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...EVERY WEDNESDAY...

Devoted to Motor Interests

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Throttle Control of Gasoline Engines.

In the present issue will be found two articles dealing with the advantages and disadvantages of throttle control for gasoline engines. A correspondent takes the standpoint that the throttle is an eminently suitable device which greatly adds to the flexibility of a gasoline engine, thereby presenting the possibility of simplifying the change gearing and improving the transmission mechanism in several ways. An article under "Our Foreign Exchanges," descriptive of a new hit and miss governor, is preceded by a theoretical consideration of the effects of throttling upon the gaseous mixture, and the conclusion is then drawn that it is exceedingly detrimental, resulting in recondensation of the vaporized gasoline and consequent misfires and irregular running.

No fault can be found with the theory developed in this latter article, for that throttling results in expansion of the charge and consequent cooling and, possibly, recondensation is correct, but the importance attached to it is, we think, overestimated. We have seen engines run on the throttle at about one-third their normal speed for long periods without a single misfire, which would seem to demonstrate that misfiring does not necessarily accompany throttling. The degree to which recondensation takes place and, consequently, the difficulty of ignition, depends upon the carburetor, and the certainty of ignition is further affected by the compression and by the efficiency of the ignition apparatus. When all these points have received careful attention in the design and been specially worked out with a view to operating the motor with throttle control no annoyance from misfires need be experienced.

Another objection raised to throttle control is that it is less economical in fuel than control by hit and miss. This point, too, is based on fact, because running on the throttle results in a reduced compression, while with hit and miss governing the compression remains constant, and, as is well known, high compression is conducive to economy. But here again the advantage of the hit and miss controller is likely to be overestimated. The throttle, too, reduces the fuel consumption when the power is reduced and in neither case is the fuel consumption proportional to the power actually delivered by the engine. The advantage in economy is therefore at most very slight, and a slight reduction in fuel consumption amounts to very little in automobile operation at the present time.

On the other hand throttle control allows of varying the speed and power of the motor between wide limits, as was well shown in the recent discussion in our columns, and also allows of the motor running free with the greatest smoothness and absence of vibration, an advantage which is appreciated by every automobilist and which is certainly worth more than a slight saving in fuel.

The throttle system of control, either automatic or by hand, is steadily gaining in favor, while the popularity of the hit and miss system is on the wane.

Skidding.

A correspondent in another column brings up again the question of skidding, which is perhaps more vital at this time of the year than at any other. He makes the assertion that a concentration of the weight near the front does not diminish the tendency to skid as compared with the usual arrangement where the weight is concentrated in the rear. The claim is often made that when the driving wheels are comparatively heavily loaded there is less tendency to skid than with any other weight distribution. The reason is not apparent and a satisfactory proof of it has never been furnished us. In fact, it seems more rational to assume that weight distribution has little influence on the skidding produced by centrifugal force.

However, skidding is due to two entirely different causes, and to treat the subject intelligently it must be considered under at least two heads. One form of skidding is that due to the action of centrifugal force on the vehicle when rounding a curve; the other cause of skidding is due to unequal traction of the two driving wheels, and this is the cause responsible for skidding when the vehicle has been traveling in a straight course.

The centrifugal force in turning a curve

acts on the centre of gravity of the vehicle and the effect when skidding occurs is to swing the rear part of the vehicle around some imaginary centre line located between the front wheels. It will at once be apparent that the moment of the centrifugal force which tends to swing the rear part of the vehicle around the centre line is the greater the farther the centre of gravity is located from the centre line—in other words, the greater the proportion of weight borne by the rear axle. On the other hand, the resistance of the rear part of the carriage in swinging around is also proportional to the amount of weight on the rear axle, and since both the force tending to produce skidding and the resistance to skidding increase in proportion to the weight on the rear axle, it will be seen that weight distribution cannot affect this form of skidding.

The case is somewhat different when the skidding is produced by unequal traction of the driving wheels. Here the force tending to produce skidding is that exerted by the motor and is independent of the weight on the drivers. But the resistance to skidding is still proportional to the weight on the drivers, and hence in this case a concentration of the weight in the rear is advantageous.

There is, however, a limit to the loading of the rear wheels, because when the front or steering wheels are insufficiently loaded they will not respond to the steering operations when the road conditions oppose a turning in the direction in which it is desired to go, thus causing what is known as "front skidding," which is, perhaps, the most dangerous of all.

Fuel Economy.

Elsewhere in this issue will be found a short report of the recent French fuel consumption trials which furnished some very interesting results. The vehicles in these trials were grouped into classes by weight, and as there was one class in which the weight exceeded 2,200 pounds and also a class of industrial vehicles, there were in all two more classes than are recognized by the A. C. F. in its racing rules, although the club's system of weight classification was otherwise adopted in these trials.

With so large a number of classes the advantage is secured that only vehicles of nearly equal weight and size are compared in the final classification. The basis of classification adopted—the fuel consumption per "tonne-kilometre"—allows, however, of making a comparison of the vehicles in the different classes with respect to fuel economy.

In the original report the fuel consumption was expressed in liters per "tonne-kilometre." The equivalent of this in English measures would be gallons per ton-mile; but since on that basis the numerical results would all be small fractions, it occurs to us that the reciprocal of this, ton-miles per gallon, would lead to more convenient figures, and this has, therefore, been used in arranging the table of results. The figures given under that particular heading, then, show what distance a vehicle weighing 1 ton, passengers and all, could run on 1 gallon of gasoline if its fuel efficiency was the same as that of the vehicle to which the particular figure referred.

In the class of motor cycles there were only two entries, both machines being De Dions, apparently of identical construction, but one using a 50 per cent. alcohol mixture as fuel and the other gasoline. The fact that the machine using alcohol showed a vastly greater fuel economy has been the cause of some jubilation among the alcohol enthusiasts in France, but it appears to us obvious that the very poor showing of the machine using gasoline was due to some such cause as leakage in the tank or piping, since in the other classes in which alcohol was used the least consumption with this fuel was always considerably greater than with gasoline.

Some vehicles showed a remarkable fuel economy; one in Class V in particular, which developed an efficiency of 43.3 ton-miles per gallon. It is to be assumed that the course over which the trials were held was approximately level and had a fairly good surface. It is also to be noted that the speed was quite moderate—an average of 16 miles an hour being the maximum for the vehicles mentioned in the table. Another noteworthy feature is that the bicycle motors showed almost the same fuel efficiency as the largest motors, which is probably accounted for by the lower transmission loss in the former case.

While the results are interesting, trials of this kind are not to be recommended for this country. Trials should serve the object of stimulating improvement in lines in which the greatest obstacles to the economical and practical use of automobiles are encountered. The reliability of the mechanism is in this respect of much greater importance here than fuel economy—that is, in gasoline vehicles, which were the only kind entered in this contest.

In the two other classes of vehicles, steam and electric, the economy of fuel or of electric energy, respectively, plays a much more important part in the economical operation of the vehicle, and if any club or other organization wishes to promote a contest specially for either of these classes an economy contest or a consumption contest would prove useful.

Public Automobile Service in the Old and the New World.

The report from London that a number of steam omnibuses have made their appearance in the Strand recalls to mind that there is considerably greater opportunity for this class of public automobile service in the cities of Europe than there is in American cities. The trolley system of urban communication has not nearly reached the stage of development in Europe that it has here, the reasons being that in many foreign cities the streets are too narrow to admit of tracks being laid or that, where this is not the case, the citizens often object to the trolley on aesthetic grounds. All the principal capitals and many of the larger provincial cities of the Old World have their 'bus services, the 'buses being in many cases double deckers drawn by two or three horses.

It has been announced repeatedly that automobile 'buses were to be introduced in London. The first venture of this kind was that of the Great Horseless Carriage Company in 1896 or 1897, since which nothing further than a few demonstration runs has ever resulted from these proposals.

In London the steam 'buses will be subject to competition with horse 'buses and not with trolley lines, as would be the case in almost any American city. Since transportation by trolley is demonstratedly cheaper than by horse 'buses the conditions of success for the motor 'bus are evidently better there than here.

Exhibition "Stunts" at Automobile Shows.

The folly of introducing dangerous "stunts" into automobile exhibitions has again been demonstrated by the very serious accident which occurred at Indianapolis last Saturday, when an automobile con-

taining two men ran off the steep incline which had been constructed for goat-like feats in grade climbing, and crashed to the floor below with its human burden, breaking bones and otherwise injuring the occupants. It is useless and dangerous to undertake to give practical demonstrations of the automobile at indoor exhibitions. The only place for them is out of doors on the road or in a suitable enclosure. The Philadelphia show of last year was attended by a distressing accident owing to attempted speeding on an indoor track, and it would seem as though sufficient examples of this folly had now been seen to prevent its repetition at future exhibitions. Persons with enough money to purchase and enough brains to run an automobile are, as a rule, little influenced by the tricks of the circus ring. A road demonstration is in every way preferable.

Conditions Affecting Winter Use of Automobiles.

By Albert L. Clough.

Anyone who should be rash enough to attempt to judge of the practicability of the winter use of automobiles by noting the extent to which these vehicles are at present used in a region like New England where this season is very severe, would be led to a very erroneous conclusion.

Some pains have been taken to learn from correspondence and personal observation how many motor vehicles are actually in service during the present season in representative New England cities, and the information gained has demonstrated that only a very small proportion of the large number of automobiles owned in these communities have been on the road during the present rather open and pleasant winter.

The fact of the small number of these vehicles in actual present use has been elicited at the same time that reports have been received of certain vehicles which have been in constant use, with little more trouble to report than would have been met with in the height of the automobile season. Some doctors have been operating their machines constantly during the season and some delivery wagons, chiefly electric, have been in regular service, together with a few vehicles for general runabout purposes, but the great majority of self propelled vehicles are in the stable just now. The reason is perfectly obvious. They are practically all pleasure vehicles, and there is no such thing as pleasure in their use at this season, but rather the danger of frozen ears and pneumonia. The little use that is made of automobiles during the winter is only an evidence of how little enjoyment there is in high speed riding in this season. There appears to be an occasional enthusiast who is willing to punish himself by taking a cross country run during this season, but generally only for the purpose of seeing what he can do. If he goes out into the country and tries to make speed it is generally at the expense of his tires, if not his health. Probably nine out of every ten automobiles about here are snugly housed. This is good judgment on the part of the owners and should reflect no discredit upon the machines.

There is no doubt that it is rather a hard matter to conveniently use a steam machine in very cold weather when it is required to make protracted stops, as it is well-night impossible to prevent the pipes from freezing, and it must be admitted that there are carburetors in present use which involve a good deal of violent exercise in starting the motor when low temperatures prevail, but there seems to be very little complaint of insufficient power or traction to overcome any ordinary conditions produced by snow. Users seem to differ, and it is by no means a settled point as to whether light or heavy machines are most successful in traveling through deep snow. Some claim that a light machine will travel over the snow and require a not unduly increased amount of power, while the partisans of the heavy carriage claim that a light machine will fail to secure footing and slip its wheels ineffectually, where a heavy vehicle would cut in down to a solid foundation. Probably both are right, and that there is a great difference in performance, due to the different quality of the snow. There is one condition under which all must be willing to admit that any self-propelled vehicle operates very disadvantageously. This is when the snow is moist and adhesive and capable of packing, under pressure, into almost the condition of ice. When in this condition, the wheels even of heavy carriages do not cut through the snow, but compress it. This process of compression requires a large amount of energy, and amounts, in effect, to the constant climbing of a heavy grade on the part of the vehicle. The compressed surface under the wheels carries enough moisture to be extremely slippery to the rubber of tires, and traction is at its worst. A carriage operating under these circumstances rides very roughly. The wheels will climb up on the compressed snow, and then, all of a sudden, "slump" through, bringing all sorts of unusual stresses to bear upon the frame of the carriage. A rope winding of tires is often resorted to in this kind of weather, and it is possible for a good automobile to get there and get back, but there is no fun involved; indeed, there is no fun being out of doors at all in such weather, and yet the general public considers the automobile an impractical novelty because the great body of automobile owners—the possessors of pleasure vehicles—are not out playing in the slush.

It has been pointed out as peculiar, and it certainly is so, that practically no attempt has been made to design a self-propelled substitute for the coupé or brougham, which are the comfortable vehicles of utility in the winter season, with the exception of the electric vehicles of these classes which are largely public conveyances. The steam or gasoline brougham, which might be so comfortable, seems hardly to have been thought of, but there is no inherent impracticality in the problem which is apparent.

Any examination of the extent to which automobiles are in use at this season in this district is necessarily quite superficial; but it is safe to say that it is so small as to be insignificant, and it is likely that this will remain the case as long as motor vehicles comprise such an overwhelming proportion of the open type, designed for pleasure purposes only. So long as this condition prevails, it is inevitable that the reputation of the automobile as a vehicle of utility should suffer in the estimation of the general public.

Steering Gears for Automobiles.

By Hermann Lemp.

Which, lever or wheel? has been the absorbing question in the domain of automobile steering ever since the new method of locomotion made its appearance a few years ago. Properly stated the real issue is between a reversible and irreversible steering device, and it so happens that the lever is the representative of the former while the wheel is that of the latter. Before taking up the merits or shortcomings of either system, I wish to dwell upon the importance of a properly designed steering gear per se. It is generally conceded that the functions of a locomotive enginer or a motorman on a surface car are very exacting, demanding reliable and well trained men; and yet, both have but two duties to perform, namely: to control the driving power and to apply the brakes. Both generally have a well ballasted and well kept track to run on. Next take the duties of a horse driver, be it on a 'bus, a cab, or a landau; with the average horse, half of the controlling work is done by the horse itself. In an automobile, however, the responsibility of guiding through the intricacies of a well patronized thoroughfare rests primarily with the driver, and it is to be expected that nothing but the best deviced steering gear should be used to facilitate this task.

Now what are the requirements of a proper steering device? First, it should be irreversible; that is to say, all strains upon the wheels from obstacles in the road and particularly the momentum of the carriage pressing against the steering wheels, when the latter are at an angle, should be completely checked in the frame of the carriage and not allowed to reach the operating handle. Second, it should be quick acting,

allowing the carriage to be turned instantly to its fullest extent if necessary, either to run around an obstruction or to right its course after skidding. Third, the controlling lever should be movable in directions which allow the operation of steering to be carried out without discomfort, and which provide the greatest leverage in all positions. Fourth, when not in use, the controlling handle should be out of the way and not interfere with the movements of the operator in reaching or leaving his seat. Fifth, there should be as few connections as possible between the controlling handle and the wheels to be turned, as every joint is bound through wear to produce loose play sooner or later.

As mentioned at the start, the lever and wheel are the two representatives of the principal methods of steering now in use. The lever particularly is the one in favor in the United States, while the wheel is more the adjunct of the foreign racing carriages. Let us now examine the manner in which these two devices fulfill the requirements stated above.

The lever is used principally in five forms: First, the pivot of the lever in front, the handle normally leading backward. The wheels are turned by the operator in the opposite sense he wishes to turn, pointing, however, with the steering rod in the direction in which he wishes to go. Reversing this function has been suggested and tried experimentally by Mr. Duryea and the writer, the pivot being located under the elbow of the operator and the handle being located ahead. Steering in this case may be compared to the playing of a hose. Under these conditions the wheels would turn in the same direction in which one intended to steer and point in that same direction. A third method places the pivot of the steering handle either on the left or right of the operator and swings the steering handle to and from the body in the same manner as in steering a bicycle with one hand. The fourth method uses a lever pivoted under the footboard with the handle extended up to a convenient height and operated forward and backward, with connections giving proper motion to the wheels. This method has been abandoned for the third method. The fifth method comprises a vertical handle in the centre of the seat, which is swung either to the left or right.

