

Motor Cycling

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& Motoring

PETROL:

Its Composition and Properties, with Hints on Using.

EVERY motor-cyclist who wishes to become complete master of his machine must learn something about the constitution and properties of the fuel which provides the energy that drives his cycle along. Such knowledge will be of the greatest assistance to him in explaining the "whys and wherefores" of certain phenomena that occur in the running of the motor. The spirit or liquid used for running small high-speed internal combustion engines is known by the name of "petrol," or light petroleum. It is manufactured from crude petroleum oil by a process known as

Fractional Distillation.

This crude petroleum furnishes a large number of spirits and oils. To mention a few, we have solid paraffin, vaseline, ordinary paraffin oil, benzoline, petroleum, ether, gasoline benzine. These all distil over when the petroleum is heated, each product having a certain exact heat at which it comes off. Now there is a certain temperature when our petrol distils over. This temperature is kept constant till no more liquid is condensed; the vessel containing the petrol is removed and replaced by another one, which on the heat being raised, collects the heavier oils or spirits, and so on.

Its Composition.

Petrol really consists of carbon and hydrogen in chemical combination, and is said by chemists to belong to the large group of hydro-carbons or substances rich in hydrogen and carbon. Many of these are liquid at ordinary temperatures and some, like ordinary coal gas and acetylene, are gases at ordinary temperatures. These compounds have a strong affinity for oxygen and when mixed with it in the right proportions combine with explosive violence when ignited. It is upon this fact that the means of obtaining our motive power or energy are based.

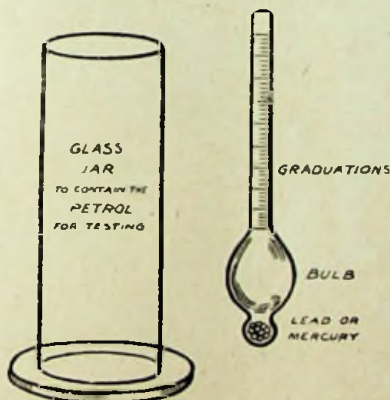
Its Properties.

Petrol is a colourless liquid, and when of good quality possesses a characteristic smell suggestive of "ether," but not unpleasant—excepting when of poor quality, when its paraffin origin is easily detected. It is much lighter bulk for bulk than water and is highly volatile at ordinary temperature, or in other words, it readily evaporates or disappears in the form of gas or vapour when exposed to the air. It is extremely inflammable and its vapour is readily ignited by a red-hot wire, or an electric spark. The most important property it possesses—so far as motor driving is concerned—is that when its vapour is

mixed with about eight and a half times its bulk or volume of air, a mixture is formed which, on being fired, gives out a large amount of mechanical energy. Other valuable properties are its highly solvent action on india-rubber and thick oils and greases; it is a fact worth remembering that pure rubber strip or cuttings dissolved in petrol makes a splendid quick-drying rubber solution.

Meaning of the term "Density or Specific Gravity."

All liquid and solid bodies differ in weight, volume for volume compared; that is to say, for instance, if we take a little block of ice an inch square and a block of lead an inch square and compare their weights, we find that the lead is $11\frac{1}{4}$ times the weight of the ice, hence we say their densities or volume weights are in the ratio of $11\frac{1}{4}$ to 1. Now water is always taken as the standard of density, and is indicated as 1.000. Petroleum spirits are lighter than water, and ordinary petrol is rather more than half its weight, or at 60° Fahrenheit it is .680 (water being 1.000), but it is most important to remember that the lower the temperature the greater the density and *vice versa*, or in other words the petrol gets heavier or lighter as the temperature varies. The density of any liquid is generally measured by a little instrument termed a hydrometer, or densimeter; this consists of a graduated glass tube attached to a glass bulb weighted with lead or quicksilver; this is simply floated in the liquid to be tested and the number to which the tube sinks indicates the specific gravity (sometimes abbreviated to sp. gr. or den.).



DENSIMETER AND TESTING JAR.

Hints on using Petrol.

The carburetter of a small motor requires thoroughly knowing to be able to get good and uniform results from it. The two chief forms are known as the surface carburetter and the spray or pulverizing carburetter. The function of both of them is to vaporise the petrol. In the first this is done by causing air to bubble through the petrol (a large surface of which is exposed to its action); in the other a small portion of the liquid petrol is forced through a small aperture and broken up into a spray by impinging on to a metal cone (there are many other modifications of this method). Before it can be used in the motor cylinder, the petrol vapour must be mixed with air in the right proportion. This requires some experience in the management of the mixture tap. The greatest power can only be got by having the proper mixture so as to ensure complete combustion of the charge. If the proportions are not correct the petrol is wasted, overheating takes place, and the exhaust gases will

smell strongly. With a perfect mixture it is remarkable how little of it is required to develop the full power of the motor. Incomplete combustion is also very often responsible for sparking plug troubles, owing to fouling or charring of the points. Now as to the difficulties in getting good results in cold weather. Many experts claim that this is the chief fault of the surface type of carburetter, and it is noteworthy that many motor-bicycle makers are adopting some form of spray carburetter. Most up-to-date surface carburetters are provided with some simple means for warming the petrol from the exhaust, and if this acts well, no difficulty should be experienced, even in very cold weather, once a start can be got. In the United States a spirit is used that vaporises slightly more readily than the petrol at low temperatures; this goes by the name of gasoline. It is a good plan always to try the sp. gr. of the petrol and compare it with a correction table; if too dense it will not give good results. In storing it, see that the vessel is absolutely airtight, otherwise the petrol will deteriorate in quality or go stale. On account of this risk it is not advisable to keep large quantities of it. It is sometimes asked if there is any other liquid that could be used in case a motor-cyclist found himself stranded for petrol. Well, there is only one that is at all likely to be obtainable at the average chemist or druggist's shop, and that is

Benzine.

If benzoline is tried, failure is almost certain, unless it is very pure and the weather warm, when it is just possible that the motor may work, although at reduced power. Petrol that is too dense for running the motor can be used up for cleaning the bearings of the machine, making solution, and for removing grease stains from the clothes.

Concerning the Dangers of Petrol.

Since the general adoption of electric ignition for motor work the dangers involved in the use of petrol have practically disappeared. Whenever there was a flame or red-hot tube in the vicinity of the petrol tank, the risk of it catching fire was very considerable, especially in case the machine got overturned; but serious accidents have even occurred on cars through the spirit leaking out through a joint or overflowing and coming in contact with the burner or hot tube, and thereby practically ruining the car. As far as motor-bicycles are concerned, there need never be the least fear of the petrol getting ignited by the electric spark, for the simple reason that the spark only takes place in the combustion chamber of the motor, and only when the petrol vapour is mixed with a definite proportion of air does the ignition take place. There is no chance of the explosion flash getting back along the inlet pipe, as screens of metal gauze fixed in the pipe render it impossible. The closing of the inlet valve alone would prevent this occurring.

A few words of caution, however, will not be out of place here, in case the novice might unthinkingly bring his oil lamp too near the petrol tank or carburetter to examine them at night. It is advisable to keep it at least two feet away; in fact, it is an excellent plan to have a small electric lamp of four volts fitted with holder, and a few feet of conducting cord to attach to the ignition battery for this purpose. It is absolutely safe to examine any part of the motor with this.

In Case an Accident Should Occur.

In the remote possibility of the petrol getting on fire by some means or other, remember that it cannot be put out by throwing water on it. As it is so very much lighter it simply floats on the water and burns as strongly as ever. The only effectual way to extinguish it is to smother it, or to prevent the air getting to it, such as by throwing a coat or rug over it; sand or something of the same nature would also do.

Another word of advice is this: Avoid working with petrol spirit indoors as much as possible. In any case have a window wide open, because, apart from the smell produced, it is quite conceivable that an explosive mixture might be formed by the spirit evaporating and mingling with the air of the room. If these few hints and precautions are observed, petrol spirit will be found safe enough to handle in every respect:

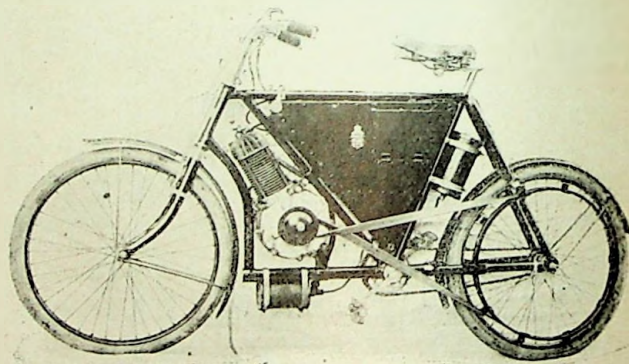
Temperature Correction Table.

Deg. Fahr.	Densimeter Reading.	Deg. Fahr.	Densimeter Reading.
30	.695	62	.679
32	.694	64	.678
34	.693	66	.677
36	.692	68	.676
38	.691	70	.675
40	.690	72	.674
42	.689	74	.673
44	.688	76	.672
46	.687	78	.671
48	.686	80	.670
50	.685	82	.669
52	.684	84	.668
54	.683	86	.667
56	.682	88	.666
58	.681	90	.665
60	.680		

This table shows what the densimeter should read at various temperatures with good petrol:

Driven by a Crossed Belt.

A newly designed motor-bicycle which promises to be successful has just been completed by Mr. W. T. Chatfield, of Quarry Road, Tunbridge Wells. The principal advantages claimed for the machine are that it is driven by a crossed belt; there is no fear of side-slip; no vibration; and that the greatest driving power is imparted by the position of the engine. The frame is specially designed to take and is fitted with a genuine De Dion 2½ h.p. motor, which is placed slightly out of the vertical, getting a full draught and circulation of air for the purpose of cooling the engine. It has been in the transmission where difficulties have frequently arisen,



and in this many motor-bicycles at present on the market have failed, as the short round belts usually adopted are not strong enough for the strain put upon them. Chain and gear driving are both noisy and necessitate the use of clutches and other intricacies to enable them to be used. Mr. Chatfield has, we learn, overcome this difficulty by using a 1¼ inch flat belt of special material, which is unaffected by wet. This belt is long and runs crossed, thus giving a good grip of the engine driving pulley without undue tension of the belt. In addition to the weight of the machine it stands the strain of hauling a trailer with a heavy passenger, without fear of breaking or stretching. The belt-rim is attached direct to the driving rim, and not by the usual fastening to the spokes. The steering is perfect; in fact, the machine can be easily ridden "hands off," and there has not been found the slightest tendency to side-slip even in the worst grease, so we hear. This is accounted for by the long wheel-base due to the design of the frame, and the correct distribution of the weight of the engine and rider between the two wheels. We like the appearance of the machine, and it appears to us a practically designed and efficient pattern which should catch on,

MOTOR-TRICYCLE CHAT.

