lead washer between the pipe and the valve, the whole can be tightened by the nut provided. It is essential, of course, that a perfectly air-tight joint should be made, as any leak in the induction pipe upsets carburation, making starting difficult and preventing the engine running slowly. If a more permanent fitting is needed, the joints can be soldered, which is decidedly the best method to adopt. Care should be taken to see that the Bowden wire is adjusted so that in the "off" position of the lever the air ports are completely closed.



An extra air inlet to a Solex carburetter, showing the method of fixing