The writer has personal experience with all these methods of steering with the exception of the last, and finds the third method the most satisfactory one for all around work. It places the operator in a position where his hand has the greatest leverage for steering purposes with the least effort. The handle may be raised to a vertical position when entering or leaving the carriage, and the vertical post having at the same time other controlling apparatus fastened to it, the other hand can keep itself always braced for such occasions as when deep sand or heavy ruts require an extra effort. Methods Nos. 1, 2 and 5 require a greater effort, as all the work will have to be done by the swinging of the forearm. Most steering devices of form one have this handle pivoted at a point near the footboard, which in many cases detracts from the useful leverage, and it would be better if a bearing were provided on the top of the dash nearly in line with the seat.

It goes without saying that all controlling devices for steering gears should be attached to the body itself and connected either through springs or links to the front axle so that any motion of the body up and down should not interfere with the main controlling handle.

A lever steering device practically fulfills all requirements, with the exception of the first one, namely, irreversibility. On the whole, lever steering is best suited for carriages weighing from 600 to 3,000 pounds.

Running on the highway, dodging around obstacles, requires a quick moving device. The average road in the country will just about accommodate the width of a carriage. In cities the number of carriages is so great that even a wider street will give but little more room than that necessary for a carriage in its free running. In order to make any headway, it is necessary to constantly dodge right and left, pass around other carriages, and there can be no question but what the quick, direct acting lever is especially suited for such work.

The only reason, as it appears to me, why lever steering has been abandoned on high powered and fast vehicles has been the fact that lever steering unsupported has been considered and actually is too dangerous on account of its reversibility.

The wheel steering device generally comprises a wooden rim of about 18 inches diameter and is expected to make a complete revolution for a swing of the carriage from one extreme to the other. The three principal means of transmission used from the wheel to the axles are: (1) a high pitch worm engages with a sector connecting direct to the steering wheels; (2) the shaft engages a square nut contained in a pivoted fork, one end of which is connected to the steering wheels, and (3) a method which simply uses a pinion with a rack, the end of which connects with knuckles on the steering wheel axles. The former two are irreversible but the latter is only so by virtue of the increased leverage on the part of the operator, but would not allow him to let go the wheel at any time without danger.

In wheel steering a motion about thrice as great in range will have to be gone through to obtain the same result as with lever steering. Both worm wheel and nut transmission, particularly the former, quickly produce loose play through wear in the worm at the thread. The writer has inspected a number of these wheels, and even on machines which were practically new found that the loose play varied anywhere from ½ inch to 4 inches. Manœuvring with wheel steering in crowded thoroughfares is tedious, to say the least, and explains to a certain extent the frequent appeal of the driver for open road. The wheel steering has, however, the great advantage of being irreversible, but close observation during the last Endurance Run from New York to Buffalo has shown the writer that an irreversible steering device *minus quick action* is not necessarily a safeguard. This requires explanation.

Assuming the front wheels completely locked, it would appear to be impossible for a carriage to leave its straight path. Driving, however, from the rear, and particularly driving with one motor and differential gears, produces skidding on slippery ground. Driving with two motors will also produce skidding, but not to such an extent as when a single motor and differential gears are used. Supposing a carriage to be running on a road of even character, then both wheels will drive equally. If now, one wheel should suddenly drop into a mud puddle, it would lose traction and in slipping increase its speed over and at the expense of its neighbor; the next moment, when the slipping wheel grips again, the momentum so acquired will augment the traction effort on its side over that of the other so as to force the carriage to swerve in the opposite direction to that on which the wheel is located.

With a carriage traveling at a good rate skidding must and can be met by a quick counteraction of the steering lever. Under these conditions, wheel steering is too slow, and I think a number of our friends running in the Endurance Trial will recall the grief to which they came through a sudden skidding on muddy ground. This behavior of the wheel steerers was unexpected to many of the adherents of irreversible steering devices, and the users of the lever pointed with glee to the few mishaps which happened to them.

It is true that many of the operators of lever steered machines retired in the evening with arms thoroughly benumbed, and would have welcomed any device assuring relief from the continuous vibrations caused by the rough roads.

From what has just been said we clearly see that the lever steering devices for carriages up to 3,000 pounds would be satisfactory in every respect if only a device could be found which would give the irreversibility of the wheel devices without their slow action. The writer has been engaged for a number of years in testing a device rendering lever steering irreversible, and was willing to let results speak for themselves, neither asserting its value too strongly nor wishing exactly to relegate it to the category of the "uncalled for." Carriages weighing from 600 to 3,000 pounds have been fitted up with a hydraulic steering check, and a number of people have had an opportunity of thoroughly trying this device under all kinds of conditions,

and everyone who has given it a really thorough trial has expressed himself quite satisfied with it. Some have said that they would at the present time not run a carriage without such a device, as by so doing they would incur unnecessarily a serious risk.

Ever since the New York-Buffalo endurance trial, and as a result of personal experience in cross-country riding with all sorts of machines, the writer feels compelled to assert in a more positive manner than heretofore his conviction that such a device is not only a useful auxiliary, but that it produces a steering gear far more satisfactory than is an unchecked lever or the usual slow wheel steering device.

The hydraulic steering check, described some time ago in the trade journals, consists briefly of a glycerine dash pot securely fastened to the front axle, a vane in which is normally locked against all action from the steering wheels, but can be moved at will by the steering handle in whatever direction it is intended to steer, automatically locking itself in all positions.

For machines weighing from 1,500 to 3,000 pounds the device weighs approximately 25 pounds, for machines of less than 1,500 pounds the device need not weigh more than 13 pounds. With its use the transmission from the steering lever to the steering wheels is direct, no more joints being added than ordinarily would be used. All shocks, however, are checked in the device without reaching the handle. The checking medium being glycerine, which is unaffected in either winter or summer, has the advantage of always retaining a large bearing surface, as contrasted with equivalent mechanical devices depending upon clutches, ratchets, etc., where the binding parts are generally small, and sooner or later through wear increase the loose play in the steering gear. The action of the device is smooth; in other words, there is no extra work added to the operation of steering with this device than without it. The little loose play required for the opening of the valves should not exceed a movement of ¼ to ½ inch at the steering handle at any time, and this motion should not increase later on. It is as good in its worst conditions as wheel steering is at its best. It retains the freedom of motion so much liked in the lever steering, and adds immensely to the pleasure of driving an automobile. No vibration from the steering wheels reaches the hand, and besides it affords that feeling of absolute security looked for in irreversible steering devices. The fact that at the present time almost every form of carriage has a different form of axle and steering connections makes it difficult to produce a device which can be indiscriminately used on all vehicles. This, more than anything else, I understand, has retarded the production of the device in quantities. It can, however, easily be applied to carriages of standard make.

Once properly installed it can be used for months without the slightest attention. Occasional inspection and replacing any glycerine that may have been lost is practically all the care the device requires. With its use the rider of an automobile will acquire that freedom of action so much liked in a horse driven vehicle, for occasionally he may "drop the reins" for attending to any slight duty as occasion may demand.

Some French Novelties.

By L. Berger.

The recent exhibition in Paris brought forth so many improvements in automobile construction that it marks a period of automobile development in France.

The type of body which is now most generally employed is the tonneau, with two longitudinal rear seats and a rear entrance. Fig. 1 shows the design of J.

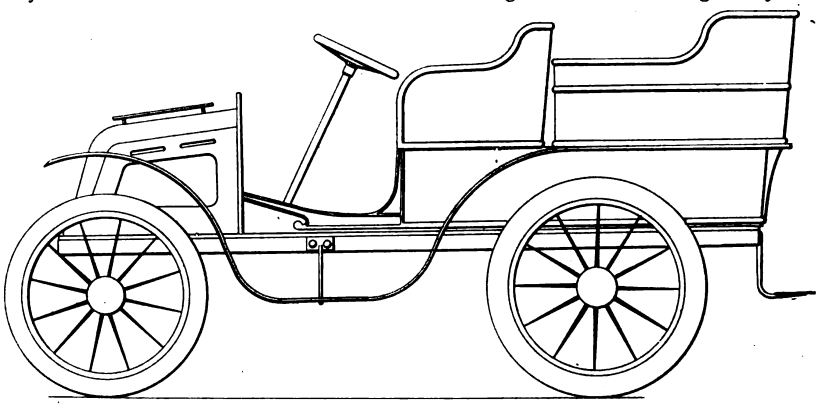


Fig. 1. Rothschild Tonneau Body.

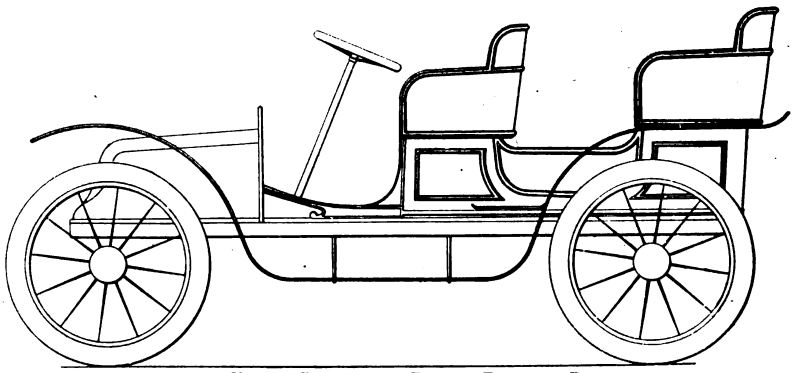


Fig. 2. Rothschild Double Phaeton Body.

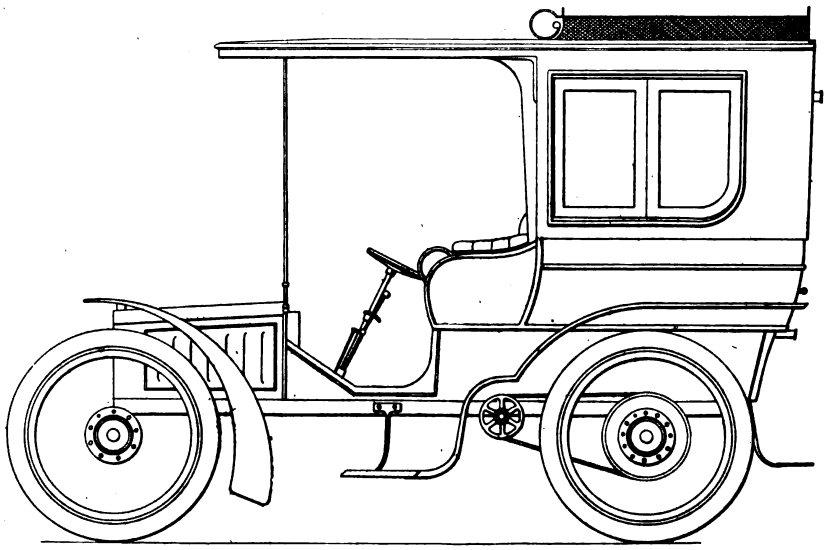


Fig. 3. Rothschild Limousine Body.

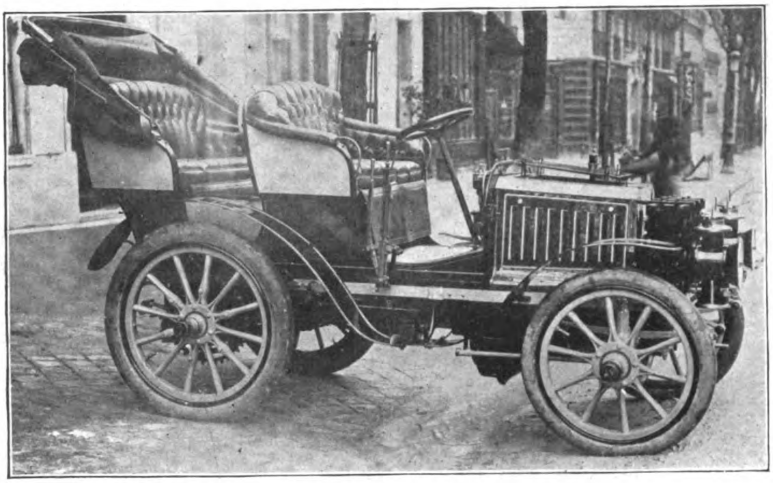


FIG. 4. VEHICLE WITH DOUBLE PHAETON BODY.

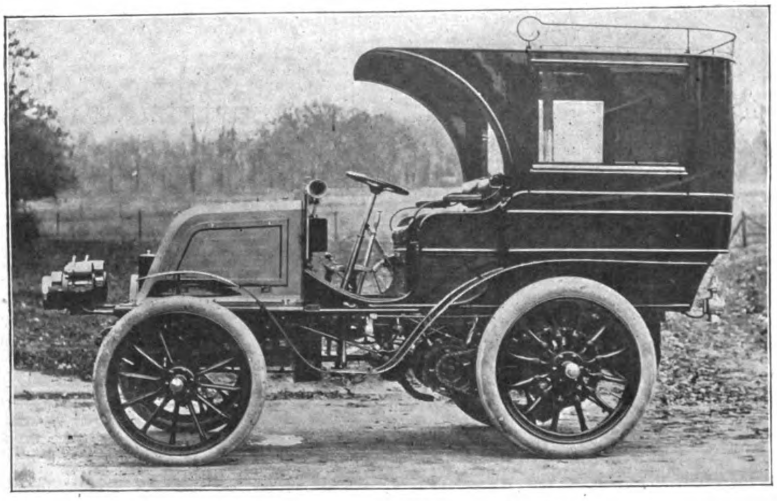


FIG. 5. VEHICLE WITH LIMOUSINE BODY.

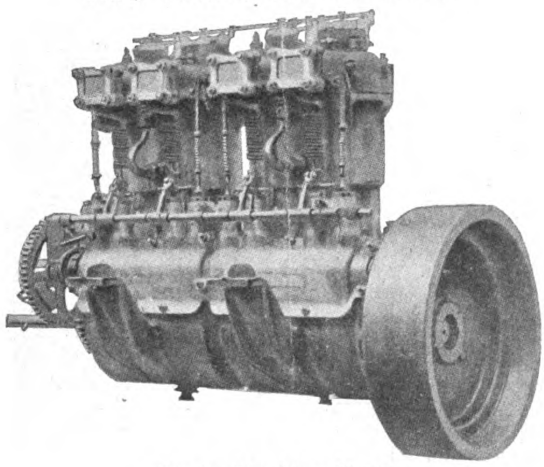


FIG. 6. THE MORS MOTOR.

Rothschild & Fils, a leading firm of body builders. The tonneau is especiallly popular with light carriages weighing between 800 and 1,100 pounds. All the machinery is supported directly by the frame or *chassis*, and the body is made of aluminum.

Figs. 2 and 3 show two other common types of body construction, the double phaeton and the limousine, and Figs. 4 and 5 are photographs of vehicles with such bodies.

The general disposition of two- and four-cylinder motors may be seen from Fig. 6, which is a photograph of a four-cylinder Mors motor. There are to be remarked the arms for fastening the motor to the frame, the cam shaft running across the cylinders, the square valve chamber covers giving access to the valves and igniter, the usual hammer break igniter in the cylinder head and the rods for operating the supplementary air admission on the suction valve.

On the opposite side of the motor, where the intake valves are located, the four intake pipes are connected by a multiple branch fitting A to the single pipe B leading to the carburetor (Fig. 7). This same arrangement is employed by many other French builders.

The Mors motor, like many others, has an automatic governor acting on the exhaust valve and a hand regulator by which the admission is throttled. The ignition

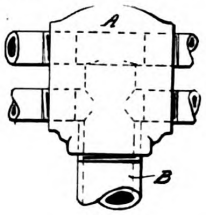
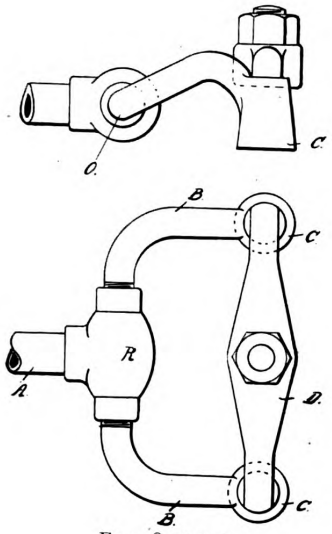


FIG. 7.

current is furnished by a magneto which has been substituted for the dynamo formerely used by the firm. Magneto ignition is gradually taking the place of battery ignition.