C. A. Smith descants cheerily on his rides to Town.

I generally use my Ariel motor-tricycle to journey to the great city, and I find on the whole that I do the trick as punctually as the railway. No travelling a mile or more to reach the termini each end; no question of being punctual; no crowd; no sitting in a stuffy carriage. There must be disadvantages, you say. Well, of course, a breakdown does occur occasionally. That spark fails at times, the fickle thing, "in course" it does. There I was recently careering swiftly homewards through Richmond Park. The car in front of me took the "Star and Garter" road, and I did too, somehow. Why? I know not! (I bet you do—pass it through them—isn't that what you call it in Bathroadese?—ED.) But lucky

anyhow, for there I was on top of Petersham when my trike stopped. The car, fortunately for me, had left the park at the gate, so did not see my shame. "Battery," said I to myself, "the spare one is at home." And so I found on testing the wretched thing with my voltmeter. Swear, did you say? Not I! Didn't I say just now I was on the top of the hill. Don't you see I only had to pedal the instrument down Petersham Hill, and there you are in touch with the wide wide world once more. Nice omnibus service at the bottom, you know. It's a lovely hill, Petersham, so I speedily store my cripple at the blacksmith's shop close to the "Fox and Duck," or whatever animals they are, and by means of the oh! so useful and up-to-date road car, we crawl together to Surbiton station and so home, as Peter, or some other chap, appears to have remarked on a similar important occasion. The morrow, being compelled to visit London once more, I drive one of my hay motors (with a trailer attached) and I duly reach Petersham at a pace well under the legal limit. I pop the fresh accumulator into the case, a drop of paraffin just as a refresher for the inhabitants, and within a few minutes I continue my crawl towards London on the three-wheeler.

On another occasion a tyre collapsed in Richmond Park. Repairing tackle and a pump I do not load the tricycle with, poor thing! So I had to jog. Between you and me there's nothing like tyre troubles to make you respect the laws of the land: I don't like "jogging" and going over "twelve." At last I find the 'ansom (joke here) Barnes repairing emporium.

"One hour, sir, as you say, to do a decent repair," quoth the saint in charge. So I borrow a safety from the good man and I cycle to Barnes Station. My schedule time due in London is 11.30. I enjoy myself muchly in the railway carriage whilst the thing meanders along in the mist, and eventually it does the seven miles to Waterloo in one and a half hours. "That tyre," I whisper to myself at intervals during the day, as I think of my schedule and the time lost. Now, I am a keen observer of bubbles; and I take care to bandage them when I see them appearing on the tyre.

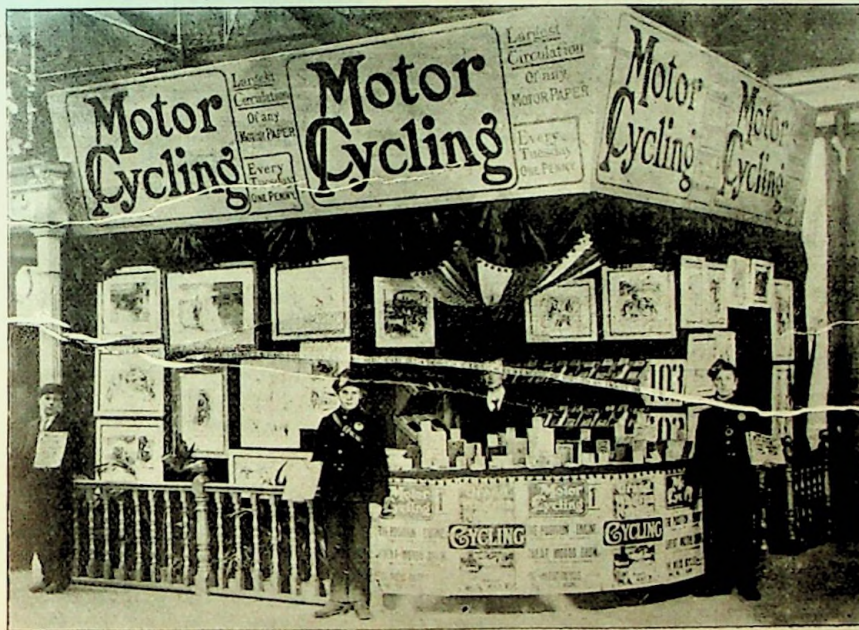
Entering Hyde Park the other day at Stanhope Gate, I was rather astonished to hear a voice bid me "Stop!" Obedience is a weakness of mine, for had I not noticed several "slops" about? So I halted immediately, and the intelligent park-

keeper points to my pedals and cranks and informs me such things—with a motor attached—are not allowed in the Park after three. I argue with him that I am not making use of them, but no use, and of course I follow his instructions and quit the Park forthwith. I steer towards Hyde Park Corner. I believe that is the name it goes by? All London seems to be out and making use of the beastly and out-of-date omnibuses; carriages, cabs and all sorts of things perambulate along and fill the streets, but, fortunately for me, I see gates on my right. All

seems nice and quiet therein. Just the sort of place I like. So I enter; no one says "Stop!" and I proceed homewards quietly and gently along this road, where at the end stands the, I have since learnt, Albert Memorial. Perhaps some of you know the highway I mean. I don't know my way about much in London. Living in the country and all that sort of thing, one forgets the names of places.

[You evidently got into Hyde Park again; you dreadful law-breaker!—ED.]

Say, fellow triker, did you ever meet another similarly mounted to yourself, and then tour together? I can recommend this if you want some fun: The other day I was Dorking way, and accidentally met another "Ariel" tricycle. We talked together, and agreed it would be advisable to have a canter. So cautiously, after loading up with fuel, we proceeded through the town, and steered for Ewhurst, via the Horsham Road. First one led, and then the other; our steeds evidently well matched. Down the hills neither of course hurried: A



The Stand occupied by "Motor Cycling" at the recent Automobile Show at the Agricultural Hall.



HIS POINT OF VIEW.

Motist: "By Jove! What a lovely coat you'd make!"

few miles, and then we met the lady with the dogs. You all know the sort of person I mean. Frantically she waved her weapon (sunshade), and urged the animals to keep out of the road. Not they; dogs are like pigs, somewhat. If you meet swine on the road it is best to stop; you cannot hop across them with a motor. So we slowed down and crept by these representatives of the canine world. Fortunately at the last moment they obeyed their mistress's call, and left the highway clear.

The moment after—what a shock to one's nerves!—the village police-sergeant passed on his bicycle—one of those celebrated Surrey police, doomed to be unpopular through the unfortunate orders which, poor chaps! they are bound to carry out. Who has not heard of their notorious doings in some districts? Their actions are condemned unanimously by the press of the country. Commanded by their superiors to hide in ditches, or to disguise themselves in plain clothes so that they may pursue the motor hunt. And as timekeepers, how they shine—so many yards in so many seconds. Trained to it evidently from childhood—in your mind, eh? Less motor dust, and perhaps all would be peace in the country. Anyhow, motors have come, and are going to stay, just like railways. The country roads should be made with the best materials—no cheap rubbish—and then there would be less dust, consequently less annoyance to the inhabitants, and fewer complaints to the chief constable concerning speedy and dust-raising automobiles. But I am digressing. Let us return to our muttons—I mean motors. The tale of the Surrey policeman wearies one. We speed on, pass through

Ewhurst, and arrive at the "Onslow Arms," at Cranleigh. Motors must have lubrication, and engines must be rested and cooled, so we chat with the jocular landlord, inspect his parlour, adorned with "Cynicus" pictures, and wait patiently for the cooling process to be successful. The four [four engines (?)] How do you make *four* at this stage?—Ed.] engines lubricated, a start is made, and passing through Womersh and Shalford, we reach Guildford, and eventually our domiciles, after an exciting and pleasant trip:

Crossed Belts Efficiency.

In regard to driving belts, it is of interest to note the earnest attempt at additional efficiency in the case of the Royal Enfield, in which a crossed belt conveys power from the engine, which is placed in front of the head, to the rear wheel.

A crossed belt appreciably increases the transmitting power of the belt, because of the greater arc of contact on the pulleys; this is especially the case when, as in the case of the motor-bicycle, one pulley is much smaller than the other. The disadvantage is the amount of wear at the point where the belt crosses, which fact is especially hard on the join. It will be most interesting to note how the experiment referred to results; should it prove from all points satisfactory, a general conversion to crossed belts may safely be predicted, writes a correspondent. As if to emphasise this belief, we have received particulars of a new machine which is fitted, we notice, with a crossed belt. This new pattern will be found illustrated and described on another page.

ENGINE POSITION.

We publish the following letter on the subject this week, which will be found to be interesting reading, and ought to add materially to the gradually accumulating fund of information on this vexed problem.

Mr. Pullinger's letter will be found to go into the matter fairly exhaustively, and it must be admitted that his criticisms on the views held by Mr. Brown have a sound technical basis to support them. He has had a good personal acquaintance with horizontal cylinder motors—one type in particular having been one of the pioneers amongst motor-bicycles—so that his views are the result of practical experiment; interesting also are his remarks upon lubrication. Just at a time when the "splash" system at present adopted is being severely criticised, he holds the view that the system is as near a perfect one as we are likely to get, and the reasons he puts forward would seem to be very sound ones.

Sir,—Having read most of the articles on the position of the motor, and especially that by Mr. T. B. Browne, I am tempted to ask you to grant me space in "MOTOR CYCLING" in which to point out a few of the errors and omissions which, in my opinion, he has fallen into. I will put my views in as simple a language as possible, that it may prove readable to motorists generally.

UNEQUAL WEAR OF THE CYLINDER BORE.

In the petrol motor (one cylinder type), which is, I take it, the one that interests us most, we have four distinct operations or strokes of the piston, and for convenience I will call them suction stroke, compression stroke, impulse stroke, and exhausting stroke.

HORIZONTAL MOTORS.

If the reader will consult the diagrams, Figs. 1 to 4, he will see that in the suction stroke the piston goes forward, drawn by the connecting-rod (this latter going under, as in Mr. Browne's case), but there being no pressure behind the piston to counteract its weight, the piston lies on the under side of the cylinder and, by gravity, tends to wear the cylinder oval. In the second, or compression, stroke the connecting-rod comes over and pushes the piston against the gases, and therefore there is not only the weight of the piston on the under side of the cylinder but the thrust caused by the resistance of these gases. The third is the stroke dealt with by Mr. Browne, and here the weight of the piston is more than counter-balanced by the thrust upward caused by the explosion in the first part of its forward motion, but not in the latter part, when the gases are partly expended. We will, however, admit that in this stroke the tendency to wear oval is nil. In the fourth, or exhausting, stroke the connecting-rod again comes over, and, as in the compression stroke, the resistance of the burnt gases increases the pressure on the under side of the cylinder, due to the weight of the piston. The result is that in three-fourths of the total distance travelled by the piston for each stroke of same it is doing its level best to wear the cylinder oval, and that in one-fourth of the total distance travelled it is nil. I think this proves that horizontal motors are very liable to wear oval. Now, in practice, I have handled horizontal and vertical motors, the latter by hundreds and of the former about sixty to seventy, and my experience is that one and all do wear oval more or less. The Hildebrand and Wolfmuller motor was my first experience, as I made some sixty of them. I can fairly say they nearly all wore oval; I will not say all, as some of them never ran at all. The bad results caused by unequal wear are so well known that it is not necessary to dwell on them. At a future date, perhaps, other discussions will crop up, and I may have the occasion to write on this subject.

VERTICAL MOTORS.

The rubbing of the piston is, all round, due to the downward and upward strokes of the connecting rod being from different directions, and the balancing from side to side of the machine. Vertical motors, as a rule, do not wear oval—this, I think, is admitted.