Charron, Girardot & Voigt, which have become a manufacturing firm, have recently placed a heavy touring carriage upon the market. (An illustration of their *chassis* appeared in THE HORSELESS AGE of January 15.) This *chassis* is rectangular and of ashwood, reinforced by thin aluminum plates fastened by screws. The weight of the frame is stated to be 27 pounds. The frame is supported on the carriage springs, and it in turn carries the machinery. There is a cross spring in the rear, which is supported by its ends on the ends of the usual semi-elliptic springs. The firm makes a strong point of this suspension, and a racing machine built on this principle was shown the writer at the Charron factory which had just come in from a 150-mile run, in which good speed was made, which showed no fatigue in the frame.

The Charron brake, which was illustrated in THE HORSELESS AGE of January 15, is composed of a steel strip 5 millimetres (20-1000 inch) thick, lined for two-thirds of its length with a cast iron strip which acts as the friction lining and works on a steel drum. The device at first sight



FIGS. 8 AND 9.

resembles more a clutch than a brake. The chain tension and the brake tension are on the same line.

The Charron motor is a four-cylinder one, in which the heads are cast integral with the cylinders. A throttle valve is located in the suction pipe, and the system of fitting one of the two pairs of intake valves to the head is shown in Figs. 8 and 9. The suction pipe A is fitted into the T-fitting R, through which passes the pipe B B, having large openings within the T fitting. At the ends of the pipe B B are fastened to it the two conical parts or "bells" C. These two "bells" are held down to their seats by means of a yoke D clamped by means of a stud and a nut. To get at the intake valve the nut is slightly loosened, the yoke swung around the stud, and the bells and pipes B B swung upward around the centre line of the fitting R. The intake valves are thus gotten at with the greatest facility. The exhaust valves are held in place by a similar yoke.

In the new Centaure motor of the Panhard-Levassor Company, which is equipped with electric ignition or tube ignition as desired, the chief novelty is the automatic starting feature (in the four-cylinder engine). There is always a fresh charge in one of the cylinders, and by making and breaking the primary circuit of the jump spark igniter this charge is exploded and the engine started. The system is said to be quite practical.

Fig. 10 represents the new vehicle of Léon Bollée, whose former tricycle construction with a single rear driving wheel

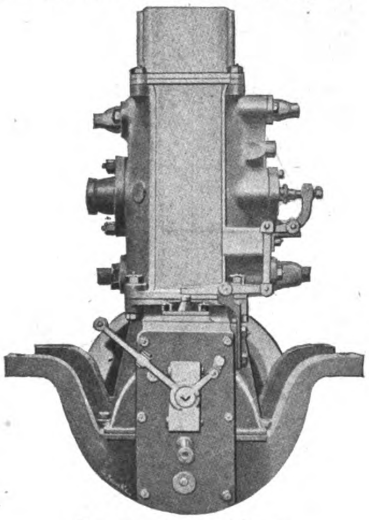


FIG. 11. DAMAS MOTOR.

is still well remembered. About the only feature of the tricycle which has been retained in this new vehicle is the hand lever outside the seat. The back and forward motion of this lever controls the change of speed and of direction, and a twist of the spade handle operates the clutch.

Fig. 11 shows the Damas motor, the special features of which are the low location of the exhaust valve and the arrangement of the spark shifting mechanism.

Fig. 12 shows the Eldin balanced motor with variable exhaust, the exhaust

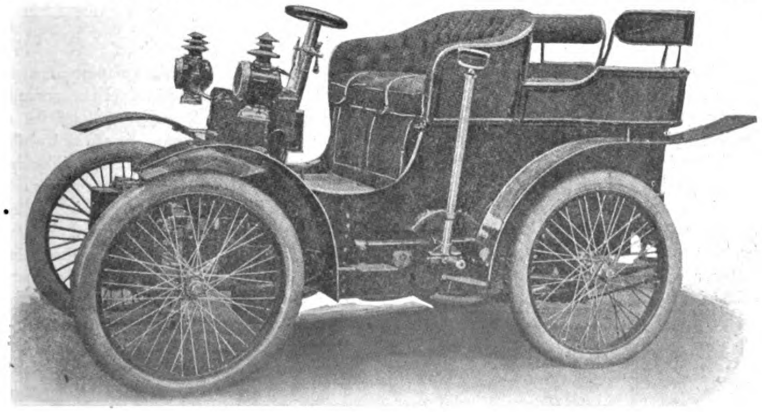


FIG. 10. NEW CARRIAGE OF LEON BOLLEE.

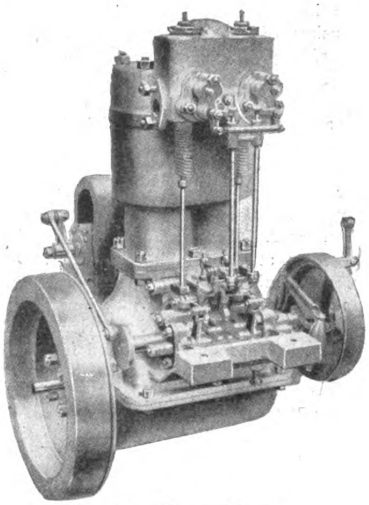


FIG. 12. ELDIN MOTOR.

valves being given a variable lift by the governor. The ignition current is furnished by a magneto and the time of ignition is variable.

A novel form of spark plug is shown in

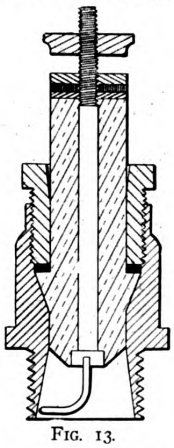


FIG. 13.

Fig. 13. In this plug the spark passes between the terminal of the control rod, consisting of platinum wire, and the wall of

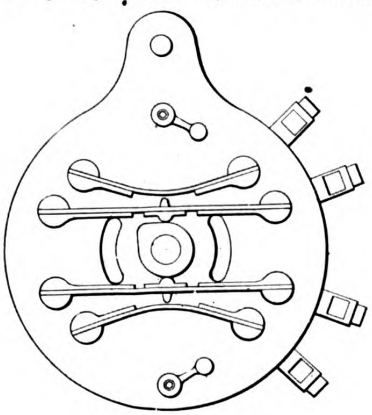


FIG. 14.

the hollow, threaded part of the metal housing of the plug. The terminal is therefore protected from oil and dirt.

In Fig. 14 is shown a new form of circuit breaker. Two springs are mounted on a disk of insulating material, their ends being fastened in studs secured in the disk. One of the springs is normally straight and the other one convex, so that its central portion is close to, but not in contact with, the former. A cam brings the two springs together at their middle portions. The break is said to be very short and sharp, and the time of ignition may be advanced by rotating the disk. The device may be constructed for one-, two- and four-cylinder motors, our illustration showing the form adapted for two-cylinder motors.

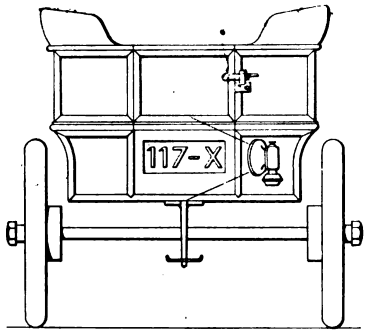


FIG. 15.

Fig. 15 shows the method of illuminating the identification numbers, as required by the new French police regulations.

Working Drawings of a Steam Carriage.

BY F. HYLER WHITE.

PART XXV.

In Great Britain every automobile weighing over 560 pounds is required by law to have two brakes, actuated separately, each capable of controlling the vehicle. Therefore, as our vehicle is beyond the minimum limit, we shall have a hand and foot brake. They will all be of the double acting type, capable of holding the vehicle from movement in either direction. The hand brake acts upon the drums bolted to the hub flanges (Fig. 130). The foot brake takes effect upon a drum bolted to the balance gear case (Figs. 133 and 134).

Fig. 171 shows the brake bands and fittings for the hub brake drums. The band itself is made from steel plate 3-32 inch thick, and it is imperative that the strip of steel should be cut from the sheet so that the grain of the metal shall be along, and not across, the band. In the latter case it will probably give out just when most required. Inside the steel band is a lining which can be of leather; but I have found camel hair belting better, as it grips well and is not so liable to heat as leather. Probably thick woven canvas belting would answer well. It is secured to the steel band by copper rivets, spaced about

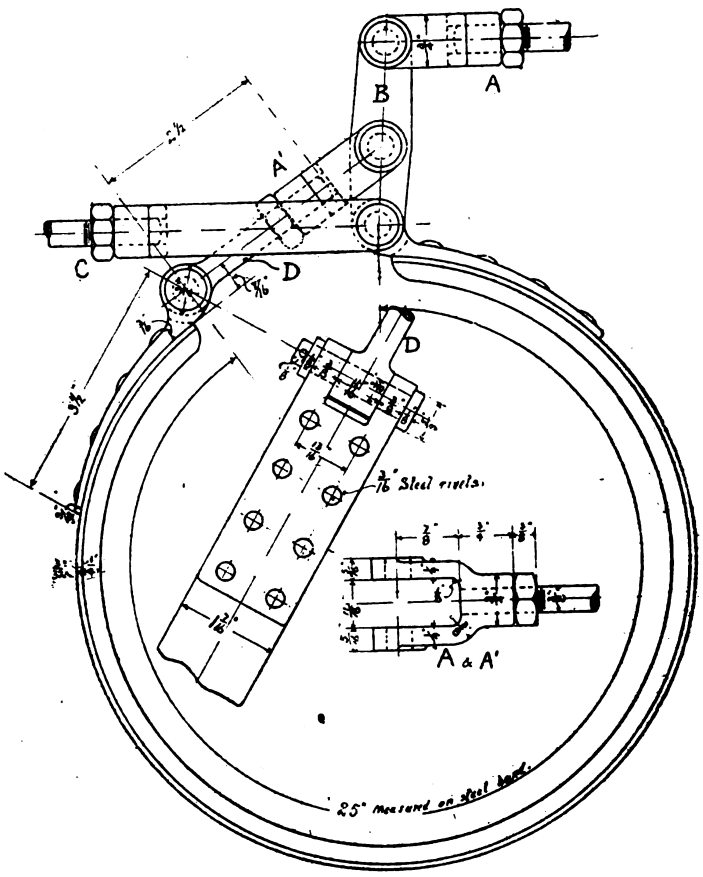


FIG. 171.

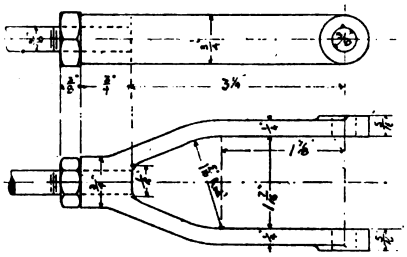


FIG. 172.

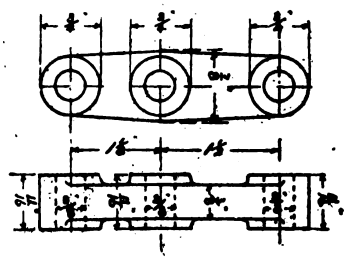


FIG. 173.

3 inches apart; the heads of the rivets being driven well below the surface of the lining material, Six or eight rivets will suffice. The lugs riveted to the ends of the steel band are to be forged in mild steel. They are both alike. Four of these lugs will be required for the hub brakes (two for each band), and another pair for the brake upon the balance gear box. These latter are of the same dimensions as the other four, but they are bent to a different radius. All the necessary dimensions may be obtained from Fig. 171. The hand lever pulls the band hard on by the rod and shackle A, which is attached to the band through the link B. One end of the band is attached to the middle of the link by a shackle A^1 of the same dimensions as A; the other end is directly pinned to the link. The rod and shackle C take the pull of the rod A, and keep the band in position. It is attached to a bracket bolted to the rear of the carriage frame. The number required of each of these parts is as follows: Link B, three; shackle A, nine; shackle C, three. The same parts are used on the two hub brakes and on the balance gear brake. The shackles A are also used to attach the three pull rods to the hand lever (and the small lever on opposite end of brake shaft) and the foot pedal. Hence the reason for nine instead of six, as would otherwise appear correct. These shackles should be of forged steel, as indeed should all the brake work, as so much depends on it. By threading the pull rods at each

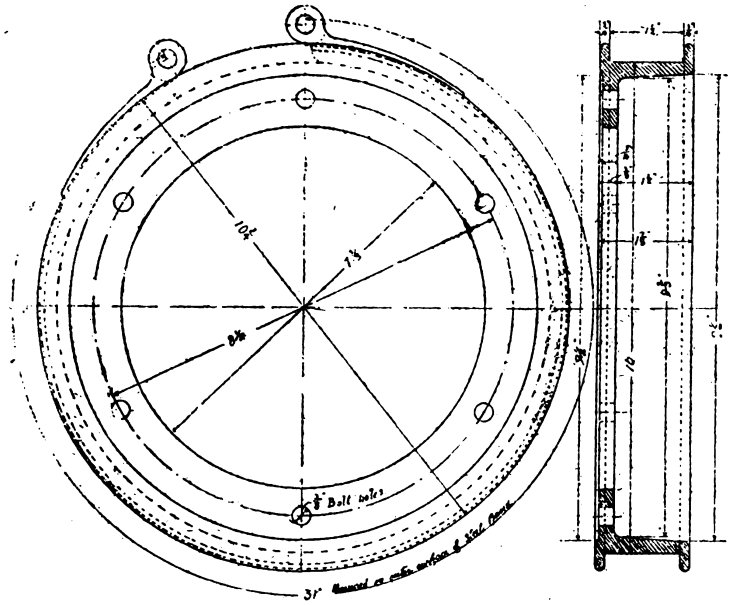


FIG. 174.

end and tapping the shackles a ready means of adjustment is provided. Lock nuts are, of course, fitted. As seen in Fig. 171, the brake is hard on, and therefore everything in the worst position so far as clearances are concerned. The short rods D enable one to adjust the brake bands to make them grip equally on each hub brake drum. For details of the shackle C and link B see Figs. 172 and 173.

The brake drum and its band for the balance gear box are seen in Fig. 174. The drum is of cast iron, and the band made the same as in Fig. 171.

The pattern for the cast iron drum is made in the manner described for the hub brake drums, Fig. 130. The six bolt holes are drilled to correspond with those already in the flanges of the balance gear box. The drum is centred on the balance gear box by the recess 1-16 inch deep, which fits over the flanges of the gear box. This can be machined from the solid. The only other parts requiring to be machined are the face of the drum upon which the brake band works, and the inner sides of the flanges. The width of the band will be the same as for the hub brakes.

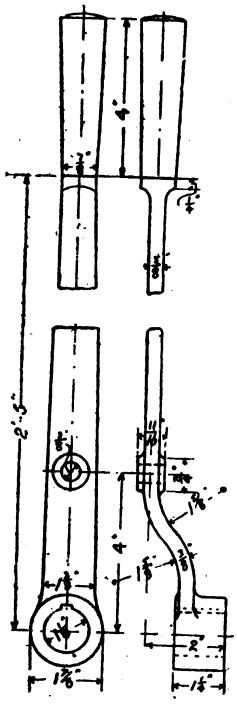


FIG. 175.