OILING OF HORIZONTAL MOTORS.

Mr. Browne does not remind your readers that we have to do with a motor, the cylinder of which attains an exceedingly high temperature; the cylinder walls, in direct opposition to the steam-engine, having to be cooled, not heated. The oil falling on the piston, which is also hot, runs immediately round to the bottom of the piston, and the upper forward portion of this latter is nearly dry, or, at least, very insufficiently oiled.

OILING OF VERTICAL MOTORS.

In the splash system of oiling, which is generally used in the small high-speed vertical motors, it is obvious that the oil is thrown, as Mr. Browne says, on one side of the piston if the head of the fly wheel chamber is left open; but, by putting in a diaphragm or web between the cylinder and fly wheels, the oil has to pass through the opening in the centre through which passes also the connecting rod. The oil is then thrown on all sides of the cylinder, as is proved by putting an extra dose of oil in the fly wheels chamber, and the boy in the street knows that the smoke coming away from the silencer indicates that the oil has got behind the piston and is burning.

Therefore the vertical motor does oil itself, and in a nearly perfect manner.

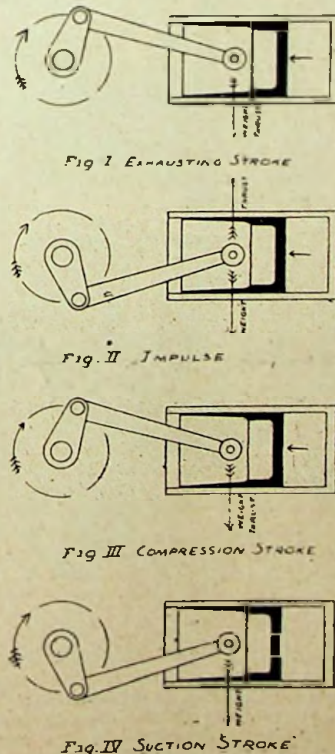
I will try and prove this to you in another way. Run your vertical motor for an hour or so with too big a supply of oil, and then take off the cylinder head; the piston will be coated with a carbonized matter slightly thicker on the edge of the piston and thinner towards the centre, but uniform in thickness all round. Do the same in the horizontal motor, and you will find the burnt oil on the piston thicker at the bottom than at the top. The inclined motor is the same, and the piston is not equally oiled.

If we only grasped the absolute necessity of perfect oiling in these high-speed and high-temperature motors, and the difficulty of doing so properly, we would not be apt to give a way points, and certainly not design our motors horizontally.

There are many other things which tend to ovalisation, and which influence the oiling, such as initial pressure due to varying temperatures; but this will not be instructive to the general reader, and the final results are not influenced by them.

Lyons.

T. C. PULLINGER.



IN TRANSIT.

Some Experiences of a Cyclist in the Transition Stage.

Elucidating a Mystery. My little "mystery," wherein the gases in the combustion chamber occasionally continued to fire after the current had been switched off, is no longer a mystery, thanks to the dozen or more of correspondents who have written me upon the

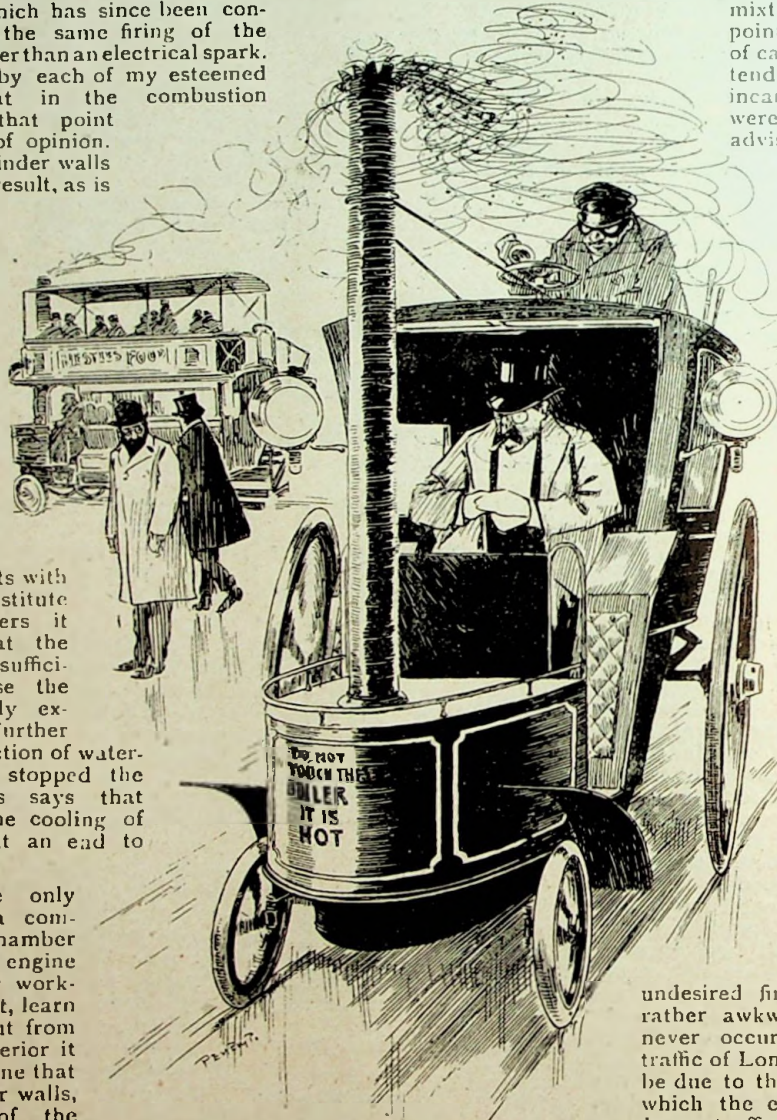
subject. One and all agree that this disconcerting action on the part of the engine is not due to any defect in the ignition system, and in the light of the information which has reached me, I have confirmed this opinion by a most thorough examination of the circuits, and find them free from defect of any kind. And in the course of a test which has since been conducted there occurred the same firing of the gases by some means other than an electrical spark. The cause is attributed by each of my esteemed correspondents to heat in the combustion chamber, but beyond that point there is no unanimity of opinion. That the heat of the cylinder walls would bring about this result, as is suggested by a reader who has had considerable experience with stationary oil engines, would scarcely be feasible, to my way of thinking, but other writers locate the guilty spot at (1) the combustion head, (2) the piston head, (3) the exhaust valve, (4) the ignition points, and (5) a piece of carbon attached to the wall of the combustion chamber. Mr. Walter Phillips tells me that in some recent experiments with gas engines by the Institute of Mechanical Engineers it was demonstrated that the piston head became sufficiently hot as to cause the mixture to occasionally explode prematurely. Further experiments in the direction of water-jacketting the piston stopped the trouble. Mr. Phillips says that greater attention to the cooling of cycle motors would put an end to the trouble.

A Likely Explanation. Could we only see into a combustion chamber whilst the engine is actually working, we should, no doubt, learn much that is useful, but from an inspection of the exterior it seems difficult to imagine that any part of the cylinder walls, the head, or parts of the exhaust valve could be hot enough to explode the gases, especially as it would be necessary for the parts to be nearly white hot. Now the suggestion from three quarters

(made authoritatively in two cases), that the points of the sparking plug become incandescent with the continued firing of the gases and are themselves hot enough after a period of rapid explosions to explode the gases, seems to me to be more than possible; in fact, this is the most probable cause. Mr. C. A. Smith tells me that he is convinced on this point from personal examination, whilst "P.M." is equally certain of the cause. He says, moreover, that he has found the explosions to continue for a longer time when the points were dirty, owing to having run with too rich a mixture. Therefore covering the points of the plug with a deposit of carbon. This, of course, will tend to make the points remain incandescent longer than if they were clean. This correspondent advises keeping the plug clean, and running with as much air as is consistent with good explosions, and then the trouble will diminish, if not cease entirely.

One little point was brought out in my latest experience of this action on the part of the engine, and that is that every charge does not explode. It seemed as if every second or third charge would ignite, and the engine would run with a series of jerks, but if the current were switched on the explosions would come regularly and about twice or three times more frequently. This, I would suggest, might be due to the fact that after an explosion all the exhausted gases would not be entirely cleared away, and the next charge or two would not be sufficiently pure to be ignited by the comparatively cool heat from the points, but the third charge might be pure enough for this to happen. I must say that when this undesired firing occurs in traffic it is rather awkward. Fortunately, it has never occurred with me amidst the traffic of London, but this would seem to be due to the relatively slower pace at which the engine is usually driven in heavy traffic, the points of the plug not becoming hot enough to ignite the charge. I must thank my correspondents for clearing up what to me, and probably to many others, was a thorough mystery.

CYCLOMOT.



WHAT OUR ARTIST THINKS:—

Steam traction for public conveyances seems to be capturing London. Doubtless, soon we shall see the steam Hansom—perchance a smut or two on your shirt front, a patch of grease on your nose, and a live spark or two in your eye—but just imagine the inestimable advantages!

THE CLEMENT-GARRARD MOTOR-BICYCLE.

The combined efforts of the well-known firms of Messrs. Clement, in France, and Garrard, in England, have for some time past been directed towards the perfecting of a bicycle motor set. As the result they have produced the set to be described and illustrated. One can see at a glance that the motor is possessed of a striking individuality in the design and arrangement of the various parts. Moreover it is extremely light, and, as will be seen, it embodies many of the latest and most advanced principles in its construction. As far as the finish and workmanship are concerned, anyone who knows the reputation the combined firms have attained in the field of light engineering will

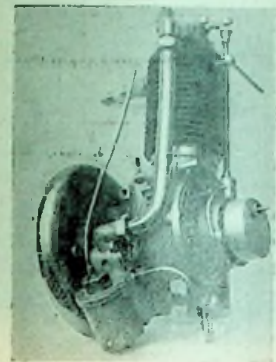


FIG. 1.—THE CLEMENT-GARRARD MOTOR.

admit that their names are a sufficient guarantee in this respect.

The Motor in General.

The motor is of the four cycle, air-cooled type, the dimensions of the cylinder being 55 millimetres ($2\frac{1}{4}$ inch) diameter, and 60 millimetres stroke ($2\frac{3}{8}$ inches). The crank, axle, and pin

are in one piece, forged out of tough steel, case hardened, and ground dead true afterwards. An outside fly wheel is provided, and this has a nicely-rounded periphery. The valves are carried by the cylinder cover, and are actuated in a novel manner. The ignition is electric, with positive "make" trembler. A viewing hole for seeing if the sparking is efficient is one of the many clever devices fitted to the motor. The general "ensemble" of the motor itself will be noted from the first illustration.

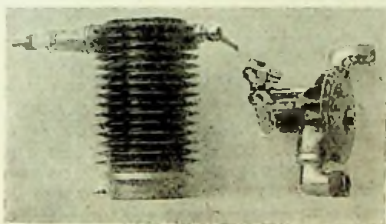


FIG. 2.—THE CYLINDER, WITH SPARKING PLUG FITTED; ALSO CYLINDER COVER.

The Parts in Detail.