Fig. 175 is the hand brake lever. This is forged in mild steel, sufficient material being left on the surfaces of the two bosses to allow of their being machined to size. The lever is set off to bring it in line with the centre of the brake drum on the hub. The hand grip at the top is made the same size and of the same material as that on the hand pump lever, Fig. 162. The smaller bosses, ¾ inch diameter, will be satisfactory if welded on; but the larger one at the bottom end should be made solid with the lever. This lever is keyed to one end of the shaft, Fig. 176, which is turned from a mild steel bar. The centre part, 1¼ inches, need not be turned its whole length. If turned to size for 1¾ inches inwards from the 1⅛-inch parts at each end, this will be ample for the bearings; the rest may be left black. A feather key, washer and screw are fitted at each end, although only shown at one end in the drawing. The washers and screws are to keep the levers securely in place. If preferred, a ¼-inch taper split pin can be put through the levers and ends of the shaft; but the screws and washers make the neatest job. At the opposite end of the shaft to that upon which the lever (Fig. 175) is keyed, a short lever, of which Fig. 177 gives the dimensions, is secured in a similar manner. These two levers are to be made a good fit on the ends of the shaft and on the feather keys; no slop fitting can be allowed here. It is also important to get the centres of the ⅜-inch holes in the levers truly in line with each other, so that a line drawn through their centres would be parallel to the centre line of the shaft. The levers are both keyed on so that their upper ends overhang the ends of the shaft.

Fig. 178 shows the bearings for the brake shaft. Two of these are required, and they may be of gun metal or cast iron. The pattern is made the same as its casting, except that the hole for the shaft will be cored out. Allow for machining the bore and for facing the projecting facing which goes next the inner face of the lever. It will not be necessary to plane the under side of the foot, as this can have packing inserted between it and the under side of the frame.

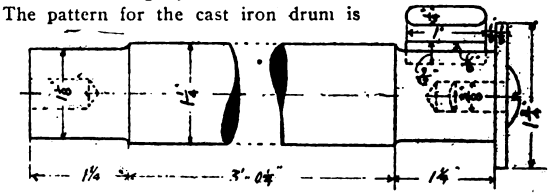


FIG. 176.

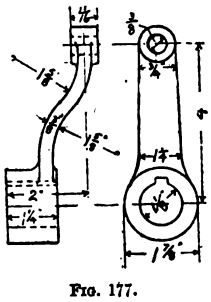


FIG. 177.

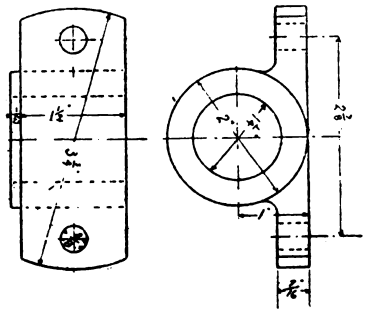


FIG. 178.

According to experiments made at the Charlottenburg Technical Laboratory, when red hot iron is plunged into an atmosphere of hydrogen and is then tempered in water it becomes brittle, the brittleness being especially remarked in the tests of cold bending.

...OUR... FOREIGN EXCHANGES

The Aster Governor.

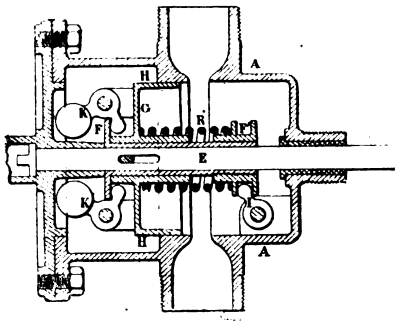
The object which this governor is intended to serve is to insure a speed as uniform as possible for all variations of power required of the motor, below the maximum, by acting on the admission of gas without changing the composition of the mixture.

Until now the only means of governing by throttling has been by employing a centrifugal governor and operating a valve thereby. This arrangement, while satisfactory on a steam engine, is far from being so on a gasoline engine. When the gas passes the throttle valve it expands and the pressure is reduced. This expansion is accompanied by a lowering in temperature sufficient to cause a part of the gasoline mixed with the air to recondense. Consequently the composition of the charge is changed. It may be changed to such an extent as to be no longer explosive and misfires and late explosions result, which makes any kind of regulation impossible. In one word, the power of a motor provided with such a governor is not at all proportional to the fuel consumed or the amount of charge the throttle lets pass, and the speed varies, consequently, according to some other law than the opening of the throttle.

Moreover, in order that the phenomenon of carburation may take place, especially with spraying carburetors, which are almost exclusively used at the present time, it is necessary that the velocity of flow of the air which is to absorb the hydrocarbon be above a certain limit which varies with the momentary setting of the carburetor; because if this speed becomes too slow no suction on the sprayer takes place and no carburation ensues, which is the case when the motor is throttled too little. The motor will begin to stop before the throttle is completely closed. It may also continue to operate with the same adjustment of the throttle if the carburetor is differently adjusted than in the first case. Finally the atmospheric pressure which acts on a single face of the throttle presses it strongly against the surface, on which it slides and thus renders the action sluggish.

The Aster firm, in basing itself on the above considerations, has devised an apparatus in which the atmospheric pressure has no detrimental influence, and which is therefore balanced; which, further, opens and closes so rapidly that the charge is admitted either normally or is not admitted at all. In this manner variations in the richness of the charge are avoided and also unforeseen variations in the operation of the carburetor.

The device consists of a hollow cylinder A, inclosing all the parts of the governor



THE ASTER GOVERNOR.

and connected by two tubes on its opposite sides to the carburetor and the motor respectively. These tubes, which have a circular section outside the casing, are flattened out where they approach the axis of the cylindrical casing in such a manner that their intersection with the internal surface of the hollow cylinder wall is a rectangle bent to the shape of the cylinder surface.

The openings thus formed are at least equal to the area of the tubes and the small side of the rectangle is parallel with the axis of the cylinder. The dimension of the large side of the rectangle is less than the diameter of the cylinder. Hence a space remains between the extremities of the two parts.

In the axis of the cylinder is located a shaft E provided with two collars F and F'. Between these collars is a disk G capable of sliding on shaft E and turning with it. This disk G is provided at its outer circumference with a lateral flange H, while more toward the centre is pivoted on this disk a pair of balls K, similar to those employed in ordinary governors. A coiled spring R of suitable compression rests on one end against the collar F' and at the other against the disk G.

The device is so constructed that when not in operation the disk G rests against the collar F under the action of spring R. Under this condition the balls are close to the shaft and the flange A of disk G is flush with the large side of the rectangular openings, thus leaving the latter fully open.

When the motor to be governed throws shaft E in motion, the disk G turns with it, carrying the balls K along. Owing to the centrifugal force the balls tend to separate and to push the disk G toward F' by compressing the spring R, since the balls have their resting point on the collar F. When the motor works with full admission its speed accelerates and the centrifugal force on the balls overcomes the pressure of the spring. The disk G then moves on the shaft E toward the collar F', and by this motion the flange H closes the rectangular openings to the casing.

When the openings have been closed no charge is admitted and the speed of the motor is reduced. The action of the centrifugal force on the balls diminishes and the spring causes the disk G to recede and the passage through the casing to open again.

It will be seen that only a very slight motion of the disk G is necessary to completely close the passage. The governor acts on the hit and miss principle. It may be adjusted to operate at any speed desired by varying the compression of the spring R, for which purpose the sliding collar F' and the shipper lever I are provided.—*From La Locomotion.*

The "Auto-Velo's" Fuel Consumption Contest.

The fuel consumption contest held under the auspices of *L'Auto-Vélo*, the organ of the Automobile Club of France, on Wednesday, February 5, was favored by pleasant weather, although the roads were not in the best condition, owing to the thaw. The contest was a very successful one, the number of contesting vehicles of all kinds being seventy-two. The rules of the contest were in part as follows:

The object of the contest was essentially to ascertain the fuel consumption of the competing vehicles over a distance of 100 kilometres (62.5 miles) at a moderate speed. The accuracy of the results was insured by providing a commissioner to accompany each vehicle and by a stringent control at the start and arrival.

The vehicles were weighed in running order with passengers and supplies, and were then classed according to the rules of the A. C. F., as seen from the table following. Solid ballast was admitted under the condition that the driver make a written statement regarding same before the start and have immediately upon arrival the presence of the entire ballast verified, under penalty of disqualification.

For a special class of business vehicles a shortened course of 60 kilometres (37.5 miles) had been provided.

The classification in each class was according to the consumption per ton-kilometre.

The two kinds of fuel used were gasoline and a mixture half gasoline and half alcohol. In one class—motor cycles—the lowest consumption per ton-kilometre was shown by a tricycle using the so-called 50 per cent. alcohol, but it is quite apparent that the other bicycle was out of order. The light carriage of G. Richard, showing the lowest consumption of alcohol per ton-kilometre, carried off the Arenberg prize.

In the class of motor bicycles all six contestants used gasoline. In the motor cycle class one used gasoline and one (50 per cent.) alcohol; in the voiturette class, seven gasoline and one alcohol; in the light carriage class, twenty-two gasoline and six alcohol; in the fifth class, eleven gasoline and four alcohol; in the touring car class all used gasoline, and in the business vehicle class all used gasoline.

In the following table only the vehicles at the head of each class are given, and

the results have been changed to English measure to facilitate comparison:

FUEL CONSUMPTION CONTEST.

I. MOTOR BICYCLES. WEIGHT LIMIT (EMPTY), 110 POUNDS. NO PEDALLING ALLOWED.

Make.	Fuel.	Gallons Consumed.	Total Weight.	Ton-Miles per Gallon.	Time of Run.	Classification Number.
			lbs.		h. m.	
Clement.....	Gasoline.	.23	242	33.3	5 2	1
Clement.....	Gasoline.	.25	220	27.4	6 16	2
Lamaudiere.	Gasoline.	.34	273	25.5	5 28	3

II. MOTOR CYCLES. 110-550 POUNDS. NO PEDALLING.

De Dion	Alcohol.	.61	385	20	5 24	1
De Dion.....	Gasoline.	1.18	330	9	6 57	2

III. VOITURETTES. 550-880 POUNDS.

Peugeot.....	Gasoline	1.53	1210	24.8	4 0	1
Peugeot.	Gasoline.	1 55	1210	24 6	4 21	2
De Dion.....	Alcohol.	2 00	1177	18.6	6 29	5

IV. LIGHT CARRIAGES 880-1,430 POUNDS.

			lbs.		h. m.	
Gladiator....	Gasoline.	1.63	1072	32	5 58	1
Darracq.	Gasoline.	1.73	1050	29.7	4 42	2
Richard.	Alcohol.	1.02	1320	25.3	4 24	9

V. CARRIAGES WEIGHING BETWEEN 1,430 AND 2,200 POUNDS.

Chénard Walker...	Gasoline.	1.79	2376	43.3	4 22	1
Ader.	Gasoline.	2.25	2970	41.3	4 7	2
Henriod.....	Alcohol.	2 60	2002	31.9	8 7	3

VI. TOURING CARS WEIGHING OVER 2,200 POUNDS.

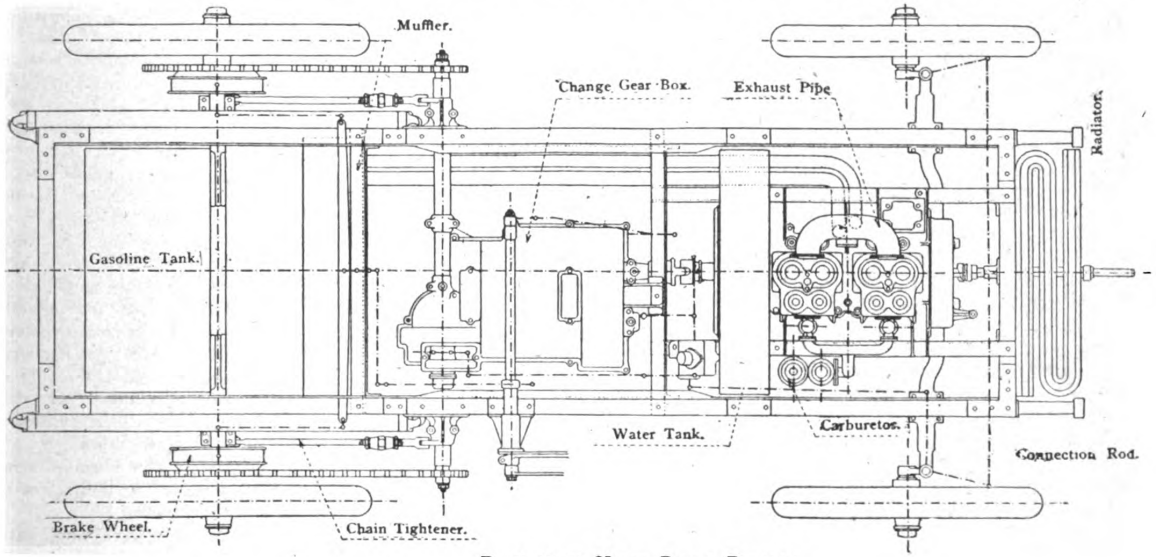
A. Bollée.....	Gasoline.	3 58	3804	34.0	3 44	1
Delahaye.....	Gasoline.	5.13	4532	27.6	5 30	2

The Ten H. P. Peugeot Carriage.

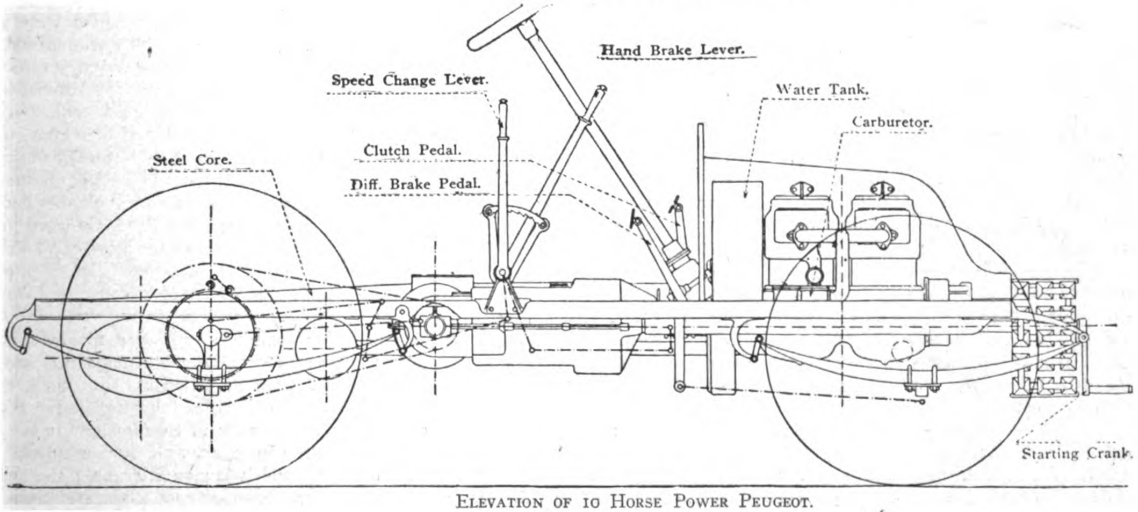
Below are given drawings representing an elevation and a plan of the new 10 horse power Peugeot *chassis*.

The drawings are practically self-explanatory. The motor is a double cylinder vertical one, located in front. We would call attention to the pivoting of the steering knuckles, so as to bring the centre line of the steering spindles to the rear of the pivot centres; the location of the water tank behind the engine; the provision of a universal joint between the clutch and change gearing; the location of the two change speed shafts in the same horizontal plane, and the consequent formation of the gear casing; the location of the gasoline tank at the extreme rear of the frame far removed from the engine and lamps, and, finally, the great similarity of the arrangement of the controlling devices to that of most of the other well-known French carriages.

A Paris court has decided that a renter who has acquired the privilege of entering the court of the building with a vehicle is at liberty to substitute for the horse vehicle an automobile propelled by electricity, steam or gasoline.



PLAN OF 10 HORSE POWER PEUGEOT.



ELEVATION OF 10 HORSE POWER PEUGEOT.

Liverpool Automobile Trials.

In connection with the cycle and motor show held in Liverpool during the second week of February, a number of contests for various classes of motor vehicles were arranged which proved fairly successful. The journey tok place over the worst roads in the district, being hilly and covered with loose stones. Rough roads, traversed at a high rate of speed, and hills, many of which were as steep as 10 per cent., afforded severe tests as to trustworthiness and efficiency. Although four of the vehicles out of the twenty which took part in the trial did not complete the run within the time allotted by the judges, their breakdowns admitted of remedy within a few hours.

Another important feature which the judges point out is the remarkable development of the motor bicycle. This motor may be said to be within reach of a very large proportion of those who at present use the ordinary bicycle; but whereas it would have been impossible for anyone except a powerful and trained rider to have traversed these roads and completed the 82 miles without fatigue and physical strain, those who rode these machines traveled the distance without the slightest inconvenience or fatigue.

The German Automobile Club has at present thirty affiliated clubs.

The Touring Club of France had a membership of over 74,000 on January 1 last.

By vulcanizing new rubber to old outer tubes of automobile tires an English tire firm claims to render old tires practically as serviceable as new ones.

A bill for a new automobile law similar to that of New York State is to be introduced shortly in the British House of Commons by Henniker Heaton.

In England owners of automobiles weighing under 1 ton are required to pay a license of £2 2s. If the vehicle weighs above this limit a double license fee must be paid.

The Austrian Government has just given its sanction of the Paris-Vienna race. The authorities of Bosnia-Herzegovina have sent an invitation to the Austrian Automobile Club to extend the race into their territory.

In some gasoline engines the cam shaft is driven by a fibre gear. In case a tooth is stripped, as will sometimes happen, it may be replaced by a number of small brads driven into the wheel to effect a temporary repair.

The Marconi Wireless Telegraphy Company, it is reported, has taken up the manufacture of ignition coils. At present there is undoubtedly a greater demand for induction coils for engine sparking than for coils for wireless telegraphy.

It is reported that the Continental Caoutchuc and Gutta Percha Company will hereafter manufacture some of their goods in France and that one of the French participants in the coming Gordon Bennett cup race will use Continental tires.

The London Distributing Kitchens, which make a specialty of delivering hot cooked meals at any desired time to one's office or flat, has recently acquired an electric delivery van, with a capacity for carrying 1 ton. The van has been running for a month or two.

The latest application of the automobile to business purposes in Paris is as delivery vehicle for millinery goods. The vehicle, which is driven by a fashionably dressed young lady, is most frequently seen in the Rue de la Paix, where it stops in front of several big millinery stores.

Automobiling does not seem to be out of season in winter in England. Between the hours of 12 noon and 1 p. m. on a recent Sunday no less than thirty vehicles were counted at a certain stopping place on the road from London to Portsmouth, either passing or stopping.

The Motor Cycling Club organized a race meeting at the Crystal Palace, London, for February 22. The motor bicycle races (5 miles on the track) were to be three in number, for machines with engines up to 1½ horse power, 2 horse power and more than 2 horse power respectively.

The Automobile Club of Great Britain and Ireland has decided to hold the coming summer, shortly after the coronation, a series of trials similar to last year's Glasgow trials, having London as a centre. The trials are to continue for a week and to consist of daily stages of 100 to 150 miles.

The standard frame dimensions proposed by the Chambre Syndicale du Cycle et de l'Automobile are as follows:

Voiturettes, 72x32 inches.
Light carriages, 76x32 inches.
Automobiles, 80x34 inches.
Touring cars, 100x38 inches.

A motor omnibus, the first vehicle of its kind introduced into Ireland, has lately made its appearance in Belfast. It has been procured by the Northern Counties Railway Company to supersede horse 'buses which have been plying for many years between Whiteabbey and Greenisland Railway stations and various districts along the Shore Road.

According to a recent report English county councils during the last year expended on main roads the sum of $10,123,555. The length of the roads repaired by the councils themselves was 15,670 miles, and the amount spent on the maintenance, repairs and improvement of these roads was $4,656,315, being at the rate of $295 per mile.

The lenses of large acetylene lamps, as commonly used on French automobiles, very frequently break, because, in order to obtain the greatest illuminating effect, the manufacturer places the lens and reflector very close to the flame. It is well to turn down the light while the vehicle is standing, as when starting suddenly after a prolonged stop, with an overheated lamp, a lens is almost sure to break.

The itinerary of the Nice-Abbazia race, by daily stages, is as follows:

Nice-Turin (142.5 miles), Turin-Verona (205 miles), Verona-Venice (75 miles), Venice-Abbazia (177.5 miles), Abbazia-Venice, Venice-Verona, Verona-Turin, Turin-Nice. The total distance is 1,192 miles and of this 840 miles will be covered at racing speeds, the rest of the course being neutralized.

Aluminum Solder.

In a recent paper on aluminum, read before the Society of Arts by Professor Wilson, the following solder is recommended: 28 pounds of block tin, phosphor tin (10 per cent. phosphorus), 3.5 pounds lead and 7 pounds spelter.

In using the above aluminum solder it is necessary to bear in mind that upon exposure to the air a slight film of oxide forms over the surface of the aluminum, and afterward protects the metal. The oxide is the same color as the metal, so that it cannot easily be distinguished. The idea in soldering is to get underneath this oxide while the surface is covered with the molten solder. With the following procedure quick manipulation is necessary:

1. Clean off all dirt and grease from the surface of the metal with a little benzine.

2. Apply the solder with a copper bit, and when the molten solder is covering the surface of the metal scratch through the solder with a little wire scratch brush.

By this means the oxide is broken up on the surface of the metal, underneath the soldering, and the solder, containing its own flux, takes up the oxide, and enables one, so to speak, to "tin" the surface of the aluminum. After this has been done the soldering is quite easy.

According to *La France Automobile* there are now 112 automobile clubs in existence, distributed as follows: In France there are 27; in England, 10; in Germany, 15; in Belgium, 8; in Switzerland, 1; in Holland, 1; in Spain, 1; in Russia, 2; in Italy, 7; in Austria-Hungary, 4, and in the United States, 36.

LESSONS OF THE ROAD

On Three Wheels Through Four States.

By Charles E. Duryea.

A little business at Carlisle, a little curiosity concerning Gettysburg, a little visit at Hagerstown, a general longing for an outing and a desire to give the three-wheeler a long drive over all kinds of roads, prompted a trip toward the Shenandoah Valley. The dirt and sand had been cleaned out of the three wheeler used in the Endurance Run, and being the only machine available fully upholstered, it was chosen for the trip.

We, wife and I, left Reading after 1 one bright autumn afternoon, and were soon rolling away toward Harrisburg, 55 miles. For 42 miles this is a toll road and in good condition, permitting one to drive at good speed, barring the occasional "scary" horses met. All hills were easily taken on the high gear, and no stops for the motor made, except one for water at a hose in front of a private house; this was not necessary at that time, but the supply was replenished as a matter of convenience, after which we did more than 50 miles steady running, with water remaining in the tank at night.

One feature noticed during the day was the attitude of drivers when the motor vehicle came in sight. Their general behavior indicated that many automobiles rushed past them without slackening or without making any attempt to avoid scaring their teams, a thing which we tried to avoid under all circumstances.

The beautiful road, the brisk wind, the mellow sunlight and the steady click of the motor made it a most pleasant afternoon; but as the sun lowered and the mountains were neared the wind grew colder, causing us to put on our wraps, put up the top, put on the side curtains and draw a robe over our knees. Even with these precautions we were unpleasantly cold before we quit driving for the evening.

Nearing Harrisburg after leaving the pike the road became rougher, and a passing cloud sprinkled us, but our top and storm apron prevented a wetting, and no delay resulted. At Harrisburg we crossed the wide and shallow Susquehanna on a quaint old wooden bridge built something like seventy-five years ago and kept by a dignified toll taker, who very solicitously inquired whether we dropped fire or not. There we took the turnpike toward Carlisle, 18 miles away, only to find that for several miles it was occupied by a trolley line in process of construction and practically impassable. Not knowing how else to proceed we wound our way through railroad ties, piles of dirt, rocks and mud holes, frequently crossing from side to side, and sometimes even on the sidewalk as occasion required. These gymnastic exercises proved too much for one of our springs, resulting in a broken leaf, which, however, did not stop our progress. By the time we were past the trolley track, darkness overtook us, and having no lanterns we began looking for a stopping place. We intended this trip to be one of pleasure largely, and to this end resolved not to travel after dark, on which account we carried no lanterns, lest we be tempted to use them. On this occasion, as on several succeeding ones, we would have been thankful for light, but we cautiously bumped our way along to Hogestown, midway between Harrisburg and Carlisle.

Here we stopped for supper and the night at a quaint old building which has been used as an inn for more than 100 years. The keepers thereof, however, are not ancient, and a good supper was promptly set forth, the little vehicle in the meantime having been run into the scale house near by. They tell with pride of a traveler recently stopping with them who stated that his last previous meal eaten there was sixty-five years ago. Our sleeping room contained solid but ancient looking bedsteads, so high from the floor that one needed a ladder, but very clean, comfortable and sleep inviting.

A HUNT FOR GASOLINE.

Morning came too soon, followed by a good country breakfast, after which the motor was oiled up and started, only to discover that the fuel supply was all but exhausted. No leak being found we could only conclude that the gasoline tank was not filled at starting, as supposed, and a hunt for gasoline began. The only store had none, but a harness shop nearby, using gasoline lamps, supplied 2 quarts, with which we ran to Mechanicsburg, 3 miles away and somewhat out of our course. Here an ample supply was quickly secured and the drive made to Carlisle over a dirt road, fairly passable, however.

A good dinner, some pleasant driving around the town with friends, including a visit to the Indian schools, passed most of the day, after which we headed south along the Mount Holly pike toward Gettysburg.

For the first 10 miles the road is fairly passable; the distance being made in much less than an hour, but the next 10 miles found us winding out way through a range of mountains. The road is as crooked in a vertical plane as in a horizontal, but with ample power we climbed the hills easily and descended them safely and pleasantly. The profusion of colored autumn leaves, the lengthening shadows of the setting sun, the bracing air and the relief from the dirt and work of the city made us enjoy every detail and care little for the roughness of the road, our broken spring being the only but constant reminder of the rough spots in life. This locality is evidently the home of the "thank-ye-mam," which abounds in lavish profusion and is constructed with an abruptness never before experienced. If a log 10 to 15 inches in diameter was placed across the roadway and a little dirt thrown each side, the form of water break typical to that region would be faithfully reproduced. The result of this method of road making was slow speed, both up and down hill, and very vicious tossing of the vehicle as the wheels crossed the obstacle. Here, more than anywhere else, the advantage of the three wheeler over the four was brought out; for while the tossing could not be prevented no racking of the body and running gear worth mentioning occurred. Dense woods were found at many places, while beautiful scenery came into view at nearly every turn. Carpets of pine needles obscured the road frequently, and as dusk came on some stretches, generally short, were quite dark and uninviting.

Near Bendersville, at a fork in the road, we struck a match and ascertained from the sign board that we had one more mile to go. A quarter of a mile further we again found a fork in the road and a sign board on a high post surmounting a stone wall. Climbing the post a match again disclosed the information that it was 1 mile up a steep hill to Bendersville over a little traveled road.

No other source of information being present we started up the hill—and a steep one it was without question. Near the top our slow speed clutch slipped and refused to drive, necessitating a stop of two or three minutes for adjustment, during which time a native came in sight and very kindly offered to push. We thanked him, assured him that we had no need for muscular propulsion, inquired where Bendersville was located, and were given the comforting information that it was just over the top of the hill, but that a good level road ran around the hill which we should have taken. Having started, however, we refused to go back, and were soon over the hill into the village.

THE VILLAGE CROWD.

Stopping in front of the only inn we were promised accommodation and alighted. On emerging from the building the vehicle was found surrounded by a crowd of villagers, each apparently expressing his opinion of the new machine, the first of its kind, evidently, in that locality. After ascertaining the location of the stable a turn of the crank started the machine, amid many expressions of fright from the crowd which followed it at a safe distance to the stable.

Good country meals, comfortable beds and a pleasant night in rapid succession brought the beginning of another day. The carriage had been pushed out of the stable and was surrounded by a curious crowd whose varied remarks were interesting to hear. A slight leak from the drain cock of the water tank had flooded the stable floor, and the owner thereof, with others, was much worried over the danger of fire from the gasoline which had been spilled, as he imagined. A lighted match dropped into

the nearest pool of the liquid did not fully convince him that it was nothing but water, so sure was the assembled crowd they they "smelled gasoline," and that such a vehicle could leak nothing else.

FALSE SIGNBOARDS.

The untrustworthiness of sign boards was forcibly shown by passing one marked "13 miles to Carlisle," and a little later another marked "11 miles to Carlisle,' although we were headed away from that city. This same state of affairs was found a few miles south of Bendersville, where in the same village within a quarter of a mile of each other one board announced the distance as 8 miles and the other 6.

The trip in the morning was nearly due south toward Gettysburg, passing over many hills, some rocky, and none very good. These roads would be objectionable after a spell of muddy weather, but were not bad driving when we passed. The early forenoon found us on the site of the first day's battle, and the avenues of finely crushed stone were much enjoyed. After visiting Oak Ridge and many monuments on its summit we drove over to Barlow Knoll, and then into Gettysburg by the Harrisburg road. Here we stopped for dinner, while the carriage was receiving the new spring ordered to meet us at this point. This new spring proved to be but little better than the old one, because of the fact that it was fully as much too high as the broken one had been too low. The carriage not only canted lamentably to the opposite side, but more of the passenger load, amounting to nearly 400 pounds, was thrown on the other spring in a very unpleasant manner, causing it to bump with great frequency. Not wishing to lose any more time, however, it was used in this condition and a very pleasant day spent driving over the scene of the second and third days' battles, the long winding climb to the top of Culp's Hill, the scene from the tower, and the beautiful coasting down the hill without power being a most pleasant part of the day's experience.

We so planned our driving as to bring us at the close near the Hagerstown road, and out this we started about 3 o'clock in the afternoon, with 30 miles ahead of us and a stiff gale in our faces. For the first 5 miles we passed over a most dusty strip, and were copper plated by the clouds of red dirt, carried by the wind, so thickly that at times even the dash could not be seen.

The road soon forked and we were in doubt as to whether to turn south and go by Emmetsburg, or continue on west toward the mountains and in the general direction indicated by the map. We chose the western route, stopping at the first house to inquire as to its correctness. We were assured that it was as good a road as the other one, although we later had reason to doubt the truth of this. The road soon became rougher, rockier and free from level spots for long distances at a time. We were in the Blue Ridge Mountains, and not only were the grades quite steep and long but the roadway seemed never to have ben cared for, and consisted virtually of a ditch at the bottom of which the vehicles were supposed to find passage. How two teams could pass in such roads was a query that fortunately we were not called upon to solve. Habitations were few and far between, and the region generally uninviting for a number of miles.

Finally we came in sight of a cabin in front of which stood a boy carrying a bicycle pump. This evidence of up to date civilization both astonished and assured us. We inquired whether we were on the right road and whether it got better soon, and were told that we would strike "the pike" about a mile further, after which we would have a good road. This mile, however, proved to be a long one, and as bad as any, terminating in a stream of water which had to be forded. We overtook a four horse team and were obliged to follow slowly behind, because there was no place wide enough to permit us to pass. After crossing the creek the team turned out for us and we quickened our pace, soon reaching the pike. If we had not been told we would not have known it, however, for it was but little better than the road we had left. However, it improved with acquaintance and became fairly passable in many places. At the first toll gate we were charged 6 cents by the boy keeping it, while at the next we were assured that no charge was made for automobiles.