In the second illustration we see the cylinder with its radiators, and the sparking-plug fitted, and also the viewing-plug. Then alongside we have the cylinder cover with the inlet and exhaust valves fitted; the elbow pieces lead off to the carburettor and exhaust box. It will be noticed that the exhaust valve, being fitted in the cover, is opened by a hinged

lever actuated by the cam lever. The piston and connecting rod possess the special feature of extreme lightness; and the crank pin, or "big end" bearing is of quite unusual width—a very desirable feature. Looking at illustration No. 3, we see the one-piece crank and shaft, and the design adopted to get perfect balancing is noteworthy. Then look at the spiral oil groove in the shaft, which ensure the lubrication of the single long bearing being efficient at all times. The same illustration also shows the crank chamber, with the long hinged bolts for fastening the cylinder thereto. This system of attachment allows the

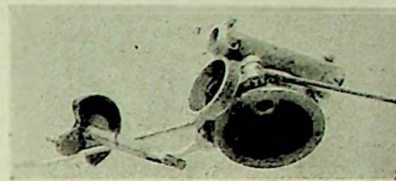


FIG. 3.—ONE PIECE CRANK AND SHAFT

motor to be very easily taken apart if necessary. The clip for holding the motor to the bicycle frame is made to swing round to any angle desired; it is also of a good length, ensuring rigidity, and equalising the strain on the tube.



FIG. 4.—THE CONTACT BREAKER

Looking at illustration No. 4 we get a good idea of the contact breaker. This has a positive make, and is provided with a light aluminium cover, through which the insulated wire passes. The end cover for the crank case carries complete the two to one pinion wheels and exhaust valve lifter. The exhaust opener for easy starting is also clearly shown. The complete cover is attached by three screws to the crank chamber.

The silencer is of effective dimensions, and of the cylindrical type. The drive from the motor is by means of a leather belt on to a pulley attached to the rear wheel of bicycle, and a jockey pulley is provided to enable the tension of the belt to be adjusted to a nicety.

The carburettor is of a simple jet form, and is fed from a supply tank which is mounted on the front of the bicycle. A coil, giving a strong spark, and accumulator of 20 ampere hours capacity is supplied with the set, and the positions in which these are fixed on the bicycle is seen by referring to the illustration of the complete machine. (Fig. 5).

The makers also state that the set can be successfully adapted to any really strong roadster machine of standard pattern. The weight all on will come out well under 60 lbs., ready for riding.

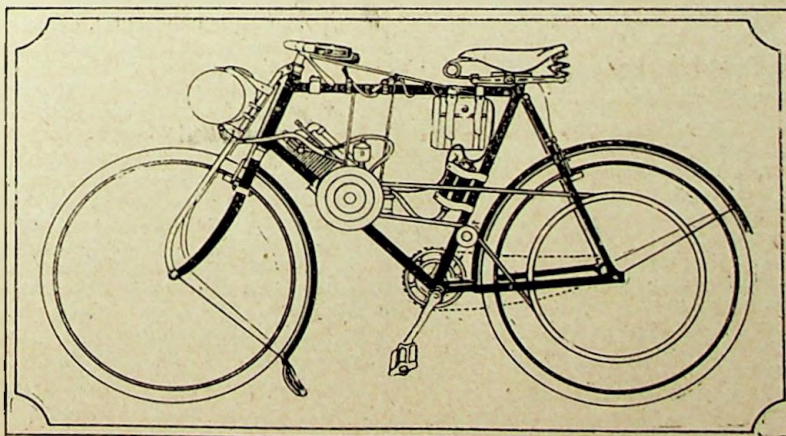


FIG. 5.—CLEMENT-GARRARD MOTOR-BICYCLE, SHOWING GENERAL ARRANGEMENT OF ENGINE AND FITTINGS.



Conducted by

EDMUND DANGERFIELD
and WALTER GROVES.

Manager :

ERNEST PERMAN.

Proprietors :

TEMPLE PRESS, LIMITED,
7, 9, 11, 13, 15, ROSEBERY AVENUE, LONDON, E.C.

OPINION.

The Bexhill Meeting.

The Automobile Club is pushing ahead with its arrangements for the Bexhill Meeting on Whit-Monday, and there is every promise of a most successful gathering of motorcars and motorcycles. Races and competitions are being provided for all classes of vehicles, and these again are divided into two sections, "tourist" and "speed," the former being decided in the morning and the latter in the afternoon. Some exceedingly handsome and valuable prizes are being offered, the majority being capable of being won outright. Amongst these is the "MOTOR CYCLING Cup," which the proprietors of this journal were invited to present for one of the motor-bicycle events; it has been allocated to Class D in the speed section for motor-bicycles weighing over 112 lbs. The other motorcycle events are for tourist machines, two-wheeled and three-wheeled, and for speed tricycles. Some sensational speed dashes may be expected from the high powered racing cars which their owners promise to take down. M. Serpollet will drive a steam car similar to that which accomplished the marvellous flying kilometre in 29½ secs. at Nice, and many other famous cars will also be seen in the kilometre trials. There will be much to interest onlookers, and there will also be much to be learned, and it is confidently expected that, not only will there be a large entry for almost every one of the events, but a considerable gathering of spectators will be present. Particularly do we wish to see the motorcycle events well filled, and we therefore urge owners of these vehicles to pass their entries through to the secretary of the meeting before the 15th instant, as only in very special cases can entries be accepted after that date.

The Show Question.

It is with regret that we learn of the Automobile Club's decision to withdraw entirely its proposed support to the Crystal Palace Show through the refusal of the trade to accord unanimous support, and the alleged bad faith of one firm in particular, whose representative had affixed his signature to the preliminary agreement, so boldly announced in our issue of a fortnight ago. We cannot help feeling that the decision of the Club has been too suddenly arrived at, and is more an expression of a feeling of disgust than a definite abandonment of its active interest in the conduct of an exhibition.

To our mind the entire cause of trouble is the fatal endeavours to secure by, shall we say, "trust" methods entire trade support or nothing. The club possesses advantages over all competitors which, properly and tactfully handled, must leave it ultimately master of the field, and there is no

need for these attempts to capture everyone, body and soul. A very large proportion of the trade is prepared to co-operate with the club, a good date has been selected, whilst the Palace, if not very accessible, is an ideal building for the purpose. We are in the happy position of having no axe to grind or party to serve, and our advice to the trade is to quickly arrange a meeting for the purpose of deciding to support the club: such support being pledged in substantial form and the scheme, as outlined, being immediately proceeded with, but on the clear understanding that a proper balance-sheet be produced annually, and all profits be devoted to the advancement of the pastime, and, therefore, the benefit of the trade which shall approve the manner in which such profits shall be disposed of. Assuming such a course to be adopted, there is no reason why other exhibitions should be interfered with at all. To our mind the more there are the more quickly will the "official" show be recognised as the national exhibition. It will be a disastrous thing for the motor industry of this country if it fails to co-operate with the pastime in a matter so vital to the interests of both.

In giving expression to these views we are not necessarily finding fault with the conduct of the exhibition just terminated, which, as a business enterprise, was certainly a success.

Engine Position.

In another column we publish a special letter dealing with the all-important subject of Engine Position. In former letters and articles we have had the views of clever writers expounded which favour the horizontal position; this week Mr. Pullinger smites the horizontal position theory hip and thigh, so to speak. Now it is tolerably certain that before we can reach anything in the nature of a standard pattern of motor-bicycle this problem of position will have to be solved once and for all; the balance at present seems to be turning in favour of the vertical position, and one point in its favour, viz., efficiency of lubrication, is well brought out in the letter published. The question of unequal or oval wear of the cylinder may or may not be capable of actual demonstration by careful measurement of the cylinder bore after a long period of running, but it would seem to us that if the piston rings perform their work properly, this oval wear theory may not have a very real existence. Now we can make a suggestion to the prominent firms in the trade, and it is this: let them conduct a series of experiments, putting a bicycle-motor through a test embodying actual running conditions as near as it is possible to do so in a workshop; let the motor be tried in a horizontal, vertical, and a mid-way position, and micrometer measurements be made of the cylinder bore in each case. We expect that the motor would require to be mounted upon a special bed plate, and, of course, water cooling or an air fan arrangement employed. A number of revolutions of the motor equal to 500 miles' actual running of the machine we suggest as the minimum: the results of such tests, we venture to think, would furnish a conclusive proof as to the position to be finally adopted as a standard. As far as lubrication is concerned, evidence is accumulating—so it seems to us—that the present system applies most favourably to the vertical position. Here again some conclusive experiments might be made—say, the actual power developed by the explosion found by some means, and the losses by piston friction determined when "splash" lubrication is employed in the different positions of cylinder. In any case we think that some research in these directions will prove of greater value than anything else in settling the problems affecting the design of the motor-bicycle. In the meantime, no doubt, there are many of our readers of a practical and mechanical turn of mind who could offer their suggestions as to the means that might be adopted to obtain conclusive data by experiment. If so, we shall be pleased to hear of such, and give prominence to such as appears to be of a workable nature.

The special Whitsun Number of "Cycling," with novel Six Page Supplement, is now on sale.—One Penny.

NEWS.

Tricycle Chat.

Read C. A. Smith's article.

Don't miss "Cycling's" Whitsun Number.

Motor pacing in amateur events is likely to catch on.

An interesting letter from T. C. Pullinger, an old racing cyclist, appears in this issue.

The Twenty-sixth Stanley Show of Cycles, Motorcycles and Motorcars, is fixed for November 21st to November 29th, 1902, both dates inclusive.

The German Motor Exhibition to be held at Berlin, will be opened on May 15. Over 100 German manufacturers have taken space, and only German cars will be shown. Parts and accessories only from other countries will be permitted.

An Irish Group.

On this page appears a photograph taken by Messrs. Lafayette, of Dublin, of the first meet of the Motor Cycling Union of Ireland. The group is an interesting one, including as it does many celebrities of the cycling and motor world. The Secretary and founder of the Union, J. C. Percy, is the second figure looking from right to left, and may be easily recognised by his genial smile. Mr. J. B. Dunlop, the Union's President and the inventor of the pneumatic tyre, is seated in the front seat of the only quad in the picture. R. J. McCreedy (Vice-President) is to be seen nearly in the centre of the group under the statue, and others in the photograph are Messrs. William Priest of the Quadrant Cycle Co., A. H. Huet, G. Dowd, A. Crawford, W. A. Evans, H. Reynolds, F. Russell, R. W. Stevens, Dr. Reid, and others. The Motor Cycling Union of Ireland bids fair for success.

A Beautiful Notion.

[Mr. Marconi, it is said, has bought a motorcycle (*sic!*), which he intends to fit up with wireless telegraphy.]

Mr. Marconi's invented, I hear,

Oh, such a capital notion!

Collapse on the road you no longer need fear

(Oh, what a beautiful notion!)

For, supposing your motor should go out on strike,

Ring up "MOTOR CYCLING" whenever you like,

With the wireless telegraphy fixed to your bike,

(Ain't it a marvellous notion?)

To save time and trouble, in dashes and dots,

(What an ingenious notion!)

You reel out a list of "I know it is not's"

(Oh, what a wonderful notion!)

And when you have got to the end of your list,

Conclude, "Dear 'M.C.,' will you kindly assist?"

Then shut down your switch, and from tapping desist,

(Oh, what a nice, restful notion!)

And then "MOTOR CYCLING" suggestions will pour—

(Oh, what a comforting notion!)

Nineteen to the dozen, or possibly more,

(What a bewildering notion!)

And will undertake that, before very long,

You'll find out the trouble,—exactly what's wrong,

And bless dear Marconi with jubilant song,

And Marconi's magnificent notion!

SYDNEY J. TAYLER.

Petrol's Properties.

Fully detailed elsewhere.

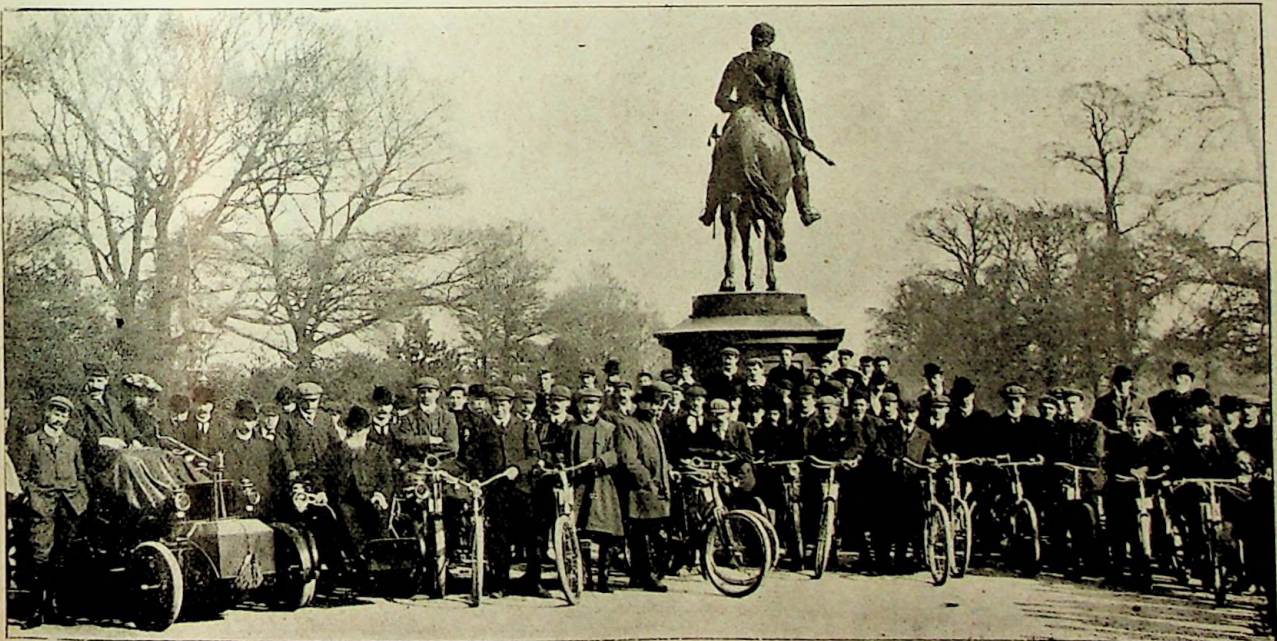
The motor-paced hour race promoted by the Poly. C.C. was a great success. Rowland Janson won.

"Cycling's" Whitsun Number is published this week. It contains a most amusing and altogether novel supplement, and is wonderful value for one penny.

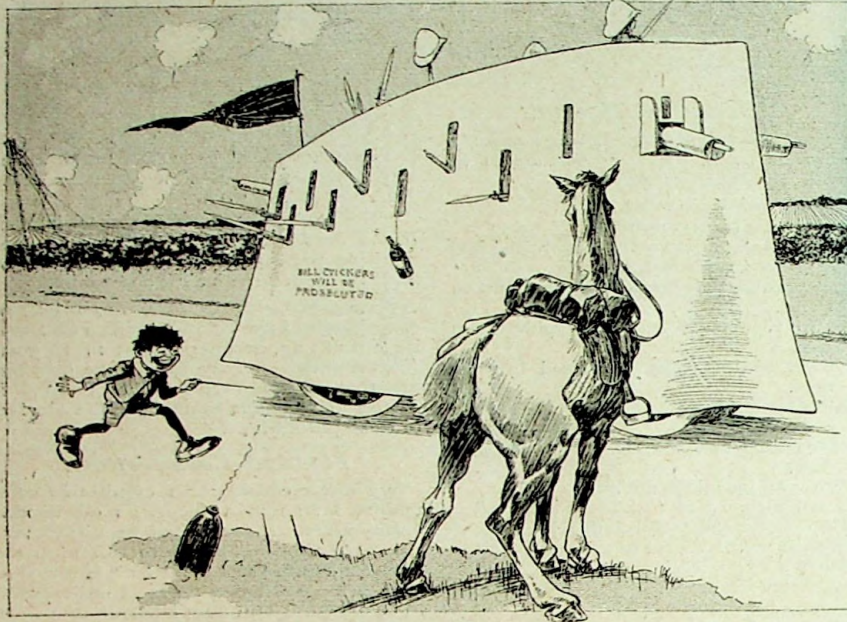
A renegade friend of ours, who brings an atmosphere of petrol into the office whenever he looks us up, prophesies that in 10 years the pedal-driven bicycle will be obsolete, and that the motorcycle will be pointed to as the triumphant example of the survival of the "phit-phit est."

Flooded Carburetters.

We hear a considerable number of complaints from motor-bicyclists of flooded carburetters. It seems that in many tanks the valve allowing petrol to run from the main tank into the carburetter is very unreliable in its action, and when it is supposed to be closed, it still allows petrol to trickle through, and the carburetter becomes flooded. This is a point to which manufacturers should give careful attention, as it is very difficult to start the motor with a flooded carburetter—the petrol not vaporising well. We think this valve should be certain in its action, and when screwed down should make a positive joint at its socket. The difficulty might be got over by fitting a clip to the top tube of the bicycle, gripping the milled nut which raises the valve stem, and holding this milled nut in place although allowing it to revolve. If this were properly fitted, the milled nut when being unscrewed would push the valve down on to its seat.



The First Meet of the Motor Cycling Union of Ireland in Phoenix Park, Dublin.



THE HORRORS OF WAR.

Ah, yes, let me see, it was the Great Invasion of '06. The enemy held the Downs, and the armoured motor was gallantly sailing in. It would decide the battle! Alas, but the irrepressible small boy was there, with no sense of the fitness of things. He would prod something and that motor tyre was irresistible!!

A number of non-stop runs are being organised in the States.

Our contemporary, "The Motor Age," of America, has reproduced, with due acknowledgment, portions of our articles on motorcycle history.

Motorists in trouble with their cycle cars will find C. F. Miles, "Onward" Steam Works, 417, Brighton Road, Croydon, able to take matters in hand. A correspondent refers to him as a most reliable repairer.

A Quaint Idea for Obtaining Motive Power.

A Brooklyn (N.Y.) genius has secured a patent for a curious device for creating energy by feeding a tape of explosive caps into a chamber where they are successively exploded by a mechanically-driven hammer. The resulting gas from each explosion passes into a pressure storage chamber, whence it is drawn into an engine in a manner similar to that in which steam is taken from a boiler into a steam engine.

Another Application of the Motor.

An interesting instance, states the "Scientific American," of the application of the motor principle to commercial uses is given in the outfit recently furnished by the Electric Vehicle Company, of Brooklyn, N.Y., to the Hall Safe Company, of the same city. A heavy truck supplied with three motors—two of which drive the rear wheels, the third used for hoisting safes—makes possible a great saving of time and labour in the work of installing heavy receptacles for valuables. A comparison of the utility of the new scheme with the former plan of installation shows that in placing a 4-ton safe on the seventh floor of a building but

three men are required as against eight, and but six and a half minutes are necessary as against two and a-half hours.

General Lew Wallace, the author of "Ben Hur," has purchased a motor car. It is suggested that he should now turn his famous chariot race into a motor contest.

The latest news anent M. Santos-Dumont is that he has sold his airship No. 6 to an American syndicate for exhibition purposes

At Berlin.

The enthusiasm for cycle racing which is still so strong in Berlin is now greatly enhanced by the motor-pacing machines which attract very great attention by their excellent work and the enormous speeds they show on racing tracks. The public takes as much interest in the pacers as in the racers.

Riding Tests in Saxony.

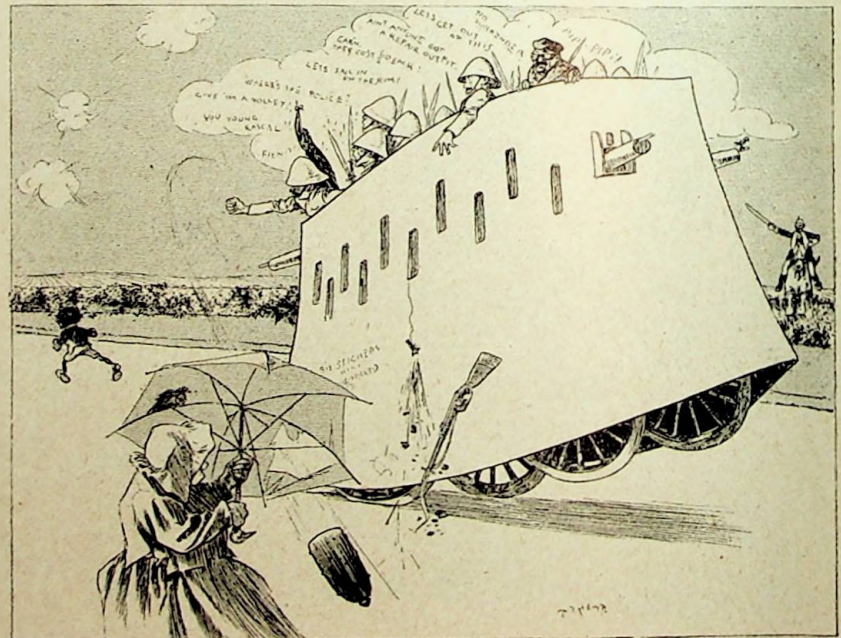
Saxony enforces a driving test from all motor owners, who have to carry large number-plates on their vehicles. And as cars or cycles out for a trial spin could not be included in these rules, it has been decided that these cars must carry a poster with the words, "Vehicle on Trial," printed in big letters. We have not come to this stage yet.

Speed in America.

In the Long Island non-stop contest over 100 miles, held on April 26th, M. Emile Voight covered the mileage in 2 hrs. 52 mins., creating an American record for that distance. His vehicle was the Panhard-Levassor which finished second in the Paris-Toulouse race last year. The next best time was done by Dr. Lyman upon another Panhard-Levassor.