A HORSE SCARE.

We passed a littie village called Fairfield and being Saturday it was filled with farmers' horses, while scarcely a farmer could be seen on the streets. The result was that we frightened nearly every horse in town and had to worry our way through the village most cautiously, stopping in one case and unhitching a horse that seemed determined to tear up the harness and buggy to which he was attached. We had many experiences with scary horses during the trip, but nothing so universal as we experienced at Fairfield.

A little later we passed through Charmian, a picturesque summer resort village on the summit of a mountain, and found the latter part of this mountain trip most beautiful. A hose by the roadside invited filling the water tank, which invitation was promptly accepted. As we wound down the mountain side we passed a toll gate and were again assured that no charge was made for motor vehicles. Here we again inquired the way, and were advised to take the toll road through Waynesboro rather than the dirt road passing more to the southward. We found the advice good, as the road the remainder of the way to Hagerstown was fine.

CHAIN TROUBLE.

The 5 miles to Waynesboro passed rapidly, although we met many people returning from their Saturday shopping excursion. At Waynesboro we turned directly south, climbing a steep hill, just after passing a toll gate without stopping. Near the top something happened, and we stopped as quickly as possible. "Retribution," we thought, but examination showed that the chain had run off the forward sprocket, probably due to the fact that one high and one low spring kept the sprockets in a badly twisted relation. It required fifteen or twenty minutes to replace the chain and go our way rejoicing, arriving at Hagarstown shortly after dark. Here we looked up our friends, put up the vehicle for the night and pronounced it a most successful day, including the bad roads over the mountains.

We visited late and slept late, so that it was nearly Sunday noon before we again took a look at the vehicle. A few short rides were taken around town, and we then decided to hunt up a blacksmith and have the low spring stiffened by inserting another plate. This was done in about two hours, at a cost of $2, and proved of no value whatever. The matter was made worse rather than better, because the temper was now out of the original spring and the new leaf had none, so that the spring immediately settled down farther than before, and the chain ran off again before we had left the suburbs of Hagerstown. Here we spent half an hour replacing it and shifting the axle sidewise to accommodate the sprockets to their distorted positions, if that was possible.

This served to keep the chain on, and we drove very nicely over a macadam toll road toward the battlefield of Antietam. This is being put in fine condition by the United States Government, and a number of fine monuments already exist. Some quite steep grades were found here, but in general the driving was excellent. We narrowly escaped having our throats cut by a wire stretched across the road at one place where repairs were in progress, and were saved only by the frantic actions of a little girl who realized our danger.

TOLL QUIBBLES.

We left the battlefield shortly before dark, and soon came to the Potomac, crossing same on a rickety wooden bridge. Here we were halted by a toll taker and 20 cents demanded. It being Sunday, previous toll gate keepers had made no charge, so we began to ask questions and learned that the bridge company did not keep the Sabbath as did the toll pike company. We then inquired on what grounds we were charged 20 cents, and were assured that the usual charge for a horse and buggy was 25 cents, but since we did not have the horse, 20 cents was thought to be about right. We then called attention to the fact that our vehicle only had three wheels, when the charge was at once reduced to 15 cents—a clear financial advantage of the three-wheeler over the four-wheeler.

A MISSING STARTING CRANK.

We then proceeded on our way and came to a fork in the road without means to ascertain which way to go. We had

passed a team, however, a mile or so back, and by waiting till they overtook us were properly directed. The road was said to be good, but it certainly was crooked enough to please the most rabid evil doer. It was now dark, slightly cloudy, the road narrow and largely overhung with trees, and Charlestown, our destination, 9 miles away. Further than this it was Sunday evening, when people were going to church, and we met teams galore—nearly thirty in the distance mentioned. At each meeting it was practically necessary to stop both the vehicle and the motor because the darkness added to the fright of the team and prevented our seeing what was being done. The many exclamations of fright and questions as to what we had there amused us, and mitigated the bother of the many stops. At one place when we attempted to start the motor the starting crank could not be found in its proper pocket, and we were beginning to think it lost only to find it hanging in the end of the motor shaft, where it had traveled since the last previous start.

A BROKEN AXLE.

We finally reached Halltown and felt our way around the mill and over the bridge to the pike. We were assured that no fit place to stop existed here, so we must go on to Charlestown, and we were further assured that the road was good. This we found to be true, although it was quite hilly. The road being wider we were able to pass some teams without stopping and thus began to enjoy driving once more. When in the suburbs of the town we turned out for another team and were just getting back into the road again when the rear end of the vehicle settled down about 6 inches and we came to a stop. Although we had never experienced such a sinking sensation before this was diagnosed as a broken axle, which investigation with a lighted match proved. The severe strains of the Endurance Run and the constant bumping over the mountainous roads, under a weak and broken spring, had proven too much for the axle to stand. Being light the vehicle was easily pushed into the barnyard of a house near by; the cushions and tools removed, and we resumed our way on foot—a most inglorious termination of our third day's driving.

We inquired for accommodations at the first likely looking place and were directed across the street to a private boarding house, where every attention was shown us and we were most pleasantly quartered. Early next morning a rail was slipped under the rear end of the vehicle, and it proceeded to the blacksmith shop behind a hay motor. The damage was investigated and a new axle and spring telegraphed for. We then caught the morning train for Luray and spent the day visiting that wonderful cavern, returning again at night.

On Tuesday the new axle and spring had arrived and we proceeded to win 5 pounds of candy by replacing the axle and spring in less than two hours, making the vehicle all right again. The remainder of the forenoon was spent in riding around the village and giving rides to a number of prominent people while seeing the sights. Here still stands the court house in which John Brown was tried, and the building formerly used as jail in which he was confined, while the site of the gallows on which he was hung is now occupied by a beautiful residence.

In the afternoon we drove to Harper's Ferry, 8 miles, driving and climbing up to Jefferson Rock and making some photographs of the Shenandoah and Potomac Rivers at that point. Here we encountered a fractious horse, which a husky youth attempted to hold, but the horse reared up so high that the youth let go and got out from under. The horse came down on the sidewalk within easy reach of a couple of grocery store loafers, who made no effort whatever to take hold of him. He then leisurely proceeded down the sidewalk around the neighboring corner. When last seen no damage was done, but our first runaway on the trip had taken place.

VARIABLE TOLL.

Going back toward Charlestown we were stopped at a toll gate, through which we formerly passed free, and toll was collected. The gatekeeper assured us that such were the orders of the directors, one of whom was present. At the next gate, however, we were again assured that no toll was collected and passed on free. Supper time not yet having arrived we secured our luggage, paid our modest bill and started for Berryville, 11 miles. This road was quite good, and the toll gate people made no charge. We stopped once to hunt for a squeak, and while doing so were the centre of observation by several teamsters who came along at that time. Learning that we were to start soon they waited to see the thing go. On being warned lest their horses scared they assure us that they would assume the responsibility, so we let her go, much to their delight.

At Berryville we found a circus in town and the streets jammed with people, while the brass band was followed by a crowd of boys, largely colored. By driving carefully and making some noise we avoided running over anyone, although one ten year old boy in attempting to jump both ways at once fell flat on his back in front of us, necessitating a quick stop. Here we put up at the best hotel (not over good), and were given a good supper and breakfast, but a bed so hard that even our clear consciences could not soften it.

The next morning we started about 8 o'clock for Winchester, 10 miles further west, the road being good, although several small streams were to be forded. None of these were deep enough to make any trouble and all went well. At Winchester it was Fair Day, and the roads leading to town were filled with people, while the place itself was exceedingly busy on this account. Being daylight, however, we did not scare many horses, and the rapid spinning over a good road on a bright morning made life enjoyable and led us to forget the hard bed of the night before.

We did not spend much time here, but began our return trip by the way of Martinsburg, 22 miles away. Along this road were many piles of stones, with a man at one end breaking rock with a small hammer. This region is a good farming country and apparently quite well to do. The road is so level that no scenery worth mentioning was found. About this time a peculiar click indicated trouble around the big sprocket, and we stopped to examine, finding the chain case loose. We did not like to remove it because of the inconvenience of carrying, so wired it in place as well as possible and resumed our journey.

At Martinsburg we filled the water tank at a blacksmith shop, while a most enthusiastic butcher stood out in front talking about the many virtues of the motor vehicle as compared with a horse and dilating on the fact that all kinds of business would before many years be done by motor instead of by horse. We agreed with him exactly, thanked him for his up to date expressions and turned eastward toward Hagerstown, 23 miles. Most of this road is good and a few spots picturesque, several small streams being forded, including part of the Potomac, which we crossed at Williamsburg.

A COUNTRY FERRY.

As we came down a bad stretch of road to the ferry we found a young man swinging in a grape vine swing, and inquired concerning the crossing. He said he was the ferryman and could only take us part way across, because of the low water, but could take the passengers all the way in the small boat. We inquired concerning the depth of the water and were assured that it averaged about 6 inches. Nothing remained for us to do except to try it and risk getting stuck; so we drove on the ferry, which is operated by the current, and were soon moving slowly over to "the bar," a little landing in midstream, fare 40 cents. Here the boat stopped and we drove off on an artificial pile of rock forming a sort of landing. We then selected what seemed to be the shallowest way out and drove cautiously over the loose rocks in the bed of the stream at this place. While it averaged perhaps 6 inches it was of various depths, but did not reach the axles and no trouble resulted.

Up from the river a long, sandy stretch was found and a steep climb to the bridge over the canal. We made no stop here, however, but drove on through toward the north. A scary horse hitched in front of a farm house made it necessary to halloo until somebody came out. Finally a man appeared and seemed very much disgusted because we were bothering him. When we brusquely informed him that it was for

his benefit and not ours he came down a little and condescended to hold the horse while we drove by. By 2 o'clock we had reached Hagerstown without accident, where we stopped for an hour, after which, bidding our friends good-bye, we went northward toward Shippenburg. Part of this distance lay along the old National turnpike, and all of it was very fair driving. We drifted along merrily, arriving at Shippenburg shortly after dark, having completed 80 to 90 miles that day, in spite of a late start and a stop in the afternoon.

We put up at the best hotel, getting good accommodations, and were ready for another pleasant ride on the morrow. Here we found an old friend of twenty years before, with whom a pleasant evening was spent, and to whom a short ride was given the next morning. Our quart of cylinder oil by this time had become exhausted and fearing that we might need more than was in the oil cups a quart of the best in town was purchased.

The Sesqui-Centennial at Carlisle was in progress, and everybody in Shippenburg seemed to be going. We were likewise headed that way, so did not meet many teams, but frequently passed them. About 10 miles out of Carlisle a loud report indicated a burst tire. This was repaired by a spare inner tube and stout wrapping of string and tire tape, with which arrangement we drove beyond Harrisburg.

At Carlisle we again stopped for a visit, drove around the town exhibiting our vehicle, seeing the celebration and otherwise enjoying the day. After securing a supply of gasoline we drove to Hogestown, 9 miles east, and ate dinner with the keepers of the ancient inn—much to their delight. After dinner they insisted on filling the vehicle with flowers and radishes as large as half gallons from their garden. Here we learened of a road through Mechanicsburg, of the dirt variety, but said to be as good as the toll road ordinarily, and much better at this time, because it avoided part of the new trolley track. We therefore went this way and found it quite passable, although during a muddy spell it would have been bad.

Near Harrisburg the trolley road was found much improved, and passage in the daylight was made without difficulty. A four-mule team drawing poles took fright, however, and headed abruptly the other way. The sudden change of direction made the wagon parts crack as if breaking, while the wheels skidded like a motor vehicle on a wet pavement. The vigorous expletives of the driver added spice to the already strenuous scene before us, and we stopped, waiting for further developments. After the team was fully turned the driver was able to control them, and in a very ungracious tone told us to come on; which we did without further delay.

THE SECOND RUNAWAY.

Just before reaching this, however, a middle aged man and a little girl in a top buggy drawn by a powerful horse were met. The horse pricked up his ears, but the man seemed to have full control and we did not stop, although we drove quite slowly. When nearly past the horse seemed to take additional fright, probably because he could no longer see us, and bolted abruptly toward the fence, crashing through it easily. The buggy wheels resisted sufficiently to break the harness, freeing the horse, and nothing else happened. We stopped, went back, assisted to lift the buggy back into the road and saw that nothing was hurt excepting the broken shafts and harness. The horse was loose in a strange field, pretty much excited. The driver took the matter quite philosophically, and we much regretted that we could not aid him further. This was our second and last runaway on a 400-mile trip through a region where the horses are not accustomed to motor vehicles.

At Harrisburg we crossed the Susquehanna on the new iron bridge, stopping long enough to photograph the old wooden structure. There we bought a supply of string and tire tape with which to better mend our damaged tire. We drove around the city a little and then headed for home. When well out of town we stopped at a quiet place, cut off the original wrappings and rewrapped, spending about an hour, and doing a job that we were proud of. We now felt safe to drive as far and as fast as we chose and gave our tire no further thought.

On reaching the first tollgate we bought a ticket at 1 cent a mile, whereas we had previously paid 1½ cents. This road afforded but few incidents, and as the darkness came on and the evening was cold, little of interest could be seen. At one place a four-mule team hitched to an empty wagon did the "about face" act in the twinkling of an eye, almost upsetting the wagon and badly scaring one of the occupants. His efforts to get out over the back end of the wagon were most laughable. A small boy getting a pail of water at a public pump suggested filling the water tank, so we stopped and borrowed his pail. This gave the villagers an opportunity to congregate, and another flood of remarks, not so favorable as at Martinsburg, was the result. Here the motor started lazily, and from this point on missed fire occasionally. This, however, was not of much moment, as our triple-cylindered vehicle had ample power to traverse such roads even with one cylinder out entirely.

BETTERED TROLLEY TIME.

Near Lebanon a trolley car conductor challenged us to a contest, but we continued steadily at our regulation gait and soon had the satisfaction of inviting him to come on. In this connection it is interesting to note that although we drove many miles by the side of trolley tracks we very seldom saw any cars going our way which indicated that we made as fast or faster time than the trolleys. Much delay by slow tollgate keepers, sometimes at supper, and an occasional scared horse marked our way toward Reading. The young moon gave a fair light, the evening was clear and cold and our speed made it really unpleasant, so that we were quite thankful when we saw the lights of Reading, and a little later pulled up at home. We had completed about 100 miles that day and had not driven steadily, either.

The trip was voted a decided success, and we have promised ourselves a repetition four times as long next year. Stone roads exist practically all the way from Reading to Luray Cave, while dirt roads, more or less parallel, permit a change of scenery when the weather is good. The costs of living are not much, and the scenery on either side of the Lebanon, Cumberland and Shenandoah valleys is certainly fine. Good stopping places are readily found, so that no long stretches need be made unless desired. High speed cannot be made, for the roads, as a rule, are not good enough, but 10 to 15 miles can be averaged pleasantly. A vehicle for this trip should have large wheels, strong running gear, ample power and good brakes, and we can truly say that touring in a motor vehicle must be tried to be appreciated. The fatigue of cycling or the tedium of carriage driving is avoided. Clothing, cameras, souvenirs, etc., can readily be carried on the motor vehicle, while the perfect independence as to time, distance and direction render it the ideal way to enjoy one's self. Our single day by train brought out the difference between railroad and motor vehicle touring most vividly by contrast—much to the disadvantage of the railroad.

Pennsylvania Lead Cab Company.

At the annual meeting of the Pennsylvania Electric Vehicle Company, held in Camden February 18, a resolution was passed reducing the number of directors from nine to seven, and a new board elected as follows: Herbert Lloyd, John R. Williams, J. B. Entz, Frank C. Lewin, Augustus B. Stoughton, Henry G. Morris and Pedro G. Salom. The former board of nine members consisted of the above seven, together with George H. Day, resigned, and W. W. Gibbs, who withdrew his name both as director and president. Vice-President Herbert Lloyd will be president pro tem. until the directors organize, which they will do in a few days.