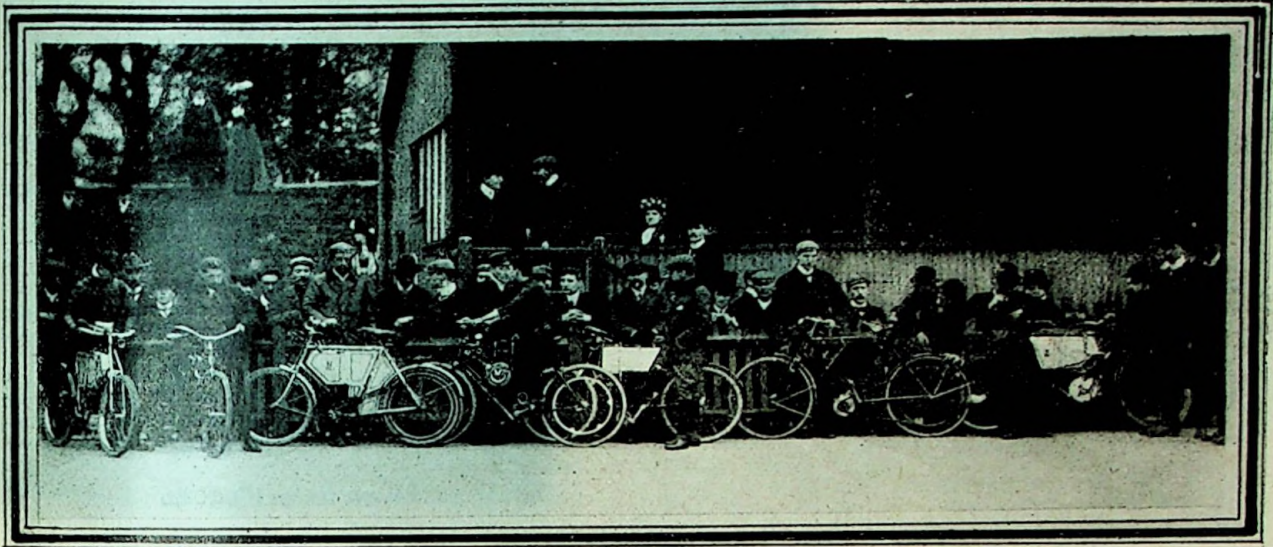
A Motorcar Chase.

Horses often shy when they see a motorcar, but it is not often that a motist helps to catching a runaway horse with his car. A driver of the Parisian firm of Charron, Girardot and Voight, recently met with a runaway horse and carriage. He promptly turned his car round, put on his highest speed, and in a few seconds was sufficiently close to catch hold of the bridle; with one hand steering and lowering the speed of the car, and with the other hand holding the frightened animal, he soon succeeded in bringing both vehicles to a standstill.



THE HORRORS OF WAR.

As that gallant craft settled down on its hind tyre, that devoted but helpless bard—but there, the rest is history—on such trifles do great battles depend.



A Group of the Pacing Machines at the Crystal Palace on Thursday evening last.

A Streatham Depot.

The Streatham Motorcar Co., of 27, High Road, Streatham, inform us that they have opened up a thoroughly up-to-date repair depot for cars and motor-bicycles; they also stock every accessory needful to motorists generally. The rectifier described a week or so ago in "MOTOR CYCLING" they will also supply—and, in fact, they make the electrical equipment of cars and cycles a speciality, being thoroughly experienced electrical engineers themselves.

A Light Motor.

The Traveller "tandem," as some of our friends call it, made by Messrs. Alldays and Onions, Small Heath, Birmingham, is a type of motor which we believe will become very popular as the public become more acquainted with motoring. It is light, measuring only 3 ft. 6 ins. in width, and can be taken through many doorways which would not admit the lightest car. The "Traveller" has a 4 h.p. water cooled engine, and is fitted with two speeds and a reverse. The details of the car have been carefully thought out, and distributed over the frame-work to the best advantage.

In Difficulties.

In an interesting letter to hand from a now enthusiastic rider he relates his early troubles in learning to manage his motor-bicycle—many were the times he was non-plussed how to account for the strange behaviour of his machine (this was of course before the days of "MOTOR CYCLING'S" Bureau.—Ed.), but by steady perseverance in tracing out the causes he has become a master of the machine, and now he is as confident with his motor-bicycle as formerly he was with his foot driven steed. The electrical part of his machine played him queer tricks till he found out that a dose of oil did not improve the working of the contact breaker. The lubricating oil which was the "life" of the motor he found was "death" to electricity. He always takes great care nowadays to see that the platinums are thoroughly free from oil.

Motor Pacing Proves a Success.

The motor-bicycle earned the good opinions of everybody as a pacing instrument in the hour race amongst members of the Polytechnic C.C., at the Crystal Palace, on Thursday. For it proved itself fast, safe, and reliable—subject to no tricks, and possessing no bad habits. G. V. Rogers on his Mitchell, and H. Martin on his 2½ h.p. Excelsior were fairly evenly matched, and with their track experience proved very capable pacers, and each man was obviously able to take his man along at another five or six miles an hour faster if he had wanted it. Wilkins rode Hooydonk's Phoenix, covering over 29 miles in the hour, and he was apparently suiting the pace to that of the rider. Leonard was on his Werner, Rivett on his Blizard, Parry on his Minerva, and there were one or two other machines. Tandem bicycles were completely outclassed in the matter of speed, but the silence with which a tandem paced rider went by was a little bit weird. In this respect, the motor vehicle was a good warning to that class of thoughtless deadhead who rushes across the track without looking out for danger. Rowland Janson went through behind Rogers with scarcely a falter, except during his bad time about half way, due entirely to being unfit for such a distance at such a pace. S. C. Hill, too, was not properly trained, but Ingram rode very consistently, being wise, perhaps, in not allowing himself to be pulled out, lest his sprint should be spoiled. Janson rode 30 miles 927 yards in the hour, which is 1 mile 447 yards better than the record distance ridden by H. Chinn behind tandem pacing. Hill accomplished 30 miles 757 yards, so that Janson and Hill are the first amateurs to attain the coveted honour of riding 30 miles in the hour. It is sincerely to be hoped that ample pacing of a suitable kind will quickly be obtainable so as to prevent it getting into but a few hands. We think that it will give a welcome fillip to amateur sport, and will interest and attract the spectator, who seemingly took very kindly to it on Thursday last. One machine being capable of taking a man right through a race, avoids

the changing of pacers, with all its dangers and its element of unfairness through bad joining, and thus each competitor is able to exert his best effort, reducing the possibility of having his chances spoiled by outside muddling. Moreover, the motor being capable of travelling much faster than he is likely to want to go, again tends towards the equalisation of the outside help that pacing affords. So, taken all round, motor pacing may be written down as a distinct improvement on human pacing.

Highway Administration.

The Leader of the House of Commons is being approached with a view to the Government granting a Public Enquiry into the existing system of Highway Administration with special reference to its bearing upon the Housing and Transport questions. The view is gaining ground that "tubes" and trams are more or less expensive and unsatisfactory substitutes for broad trunk thoroughfares. No new main roads out of London, for example, have been built for many generations although population and traffic have increased many times.

New Main Roads.

Interesting alike to cyclists and motorists is the notice of motion which the Hon. A. Stanley, M.P., has placed on the paper in the House of Commons. Briefly, this is to call attention to the fact that road building has been suspended since the abolition of the Turnpike Acts; to the congestion of the traffic owing to no new trunk roads having been built; to the growing difficulty and increasing cost of transporting goods by road and their serious effect upon the industrial efficiency of the nation,—and to move that steps be immediately taken to get these new roads made, both privately and by public authority. Now that the motor sport is increasing so much every year, it is imperative that the old main roads be kept up to a proper state of efficiency, and that new ones be built, and it is satisfactory to note that the Roads Improvement Association are working hard to that end.

ON THE ROAD.

Riding Experiences of Members of the Staff.

Two Pleasant Spins.

My last week-end, writes "Cyclomot," gave me the opportunity of a couple of spins which, had I gone out on the bicycle in the usual way, would in all probability have been just about half as far. The first ride was one of 45 miles out and home, with nothing really bad in the way of hills; much the same, in fact, as was the second spin of 40 miles. But the wind! There was a north-east wind blowing across the open country during the first ride, and it had increased to an absolute gale on the second. Some fairly speedy cycling friends whom I picked up on the first ride, and who expressed a liking for a comfortable position at the rear, in order that they might cover the five miles they yet had to go, had their work cut out to keep their position, although I was "nursing" them all the way. But on the next day there was nothing that could live with my little vehicle, if I chose to let it do its best. On one hill, up which four-fifths of the cyclists were walking, and on which the traffic was fairly heavy, we went up at about 15 an hour without pedalling, and one man managed to hold my back wheel. But I proved my superiority when I laid down to the wind! The machine increased its pace a mile or more an hour, I should think, and the cyclist couldn't quite do it, so I mercifully sat up again and paced him to the summit, and as he took a breather at the top he smiled upon me with a smile of gratitude.

And an Experience.

The second spin could have been a non-stop, as neither of the two dismounts were necessary, or for any purpose except that of shaking hands with friends. The first spin was not quite free from trouble, as when within three miles of home the sparking became intermittent, and on at last getting off to ascertain the reason, I put my finger on the cause straight away. Whilst riding along I found that the petrol was not at fault, and I guessed that as a new accumulator had been

put in that day, a wire might have become loosened from a terminal. But it proved to be a defective bridge to the accumulator, the piece of zinc joining the two cells having been loosened by the vibration caused by an absence of packing. As I was only a little way from home I tried to pack the bridge into close contact with the terminals with a duster, but this was ineffective, so I took a piece of copper wire, and, after scraping the enamel off, wrapped the wire round one terminal and then round the other, and so made a temporary bridge. It answered admirably, and would have served as a permanency, but on reaching home I re-soldered the old bridge on and have had no further trouble. The value of a little bit of wire, or string, or rubber, or asbestos, on an occasion like this, cannot be measured in terms of money, and consequently, I find that my tool-bag is beginning to collect all sorts of odds and ends.

Lamp Coincidences.

We think the following coincidences are worth recording: both took place on the same day but in different localities. In one case Mr. W. H. Kitto, the well-known automobilist, was driving at a good speed in his Gobron-Brille car—one of the claims for this car is that it is exceptionally free from vibration—when suddenly the bottom of one of the lamps dropped out, and, peculiarly enough, it fell on to one of the front mudguards, and stayed there; one of the passengers picked up the part of the lamp and replaced it. In the other case, Mr. J. Van Hooydonk was riding his Phoenix motor-bicycle on the North Road and T. G. King, a well-known racing cyclist, was hanging on. Suddenly Mr. Hooydonk saw something flash in front of his eyes, and shouted that he had dropped something: almost at the same minute the hanger on discovered that his front tyre was punctured. They both stopped and found that one of the small side glasses had fallen out of Hooydonk's lamp, and King had run over it, puncturing his tyre.



ROEHAMPTON GATE

This is the favourite entrance into Richmond Park, through which on fine Sundays thousands of cyclists and motorists pass on their way to the Ripley and other roads.

A PLEA FOR A LIGHTER MACHINE.