The annual statement gave the following figures:

Value of property, vehicles, etc...	$825,000
Sales of vehicles for 1901.....	88,000
Loss during first six months of 1901 from cab service.....	17,000
Profit during second six months (about)	4,000

...COMMUNICATIONS...

Flexibility of Gasoline Engines—Nice-Abbazia Race.

NICE, France, February 3.

Editor HORSELESS AGE:

I have been much interested in the various articles in your journal on the flexibility of the gas engine as compared with that of the steam engine, and I am convinced that the claim of the want of flexibility in the former is largely due to experience with engines governed on the hit and miss principle.

Some few years since I satisfied myself that in a gas engine ignited by the electric spark the regulation would be more perfect and the flexibility much greater if it was governed by throttling the gas, and began the construction of an automobile engine to settle the question.

During the time it was under construction the shop was frequently visited by the representatives of two of the largest automobile manufacturers in Europe, and I was told that I was wasting my time and money; nevertheless it did succeed and both of those concerns are now making all of their motors on that principle.

There is no trouble in running my engine from a minimum of 300 to a maximum of 1,000 turns by merely throttling the gas, and thus reducing the speed of the carriage to less than a third of its greatest speed, which, it appears to me, shows a very considerable amount of flexibility.

I have not the proper means here for brake tests, but I got a friend who constructed a similar engine to make some indicator tests for me and he sends me the following figures: Power developed at full speed, 800 turns, 9.38 horse power; at 400 turns, 4.18 horse power; at 200 turns, 2.16 horse power. The reduction to half speed was caused by tightening the brake until that speed was reached and that to 200 turns by throttling the gas.

My friend does not give the power consumed in turning the engine, but I imagine were that known and deducted in each case we would find the effective power remarkably proportional to the fuel consumption.

Now the object of the foregoing is to lead up to a hobby of mine—viz., that the carriage of the future will have only two speeds, viz., a high one, in which no gearing will be used and a low speed for use in starting, backing and for climbing unusual hills, all the intermediate speeds being obtained by throttling the gas.

Suppose we take as a case in point a 10 horse power carriage which makes 20 miles an hour on the level, and which comes to a hill upon which it has to use a gear which reduces the speed to 10 miles. It follows that to attain the same result without gear we must have an engine which will develop 10 horse power at half speed or, say, a 20 horse power engine. But the difference in weight between a 10 horse power engine and a 20 horse power is very little, if any, more than the gearing required to reduce the speed to, say, 15 and 10 miles an hour, and we have the immense advantage that we can have by merely throttling the gas any speed between 10 and 20 miles, whereas in the other case we have the fixed ratios of 20, 15 and 10, besides which we avoid the noise and trouble of gears.

I visited the Madison Square Exhibition last fall and the Paris Exhibition in December, and could not but be struck with the great reluctance our American manufacturers have to abandoning the conventional carriage shapes, while on this side practically all the manufacturers have come to the same model, with the motor in front. The reason is obvious, viz., that it is much more important to have all the machinery readily accessible than to follow old lines.

I saw a carriage at Madison Square Garden built by one of the most prominent American builders, in which it was impossible to get at the valves without taking the cylinders apart, which meant a good half day's work. When I asked the builder about it he said that his valves never needed taking out, which any practical automobilist knows is ridiculous.

I have done many thousands of miles' touring nearly all over Europe, and am sure that many improvements may be made in European carriages; but must admit that up to the present they are vastly superior to anything we have turned out in the United States.

I am proud of American energy and ability, and am convinced that in time they will build better automobiles than are built on this side, but we must first abandon the idea that we know it all, and profit by what has been done elsewhere.

I inclose the program of the spring races of the Automobile Club of Nice, and, as a member of the race committee, beg to assure your readers that we will be delighted if any of them are disposed to enter for the same, and can assure them a hearty welcome.

The race to La Turbie is about 10 miles with a climb of nearly 2,000 feet, beginning with about 3 miles of nearly 10 per cent. grade and a little farther on a ½ mile of nearly 11 per cent.

The mile race is on a perfectly level and straight cement pavement about 60 feet wide, while the race to Abbazia is about 800 miles over mountain, valley and plain, so that it will give all kinds of machines a good test, particularly as all repairs on the road except those to pneumatics are strictly forbidden. H. W. BARTOL.

Electrolytic Action of Calcium Chloride Solution—A Query.

SAUGERTIES, N. Y., February 14.

Editor HORSELESS AGE:

Referring to the very interesting article by E. E. Keller in your issue for February 12, and also your editorial, on the subject of "Non-Freezing Liquids for Cylinder Jackets," I would like to ask if electrolytic action does not destroy the tanks, pipes, etc., through which the calcium cloride is circulated, more than chemical decomposition?

If the several metals tested had been electrically connected, as they are in the construction of motor vehicles, would the results have been the same?

READER.

[Calcium is electropositive to any metal that may be used in automobile construction, and there is, therefore, no danger of electrolytic action from the calcium chloride itself. Impurities contained in the solution may have a tendency to cause electrolytic action, but the results would naturally be comparatively insignificant. Tests on galvanized iron would easily show whether electrolytic action might be expected in the circulation system, as this material would not endure in a strong, exciting fluid.—Eo.]

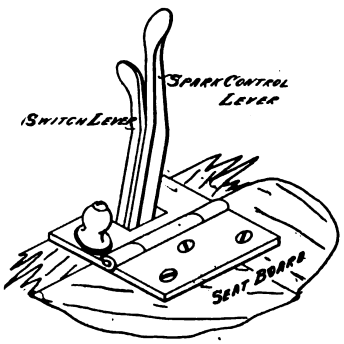
Vacuum in the Muffler—A Simple Spark Lever Lock.

MISHAWAKA, Ind., February 15.

Editor HORSELESS AGE:

In the recent discussion on the phenomenon of a vacuum in the muffler and exhaust pipes the reasons for same are not always clearly stated in the different articles.

I have always supposed that the report of a gun was caused by the sudden expulsion of air from the gun barrel, this air being as suddenly replaced by air re-entering. Now it is fair to assume that the same thing happens in connection with the sudden exhaust from a gas engine, and the quicker the exhaust takes place the more the vacuum. If the exhaust gas is choked down by a poor muffler it will issue at almost a steady pressure and very gradually, so that there is no chance for air to re-



A SPARK LEVER LOCK.

enter; in other words, for a vacuum to form.

To turn to another subject, I saw a very good and inexpensive device applied by a a local automobile owner to an "Olds" rig to prevent boys or others from moving the switch and spark changing lever. It consists of a common butt hinge, as shown in the above sketch, with a place filed out to hold the levers in an upright position, and a wooden knob riveted to the hinge to move it by. The hinge is screwed to the seat.

R. B. HAIN.

Early Literature on Calcium Chloride Solution for Cylinder Jackets.

MANCHESTER, N. H., February 16.

Editor HORSELESS AGE:

I have read with great interest and appreciation the very scientific article by E. E. Keller on "Non-Freezing Liquids for Cylinder Jackets." This contribution is a good example of the kind of paper which is needed in the art, full of exact, pertinent information based upon actual tests made on scientific lines. If we could have more of this sort of thing, motor carriage practice would soon be generally regarded as a genuine branch of engineering, which it actually is.

It would seem, however, that Mr. Keller must have failed to notice some of the published matter in regard to this subject, as he says: "I had occasionally noticed in some of the automobile journals mentions of calcium chloride solutions and diluted glycerine for this purpose, but nothing of a definite or positive nature. The articles noted were usually nothing more than remarks that this or that substance, in indefinite and varying form, was suitable."

The HORSELESS AGE for January 30, 1901 (somewhat over a year ago), contained an article by me, entitled "Winter Use and Housing of Automobiles" in which I said: "* * * The writer has found a solution of calcium chloride to be by far the best of anything yet tried. If about 5 pounds of this salt be added to each gallon of the cooling water a solution is obtained which will not freeze or crystallize out at temperatures far below zero. Calcium chloride should cost about 1½ cents per pound. It is perfectly neutral or even slightly alkaline when properly made, and thus will not attack the metal of the jacket and tanks as salt is likely to do, or deteriorate the rubber connections, as will glycerine. * * * If any incrustation is capable of being formed upon the jacket passages by the use of this compound, it has yet to be observed by the writer. An ignorant chemist might be likely to 'palm off' upon the purchaser chloride of lime instead of calcium chloride—a very different compound—and this should be guarded against."

There seems to me nothing indefinite about this statement, but it appears on the other hand to embody all that the average user need know upon the subject to secure satisfactory results. The article quoted from is, to my knowledge, the first instance in which calcium chloride solution has been proposed for automobile use in the technical press. The solution as originally specified seems to work so well that I have never seen any reason to modify the original recipe.

In The HORSELESS AGE of February 13, 1901, I published a letter in regard to the different degrees of hydration in calcium chloride and the effects of this upon the solution, and stated that my recipe referred to calcium chloride containing six molecules of water of crystallization. I also quoted from Engel's tables as to the properties of the solution when made as directed in regard to freezing and depositing crystals.

On February 27, 1901, THE HORSELESS AGE contained a letter from me answering a communication regarding possible corrosive or electrolytic action, in which I said: "* * * My use of the same (calcium chloride) has brought to light no evidence of such effect. * * * I shall be considerably surprised if any of your subscribers find any galvanic action of any practical importance due to the use of this solution; but if in any instance it should be found of serious importance, I think means can be found to prevent it."

I make these abstracts simply to show that the subject of the use of calcium chloride for jacket solution was, for all practical purposes, definitely understood over a year ago. It did not seem to me of advantage to plot any curves, as there is found in every chemist's handbook a table developed by the most careful German laboratory work that clearly defines the relations of percentage composition, specific gravity and freezing point of such solutions.

I do not wish to detract from the scientific value of Mr. Keller's work, but merely desire that its novelty may not be overrated.

ALBERT L. CLOUGH.

Planetary Gear Ratios.

TROY, N. Y., February 20.

Editor HORSELESS AGE:

The writer notes you have illustrated sketches, which he recently sent you as a portion of his transmission gear. You will note in the beginning of my communication I stated in the course of a week or so I would send you blue print covering the arrangement I have adopted. The sketches and the description covering the operation of the gears were not a description of a portion of the writer's three speed transmission, but were simply an article on gearing to illustrate the change in ratios, by simply changing the direction of rotation of pinion marked C, which engages both the internal and external gear. In both cases C makes the same number of revolutions as the driving shaft. Both are the same in diameter, and engage gears that are similar. In one case, however, the direction is opposite the driving shaft, and in the other with it, and if an intermediate gear is put between A and B, in Fig. 1, the ratio would be the same as in Fig. 2, irrespective of the size of A and B, provided they are both the same size; consequently your comment on the ratio is erroneous. The two illustrations are simply to show the variation in ratio caused by the sun and planet system when the pinion engages an external and internal gear, and revolves in opposite directions. To make this plainer, when C is revolved in one direction, the reductions become 1 to 2 and 1 to 6; when it revolves in the other direction, the reductions become 1 to 4 and 1 to 4.

W. S. HOWARD.

Winter Use of Automobiles—Racer Design.

READING, Pa., February 18.

Editor HORSELESS AGE:

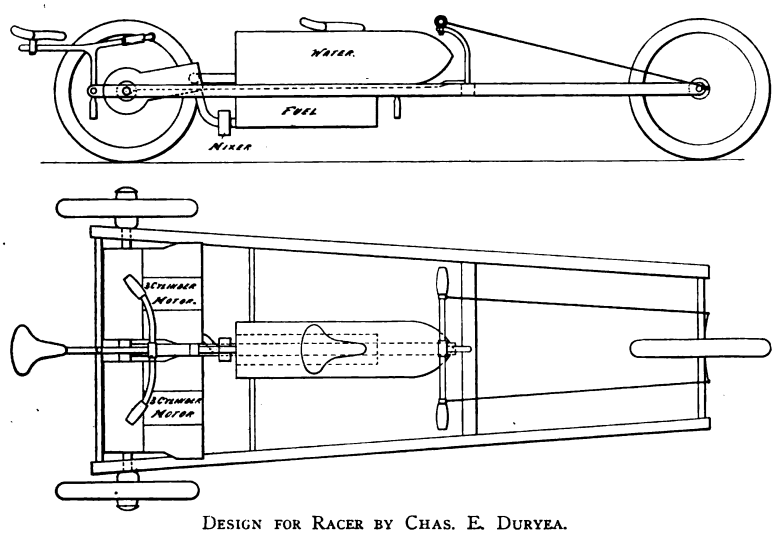
Each issue of your paper contains many good things but the last one overflows with them.

Your statement regarding cold weather use is undoubtedly correct, and it is a matter of regret that the public suppose automobiles to be fair weather machines only, like cycles. Unfortunately some manufacturers, who should know better, support this belief and make no attempt to provide vehicles or fittings for cold weather use. We have been driving our carriages almost daily this winter and have never quit because of the severity of the weather. Mud, snow and rain are our favorites, and we take pride in going out when other machines are not to be seen.

Regarding clothing, the use of a foot mat heated by the exhaust gases and a storm apron or big lap robe covering even the controlling handle enables us to drive in cold weather without discomfort. We fear greatly, however, that a cold weather endurance run would not demonstrate the capabilities of the vehicle as it should. For example, in a mud run the last vehicles have the hardest work, as the road is cut more deeply and they get no credit whatever for this additional labor. In a snow run the reverse is true and the first vehicles through the snow are not only obliged to break down the snow but the fresh snow offers no traction as does the packed snow, so that the later vehicles will ordinarily find the conditions much easier. We frequently find this just outside our factory door, where our wheels slip badly in the fresh snow but climb readily after a few teams have passed through. The grade is about 12 per cent.

The experiences of Robin Damon are the most interesting and sensible reading I have run across for some time and I commend that article to beginners in particular.

The design of racing machine by Mr.



DESIGN FOR RACER BY CHAS. E. DURYEA.

Howe is so closely in accord with a design of my own (of which I send you a hurried pencil diagram) that I must say, Bravo! The racing machine so differs from the vehicle for everyday use that the experience of the bicycle is not likely to be duplicated in the automobile business, and it is with regret I have watched manufacturers building racing machines in the hope of selling them to the public, and seeing the public buy them not knowing that better vehicles, designed specially for everyday use, could be had. If I am ever rash enough to build a racing machine I expect it to be principally motor and wheels, with as few wheels as possible.

The design submitted consists of two independent three-cylinder motors, each having a rear driving wheel directly attached to one end of its crank shaft. This arrangement does away entirely with transmission gearing and balance gears. It gets the power directly into the wheels without much friction or lost motion. Wooden reaches of the toughest hickory run from the bearings inside the rear hub to the crossbar of the single steering wheel in front and serve both as reaches and as springs, which, together with large tires, provide all the elasticity needed for racing purposes. Fuel and water tanks of any size desired are placed in front of the motor with a saddle on top for the driver, while handle bars are provided for steering the single front wheel. The motor may be controlled by either the front or rear rider as preferred. At the rear is a saddle for the attendant, who will push the machine to start the motor and jump into place as it pulls away. Stirrups for both riders, of course.

This arrangement need not be expensive to build nor difficult to keep in order, while its design is such that it can be strong enough to stand high speeds and great abuse and yet not weigh to exceed 400 to 500 pounds. Within this weight it is possible to construct a machine having 25 to 30 horse power without particular refinement and provide tank capacity for 100 miles if need be. You will readily recognize that a machine weighing 20 pounds per horse power or less will have some capability, but its uselessness as an everyday carriage is clearly apparent, and I trust this comparison will do something to show the public the difference in vehicles adapted to two purposes so widely different. If racing rules should require both passengers to be mounted side by side a cross seat just over the motor heads can readily be arranged.

CHAS. E. DURYEA.