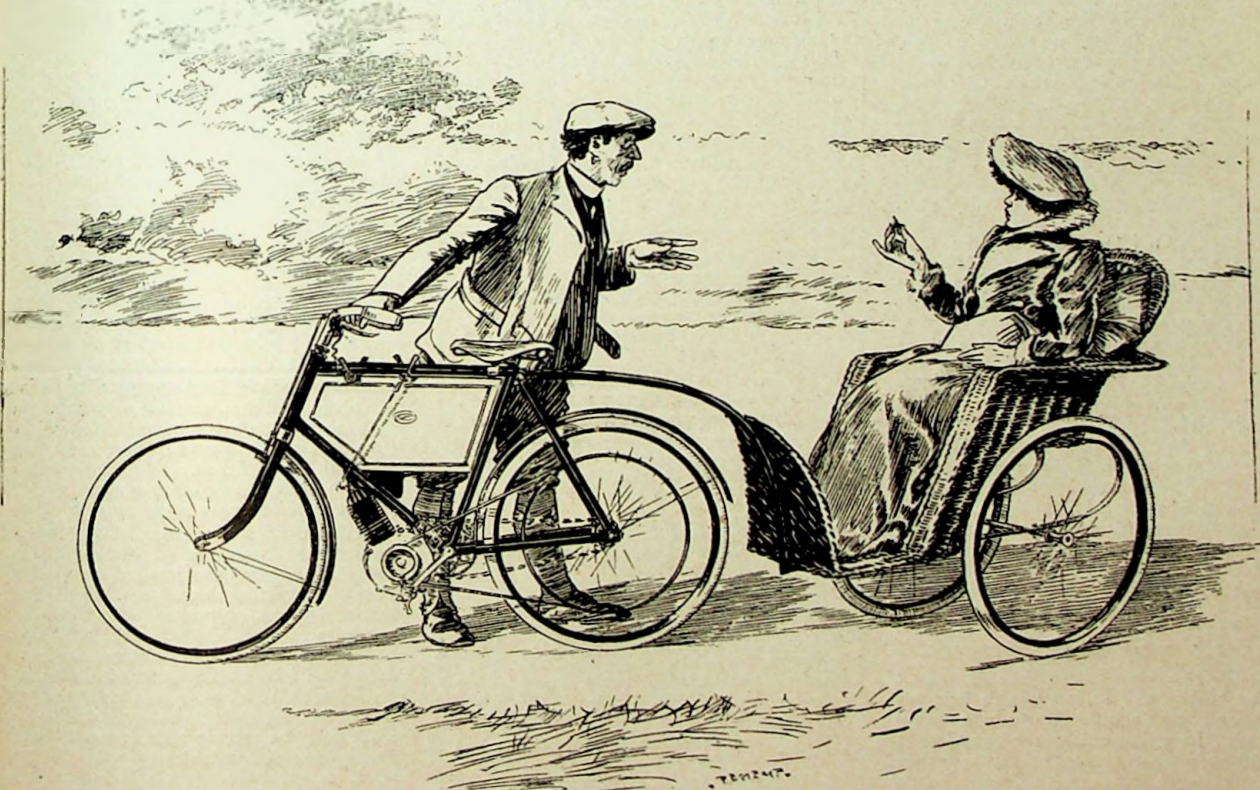
The Weight of the Motor-Bicycle, and How it can be Reduced.

A factor of considerable importance in the popularising of the motor-bicycle movement, and one that must appeal strongly to the general cycling public, is the possibility of obtaining a machine of something like a manageable weight, and at once of sufficient power and also strength of parts to ensure absolute reliability. Let us look at the position the motor-bicycle holds to-day as regards weight; take one with a $1\frac{1}{2}$ horse-power motors of standard design, and put it on the scales. In nine cases out of ten it will be found to come out in the neighbourhood of 85 lbs. Take any one of the numerous machines of varied design with a high-power motor fitted; more often than not these range from 90 lbs. up to a cwt. Now one of the charms of the motor-bicycle is its claim to be the most compact and manageable of all the many varieties of automobiles now before the public. Looked at from many points of view, this claim is fairly well substantiated, and one rarely hears the skilful and enthusiastic rider grumble at his machine on the score of weight, providing it serves him well in the direction of speed and reliability; but to the would-be motorcyclist, who, we may assume, is generally a fairly good bicycle rider, the weight question is often a serious one with him. Agents know this very well, and many are the explanations they have to make to the prospective purchaser, who very often expects to be able to lift the machine up by the handlebar and saddle in the way he is wont to do with his light roadster bicycle; in many cases the look of surprise at finding it is quite as much as he can manage to lift the front wheel up from the floor is a study in its way.

Then he asks—"How am I to get this thing up the front steps at home, let alone take it up the staircase at the office?" And then there is the inevitable question as to the pedalling of the machine home in case of a breakdown—Does the extra weight make the work much harder? And so on. At the present stage of development of the motor-bicycle, we must not expect too much; even as it is, the motor-bicycle of to-day is a marvellous piece of light engineering. Clever brains, backed up with any amount of capital, are hard at work perfecting the details and increasing the efficiency of the whole machine; but, so far, little has been done in the way of producing an actual "light roadster motor-bicycle," such as would find a very large market indeed. Of course, it will be argued that we are trying to advance too quickly by putting such an idea forward in the early "safety" days. The "light roadster" bicycle, fitted with solid and cushion tyres, often weighed as much as 55 lbs. or 60 lbs., and it was only after a long series of stages in principle and detail improvement that we finally reached the 28-pounder of to-day. One would hardly care to suppose that such a long period must ensue before we reach the 56 lb. motor-bicycle; such a weight, or thereabouts, must, in the writer's opinion, be aimed at if the motor-bicycle is to become thoroughly popular.

Can the motor-bicycle be lightened and still retain a good margin of safety? In the writer's opinion it certainly can be done. There are at least two on the market abnormally light.

(To be continued.)



CONSOLING!

Motorist: "Well, I've pedalled as far as I can, and simply can't go another yard. Where on earth can that connecting plug have gone?"

Fair Passenger (producing plug): "I suppose this is no use? I found it on the table at tea time, and I was going to ask you what it was."

OTHER PEOPLE'S VIEWS.

Correspondents are asked to write their views in a brief and concise form. We have been obliged to hold over several interesting letters this week owing to pressure on our space.

Water in Petrol.

Sir.—Referring to "Petroler's" letter in last week's issue of "MOTOR CYCLING," about "Water in Petrol." I have had an experience very similar on a racing motor-tricycle, fitted with a Longuemare carburetter. As I often used to get the battery case about a quarter full of petrol. I sent the complete tank to be repaired. After waiting about a week for it, I got it back, and it appeared to be in perfect order. I took the bicycle out, but, after riding it about two miles, I found I could get no power out of the engine, and after much puffing blowing, and snorting the machine stopped. To my dismay, I found the carburetter half full of water. I therefore tackled the "Fiend Man" who repaired the tank, and finally he admitted that he had filled the petrol tank with water to test whether it was leaking, but he had drained the water out after doing so (?). Needless to say, this man is one of the many "motor experts" in this country.—Yours faithfully,
J. C. NIXON.

Railway Regulations.

Sir.—From enquiries I have recently made, it appears that some railway companies object to take motor-bicycles in their luggage vans if there is petrol in the tank. This is, to say the least of it, very awkward, as you may be expected to empty the tank and waste the petrol; or suppose you wish merely to train out from town to the country and start riding, you may be landed at a village and be unable to buy fresh petrol, and this would especially apply on a Sunday at many places.

Again, recently, on the G.E. Railway, Liverpool Street Station, I was told at the left luggage office for cycles, that they may not receive the machine if "charged" (?), i.e., if petrol in tank, and if such regulations are enforced, motor-cyclists will sometimes find themselves most awkwardly placed.

Can you do anything to remove these restrictions by communicating with the railway companies, and pointing out that the risk (if any) of petrol in the tank is practically nil?

No motor-cyclist, unless he can help it, will risk his machine in a luggage van, with all the risk of damage and breakage, but there are occasions when one has to do it, "volens volens," and pay pretty dearly for the privilege, as some of the companies charge an extra price for motor-bicycles as over ordinary cycles.—Yours faithfully,

G. ARTHUR BROMAGE.

Silencers and Back Pressure.

Sir.—While approving of the excellent article on "Silencers," in last week's journal, there is one point I should like to take exception to, viz., the writer of the article condemns the position of silencers placed below the frame as long exhaust pipes with bends exert considerable back pressure. I had occasion to try and remedy a refractory silencer fitted to a 14 h.p. Minerva engine. After removing silencer, I bent three feet of five-eighths seam less copper to shape of frame, and fitted oil

silencer to it in position under bottom bracket. Back pressure was very noticeable in the old position, but in the new there was no sign of it. I attribute it to the length of pipe in conjunction with the baffle plates. Gas engine exhausts are often 50 feet away. Does not this seem to support the theory that within certain regulations, the lengthened position is an advantage? If this were not true, surely we should find in practice that the silencer, or exhaust box, of a gas engine would be as near placed as possible outside the engine house.—Yours faithfully,

SPEEDWELL.

The Position of the Engine.

Sir.—I think in discussing the question of the vertical and horizontal engine it is as well to put one's position clear. I do not myself in the least wish to say or imply that a vertical engine cannot be made to work satisfactorily. This would be absurd. The discussion began by a gentleman writing to the effect that vertical engines had been found a complete failure and wore out directly. He also stated that all engineers favoured the vertical. My position is simply that the one can be made to work practically as well as the other, the balance of experience being in favour of the horizontal. It is really simply a question of what will best suit the arrangement of the car, and my opinion is that when we get a really reliable and satisfactory motor the horizontal position will be found the most serviceable.

With regard to the remarks of Mr. Poate, it is not true that in "nearly all cases" there is a division between the crank chamber and cylinder. Panhards and Daracqs, to take two quite different styles, are not, and in fact it is only a few makes that are. Further, I have found by experiment that the piston is not lubricated "by the piston dipping into a groove in the top of the crank chamber." It is absurd to suppose that oil stays in a

groove like this when the piston dips into it some 1,000 or more times a minute. As a matter of fact I have proved by trying that it does not make in a given motor the slightest difference whether there is such a groove or not. The piston is entirely lubricated by the oil in the crank chamber being in the form of mist which covers everything in communication with the crank chamber. If the piston were lubricated by the groove it would not matter whether one or several charges of oil were in the crank chamber as the groove could only be full in either case. Everyone knows that as a fact the more oil in the crank chamber the more the piston gets, showing that it is a mist which simply gets thicker.

Re Mr. Waugh. He is in error in stating that all locos have the pistons carried through the cylinders "where space permits." Space always permits; but it is not often done. It is, however, done by a few people, and it is also done by a few marine engine makers in vertical engines. As to the Willans' central valve engine, this, to the best of my knowledge, always runs at very moderate speeds. A loco. with a two foot stroke is often run up to over 300 revs. This is, I believe, nearly double that of Willans' engines of equal stroke. As to the weight of the piston, this is such a ridiculously small amount that it is absurd to suppose it can wear the cylinder materially. It is not often one 50th of the thrust due to the connecting rod, and as this is taken by the cylinder, anyhow, 2% more or less can be of no consequence. In any case, it is obvious that the wear due to this would not show till everything else in the engine had been renewed a good many times, and the whole show thrown on the scrap heap.

As regards the horizontal valves there is more to question. Even there it would seem that they can be made to work equally well if properly made. At all events both Crossley and the National Gas Engine people think so, as they put their gas and air valves horizontal in their latest engines. I need hardly point out that an ordinary gas engine running 10 hours a day gets as much running in a month or two as most motors get in their lifetime. Personally, I made some hundreds of feed pumps with horizontal valves, and they worked very well. Some of these pumps are running after 10 years' work. It seems to me a question of having a good guide well fitted, and I can quite well imagine that many of the motors on the market have the valves the reverse.

Re proportions of engines. I don't suppose that it makes much matter whether the stroke is slightly longer than the dia. or not, but we seem to be getting down to strokes of very near the same, anyway. What Mr. Stock says is quite right. Half an inch stroke would, no doubt, in practice increase the power. But so would a slight increase in the dia. of the cylinder. In locos. there are many reasons for not making cylinders bigger dia. as there is difficulty in getting them in or in getting strong enough crank shafts. On the other hand, in all high speed marine work the stroke is usually less than the dia. The same stroke as dia. seems to be the usual practice in the States for marine petrol motors, of which they have built thousands.—Yours faithfully,
F. STRICKLAND.

CYCLING'S

WHITSUN NUMBER.

This Special Issue of "Cycling" is published on Wednesday this week, and is a really wonderful pennyworth. The following are some of the contents of the number which consists of 28 pages and a . . .

SIX-PAGE ART SUPPLEMENT.

ROADSIDE REPAIRS.

With Useful Diagrams.

A TOUR IN FRANCE FOR £5.

With Map.

CYCLO-PHOTOGRAPHY.

With Charming Photos.

LADIES' NEW CYCLING COSTUMES.

With Illustrations.

HOW TO ENJOY TOURING.

By A. W. Rummy.

OUT AND ABOUT.

Two Pages of Interesting Snap-Shots of Cyclists on Popular Roads.

RIGHTS AND WRONGS.

The right and wrong way of doing things, described and clearly illustrated for the benefit of beginners and others.

NEW IDEAS.

The latest invention, described and illustrated.

Special and Novel Supplement

A DAY OF ENGAGEMENTS.

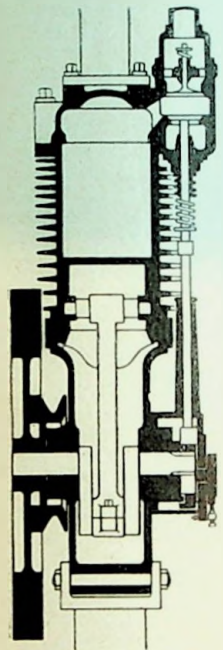
DON'T MISS THIS SPLENDID ISSUE. 1d
NOW ON SALE.

INVENTION.

The latest improvements in motors, motor cycles, and accessories.

A New Departure in Motor-bicycle Making.

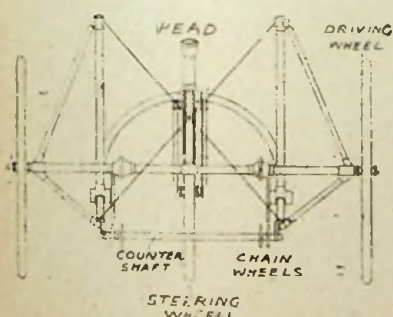
The following is a brief description of a motor-bicycle about to be placed upon the market by Messrs. Brandes and Perkins, of Coventry. The motor and its fittings are their particular line, and this they will fit to any make of bicycle at the customer's option; moreover the complete machine will be retailed at a figure lower than any yet quoted in the trade, so we understand. In the specification of the motor there are several novel points. The cylinder instead of being made from a casting is turned up, with radiators complete, from a bar of steel, thus giving an extra finish to the motor. The bore of the cylinder is 70 m.m., stroke 72 m.m., and a power of 2½ horse is claimed. An outside fly wheel is employed, and this is 12 inches diameter. Internal lubrication is effectively performed by means of a tongue which licks up the oil in crank case, and throws it up into the cylinder; provision is made for rendering it impossible for the oil to foul the sparking plug. Another good point is the ball valve in crank case, which releases the air and prevents cushioning of the piston; an excellent design of lubricating pump is fitted; this has a glass barrel, and the rider can be quite sure that his pump is working. Electric ignition is employed, of course, and this is wired with a special view to avoiding short circuit. Transmission of the power on to the back wheel is by means of a ¾-inch twisted wire rope.



We find from an illustration sent us, that the motor forms an integral part of the frame between the seat tube and bottom bracket. Free engine and exhaust lifter are provided, and the makers state the weight of the complete machine is only 65 lbs., and that there is ample power for pulling a trailer fully loaded at a good speed. In trials the machine has touched a speed of 44 miles per hour on the level.

Starley's Sociable.

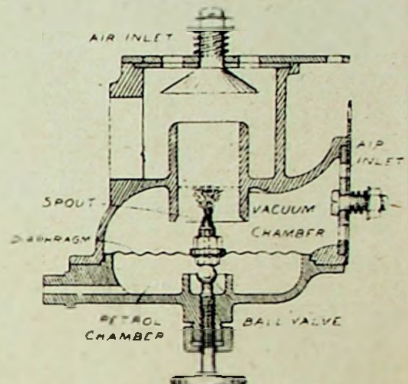
Mr. William Starley, of balance gear fame, has invented a new form of the old sociable in which the riders sit side by side. The front wheel is mounted in an ordinary steering fork, and from the lower part of the head a straight tube extends to the centre of the main axle, which is provided with two sets of balance gear and at the outer ends of which the driving wheels are mounted. One of the seat pillar tubes has been arranged slightly in front of the other so that the adjacent elbows may not be in contact. The lower ends of the seat pillar tubes are provided with brackets and are connected with the head by a curved tube. A counter shaft is arranged below the main axle. The machine is driven by



means of chains passing from the bracket chain wheels to chain wheels on the counter shaft, and by means of other chains passing from the counter shaft to chain wheels on main axle.

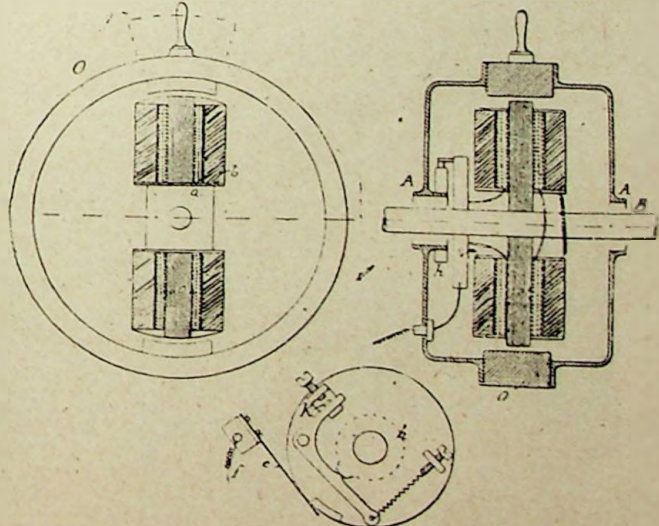
Blake's Carburetter.

F. C. Blake's carburetter consists in the use of a petrol chamber forming the base of the vacuum chamber, and having a flexible diaphragm to which is secured a nozzle or spout with a ball or other valve for cutting off the petrol, the intermittent feed of which, from within the petrol chamber and through the spout, is consequent upon the action of the vacuum upon the flexible diaphragm combined with its return stroke. Suitable air inlets are provided to adjust the mixture and regulate the degree of vacuum.



The "Croissant" Ignition.

A permanent magnet, O, is held by two hollow pegs, AA, which are crossed by the bearing, B, carrying the induction coil, which rotates in the magnetic circle, the bearing receiving its power from the motor. The coil consists of two layers, one of strong wire, a, whose ends, x and y, are connected with the interrupter, J. The second layer is of thin wire, b, the one end of which is in contact with the battery and the other with a contact carried on an isolation plate. The a created current is interrupted at every rotation on the point K, by removing the sleeve which is lifted by the fixed latch, h. The interruption creates in the b circle a momentary induction current, which goes from contact d through the friction e to the wire, f, which is connected with the sparking-point. As soon as the position of the fixed parts is altered by moving



a lever, the interruption and ignition changes. The apparatus supplies at the specified moment a spark, without the need of a condensator

OUR INFORMATION BUREAU.

A large number of replies have been dealt with through the post. Information on all subjects pertaining to Motors, Motorcycles, and Motoring generally, will be given to readers who seek such information or advice. Any reader who desires to ask a question with a view of ascertaining the views of other riders based upon actual experience should send his query, which will be inserted, and replies to such questions will duly appear, if of general interest; if not, a reply will be sent by post; a stamp, therefore must always be enclosed.

H. H. May (Upper Tooting, S.W.)—We can recommend you to go in for the "Rex." It is a very powerful machine, and one of the best possible for a hilly country.

C. W. (London, W.) is thinking of purchasing a motor-bicycle, but cannot make up his mind as to make, and enumerates several patterns. We can recommend him to go in for an Excelsior.

An Old-Timer.

Mr. "Champion, 1888" (Surbiton).—You will be excellently suited by the 2½ h.p. "Excelsior." It will carry your weight up any hill you are likely to meet with on a main road. Our correspondent belongs to the "Old Guard" of the solid tyred good old high wheel days, and is on the point of taking up the motorcycle. The fact is, he objects to being passed on hills by motors. Here is one more instance of the old-timer going in for the motor.

S. BEVERLEY informs us that he just recently patented a swinging crank that offers a more comfortable position for the feet than the usual fixed crank. He tells us several expert riders speak highly of it. Doubtless a line to his address, 97, St. Stephen Street, Salford, will elicit further information if any reader desired such.

Choosing a Second Pattern.

E. L. (Hednesford) is on the look-out for a second-hand motor-bicycle, and mentions three which have come under his notice. Which should he select? Of the three, we should say endeavour to get the "Phoenix"—it is probably one of the original 1½ h.p. We do not personally know of anyone to report upon its condition, but fancy he would be fairly safe in purchasing right away—or, better still, try and get it on approval.

Conversion.

E. C. W. has a Mohawk open-front tandem which appears strong, and he asks whether he can apply an engine—speed aimed at 12 miles an hour on level, and fair hill climbing power. We advise him write Mr. G. Calvert, Woodville Road, Mildmay Park, London, N., who is a specialist in this line, and who has something suitable for the purpose. For a single machine we can recommend the "Excelsior" out of many. An excellent trailer is made by the Coventry Eagle Cycle Co., and would be just the thing for you.

G. S. T. (Oldham).—We should advise you to send your engine to the maker mentioned.

A. E. (Plumstead), you probably have in mind the article on Roadside Repairs which appeared in No. 4 of "Motor Cycling."

R. C. R. (Birmingham).—Some hints on the subject will be found in our article on Roadside Repairs. A good outfit to carry is Guest's. We have found their canvas-backed patches excellent.

Resistance and Over-Heating.

W. H. W. (Stroud Green, N.) seeks advice on several points in regard to the Excelsior. (1) The engine, not being "freed" without detaching the belt; is the machine impeded to any appreciable extent when the engine is connected, and the exhaust is open, and one is running down an incline? Yes there is considerable resistance offered by the motor, even when running light. This is distinctly noticeable as compared with a "free" motor. (2) What are the signs of overheating in an engine? Motor loses power on hills, and the inlet valve fails to allow a charge to pass into the cylinder. The temperature of the cylinder, becoming excessive, soon shows itself. (3) Opinion as to speed gears? We should advise you to wait a short time; several two-speed gears are about to be put on the market. (4) We place the machines in the following order:—1, 2, 5, 4, 3, 6.



If horses could only express their thoughts! The "horse-power" so much in evidence on our roads at the present time.