Side Spring Suspension.

SPRINGFIELD, Mass., February 19.

Editor HORSELESS AGE:

I notice in your issue of February 12, in the description of the Oldsmobile, a statement to the effect that the Olds Motor Works were the originators of the side spring suspension. I believe that the Buckeye people, in Cleveland, originated the idea of the side spring used as a reach in automobile construction, and saw an illustration of their vehicle with this type of spring in an issue of THE HORSELESS AGE several years ago. I should, therefore, judge that the Buckeye people first adopted this construction on motor vehicles and that their design certainly antedated the Oldsmobile.

H. A. KNOX.

Electric Welding of Connecting Rods and Other Parts.

CLEVELAND, Ohio, February 19.

Editor HORSELESS AGE:

The writer has been much interested in following the articles which you are publishing from time to time on steam carriages and other auto construction. In Volume 9, No. 7, there is a part of an article by T. H. White on steam carriage construction, with working drawings for same. We are especially interested in the description of the manufacture of the connecting rod on page 200, and beg in this way to draw the attention of the author to the great improvement over the methods suggested by this drawing which could be secured by means of electric welding. It would first enable him to construct a tubular centre which could be tapered at either end to the centre, giving that portion of the rod which is to stand the greatest strain increased diameter, without materially increasing the weight. It would also make the rod much lighter by doing away with the telescope portion of the forgings, as drawn.

Further, it would eliminate the softening effect of brazing these parts together, which in a construction of this kind is an important matter. By using electric welding for the union of the parts mentioned, the tubing of the forging and the tube could be hard drawn and electrically welded without softening the tube in any way, and a theoretically more correct structure would be obtained.

There are in connection with all vehicles many possibilities for the use of this process; it can be most serviceable in forming designs structural and otherwise better adapted for the character of work intended than it is possible to obtain by any other method.

W. S. GORTON.

Skidding.

READING, Pa., February 17.

Editor HORSELESS AGE:

I have read many views on the subject of the proper distribution of weight in an automobile to prevent skidding, but it appears to me the advocates of front and rear weight, respectively, are about as near right as the two boys, one of whom contended that a lobster was green, while the other said it was red.

My observations have shown me that the vehicle with the weight in front is equally subject to skidding as the one with the weight in the rear.

I have also found that a vehicle driven on the four wheels is more free from this skidding than one driven on either the front or rear wheels.

After viewing the question from all sides I have concluded that it is impossible to overcome this trouble, unless we could have all roads built with zigzag ruts.

Take the conditions as they exist, say with a carriage traveling 10 miles per hour. Here is a body weighing, say, 1,000 pounds, traveling at the rate of 880 feet per minute. Then attempt to turn that moving weight from a straight into a circular course, and that is where the trouble arises. That weight will have a tendency to go off on a tangent to the circle, and no matter on which end of the feather we fasten the bullet, we cannot shoot it around the corner. It would appear, therefore,

that tire construction has more to do with the question than weight distribution.

The smooth, flat surface of the pneumatic tire, on slippery asphalt or clay road, is very like the toboggan sleds we made when boys—by taking two barrel staves and nailing a block across each end. We would go very nicely in a straight line until we struck the slightest obstruction, when we would go spinning any old way, but always down hill or the way of the least resistance. F. D. LENGEL.

Grade Climbing in Snow.

READING, Pa., February 19.

Editor HORSELESS AGE:

"Facts are stubborn things" and "seeing is believing." On this account I send herewith a photograph which I term "A Study in Traction." It represents one of our four-wheeled phaetons in about 2 inches of snow on a 10 to 12 per cent. grade, just outside of our factory door and directly between the writer and his dinner. As you will see, both rear wheels are slipping without perceptibly moving the vehicle, showing that it is not lack of power but lack of traction which stops progress. The forward wheels are not frozen to the axle nor is there any invisible wire or other trickery about it. The light fall of snow had rendered the surface, which by the way is cobblestones, sufficiently slippery to allow the rear wheels to slip without driving the vehicle, and this is not an isolated instance either, for it has occurred almost every time this winter that fresh snow has fallen. As soon as the snow packs somewhat, the the tires can get a grip and then progress can be made, but with fresh snow or on wet ice or in mud that is thawing on top this condition is frequently met and is a stronger plea for more weight on the rear than pages of printers' ink.

The machine shown carries about five-sixths of its weight on those rear wheels which are spinning so freely. You can readily see, therefore, that other vehicles more heavily loaded in front would stand no show at all of climbing this grade.

The great trouble with motor vehicle builders and users is that they do not take their machines out in all weathers, and therefore do not know what is required and do not build a machine that is capable of meeting all conditions; and more cold weather education, as suggested in your last issue, would be of benefit to the industry. CHAS. E. DURYEA.

Sun and Planet Gear Patent Rights —Lava.

BOSTON, February 21.

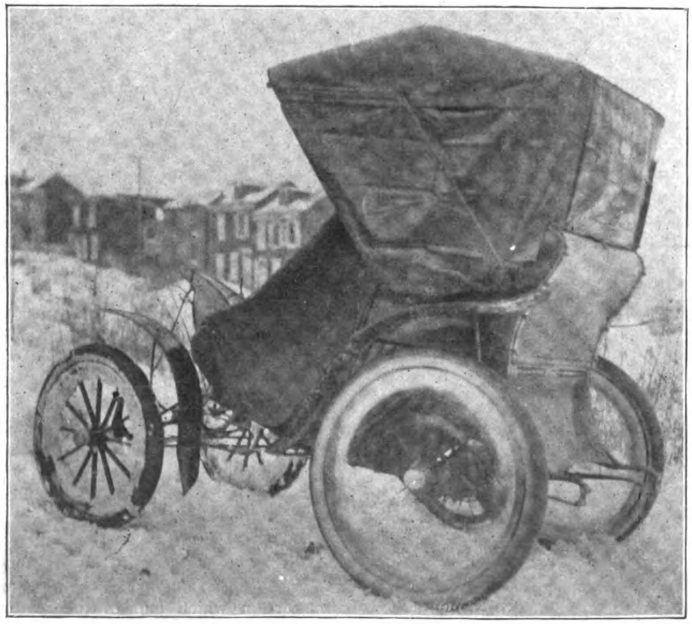
Editor HORSELESS AGE:

I see by your issue of February 19 that the Upton Company claim priority on the gear which they build. I had a gear of this description on a vehicle for over a year before their patent was applied for. Also, the drums that contained the pinions were held from rotating by a band brake identical with the Raymond brake. Some people came to my shop with blue prints of an engine, "only the outside," looking for a running gear. The next I knew about a year after the patent for the Upton gear was issued.

As far as sun and planet gears are concerned, they are great power chewers, as I found out to my satisfaction. In the one I had on the carriage the pinions were mounted on hardened and ground steel studs provided throughout with roller bearings. The gears were of tool steel and the whole case packed with vaseline. When building this gear I thought that the construction and method of lubricating was all that was required, but from experience I learned otherwise.

Your correspondent who asks where to obtain lava may write to the D. M. Steward Manufacturing Company, Chattanooga, Tenn. I have had bushings made there for spark plugs.

F. HEYMANN,



A STUDY IN TRACTION.

The Automobile "Road Hog" in Massachusetts.

LOWELL, February 22.

Editor HORSELESS AGE:

The prospect is good that Massachusetts within a short time will have a speed limit law for automobiles. Up to the present time all users of the highways have got along by observing the rule of the road and the familiar common law principle of due care. For the fact that automobile owners are now likely to be discriminated against and stigmatized as persons not to be trusted with privileges enjoyed by other users of the highway, the fraternity in Massachusetts is principally indebted to persons from New York who have gone up into Berkshire County and terrorized the whole community, practically driving horses from the roads, as testified to at a legislative hearing the 20th inst., and placing the life and limb of even pedestrians in the thickly settled parts of towns in danger. One prominent automobile owner was mentioned by name, and examples of his abuse of the privileges of the road given by men whose word was not to be doubted were cited, that brought out an instant disclaimer and condemnation from every automobile owner present—the room being crowded with them. Now in this part of the country it is not considered good form on the part of a person claiming to be a gentleman to willfully do things that discommode and annoy others. I believe that a public apology, coupled with a promise on the honor of a gentleman not to repeat the offense, is due from every one of these persons. The same remark applies also to a lesser number who have caused similar complaint among the residents of what we call the "North Shore" down in Essex County. Such action might yet be effective in at least modifying proposed drastic legislation now pending at our General Court. The legislative committee on roads and bridges appears to be governed by conservatism and good sense. Leave to withdraw has been given on a specially obnoxious measure providing for registration and numbering. An expression of regret from offenders whose action has caused complaint would probably do much to temper the Legislative's decision in affording relief to the sufferers. In the absence of it there will be simply nothing left but for other automobile users in

Massachusetts to combine and give all possible aid to the authorities in curbing the nuisances. My judgment of the spirit of the majority of automobile users in this State is that they are not in a mood under the circumstances to witness the forfeiture of the liberal privileges they and visitors from other States have enjoyed on Massachusetts highways simply because of the ruffianism of a small number of their own citizens and others who have persistently and maliciously, it appears in some cases, ignored the fundamental elements of common decency, propriety and equity on the road. R. T. HEMENWAY.

A Reply from Mr. Gibson.

NEW YORK, February 24.

Editor HORSELESS AGE:

Replying to the communication from J. A. Kingman, of the Locomobile Company, printed in your issue of last week, I shall undoubtedly continue to talk, as he surmises, having paid $2,400 to George E. Whitney, and about $1,500 to George M. Cruikshank, for that privilege.

While Mr. Kingman's letter gives the impression that my veracity is liable to be questioned by the public, I am perfectly willing to leave the issue to those who know the history of the production of the first practical steam carriage, or who care to learn the facts themselves.

All I wish to remark now is this: If Mr. Whitney had invented a steam vehicle before I went to him in June, 1896, and supposing him to be an honest man, why did he accept employment under me, to act as my workman in carrying out my ideas in the construction of my steam vehicle? He knew that I considered these ideas to be my invention, because I went to the expense of erecting a partition in his shop in order to ensure secrecy against outsiders. He accepted the most confidential trust extant—that of building from an inventor's designs—and when I asked him if he had any ideas of his own which would be useful in the proposed construction, and which I told him I would purchase, he said he had none!

Mr. Kingman's reference to a portion of my sworn testimony in the interference with Whitney and my letter to George Killam is artfully intended to indicate a contradiction, whereas the merest tyro in "understanding" who has studied the case will appreciate that on November 9, 1896, the date of the Killam letter, while I had learned of Whitney's statements that he was the inventor of the devices in my wagon, I could not believe he would have the audacity to dispute my title to patent rights. It is quite evident that if I had been imbued with fears of this nature I should have hastened the filing of my application for patent, which, as a matter of fact, I did not place upon record until February 8, 1897. Furthermore, notwithstanding my patent application had been officially allowed, I did not order the issue at once, as is usual when interfering applications are apprehended, but permitted it to lie in the Patent Office; so that when, on December 6, 1897, interference was declared between my application and an application for patent filed by Whitney on April 30, 1897, I was very much surprised. My testimony, given in the suit, was to the effect that this was the first notice I had received that Whitney had applied for a patent, or intended to apply for a patent, and was not, as opposing counsel sought to make appear by his bulldozing manner in cross examination, in contradiction of my knowledge expressed in the Killam letter.

Although defeated by Whitney in the interference suit on the single feature of the adjustable stay rod between the motor and driving axle, I still have ample confidence that the truth will finally prevail, and I shall have no hesitancy in defending my rights in the law courts whenever called upon to do so.

Meanwhile, so far as Mr. Kingman is concerned, I am not able to congratulate his company on the strength of its position in assailing other steam vehicle makers from behind the ramparts of the Whitney pretensions. C. D. P. GIBSON.

Gasoline Wagons Wanted by Real Estate Dealers.

WICHITA, Kan., February 19.

Editor HORSELESS AGE:

We have had a number of calls for a gasoline carriage capable of carrying from eight to sixteen persons, to be used by real estate dealers in showing farms to customers. The machine must be reliable and simple, and capable of making hills, and from 8 to 15 miles an hour on the level.

We have positive customers for the right machine. Can you give us address of anyone building such a carriage?

WICHITA AUTOMOBILE COMPANY.

Contact versus Jump Spark.

LAWRENCE, Mass., February 21.

Editor HORSELESS AGE:

Taking notice of many interesting articles in your valued paper and seeing the simple factor "the sparking of motors" causing so much comment, I would like to make a few remarks in regard to the letter by C. E. Duryea on page 238 of No. 8. He says: "'To secure the proper combination of parts is the trick.' This is where the fault lies. The primary system is almost as simple as piping water and there is no 'trick' about it. If the mechanical parts work and a current is furnished the parts will work and be free from mystery, worry or 'tricks' of any kind."

Now anyone being "acquainted" with piping water for motors and wiring for primary or secondary current will find the latter easier and less liable to leakage than water piping. It is also easier to remedy the wire leak than the water leak—considering the motors in normal condition, spark coils and igniters faultless—that is, as good as they can be bought at present in the market. Then there is no trick about it and the jump spark will be found the simplest and most reliable form for all speeds.

It is well known that the jump spark is preferred for extremely high speed, and if Mr. D. will consider the construction of the spark coil and its working he will agree that it is superior also for the slowest speed.

Mr. D. says: "If the mechanical parts work and a current is furnished the primary spark will work and be free from mystery or 'tricks' of any kind." Now there is certainly no mystery or tricks in the jump spark—for a fact, in neither of the two.

The greatest trouble in the contact spark is decidedly "the mechanical parts," which are quite complicated and need frequent attention and repairs. These troublesome "mechanical parts" are entirely omitted by using the jump spark, and are extremely simple in multiple motors where only one spark coil and one battery are used for all the cylinders. There is no need to mention the convenience of not having to look at the jump spark plug for many months, whereas the contact plug needs frequent attention. There is no doubt that the use of the contact spark will be a rare occurrence in the near future, and I feel certain that Mr. D., who deserves great credit for his valuable contributions, will be pleased with the simplicity and faithful performance of the jump spark even under quite adverse conditions. P. SCHNEIDER.

Throttle Control of Gasoline Engines.

BOSTON, February 22.

Editor HORSELESS AGE:

On most of the large gasoline carriages of European manufacture, particularly those using hot tube ignition, no other means than the governor is provided for controlling the speed of the motor. If the action of the governor could not be modified from time to time in order to change the speed of the carriage, it would either be necessary to change the gear or slip the clutch, neither of which is desirable. Hence an accelerator or governor control becomes very desirable, if not a necessity.

The reason for adopting a governor instead of a simple throttle for speed regulation was that with hot tube ignition regulation by throttle is so supersensitive as to be impracticable to any great extent. Besides, regulation by governor has the advantage of being more automatic than by throttle, and the "hit and miss" system has the additional advantage of great fuel

economy under light loads. On account of these advantages and of conservatism the governor has been retained as a speed controller, although the advent of electricity for ignition purposes has rendered much simpler devices quite efficient.

In America, however, the tendency seems to be to use a simple throttle to control the speed of the motor, and if a governor is used at all it is only to prevent the motor from attaining dangerous speeds. Under these circumstances it would seem that an accelerator would be unnecessary. In fact, it is doubtful under these circumstances if the advantages afforded by a governor are worth the additional complication.

HAROLD H. BROWN.

Brake Tests of the Brennan Motor.

CLEMSON COLLEGE, S. C., Feb. 21.

Editor HORSELESS AGE:

In this period, when there are numerous small gasoline motors on the market with high rated horse powers, it is gratifying to find a motor that comes up to the rating of its builders. Some time since I tested at the Clemson College engineering laboratory a 5 horse power double cylinder, air cooled motor, made by the Brennan Manufacturing Company, of Syracuse, N. Y. The results of this test I believe are of interest to the users of gasoline vehicles.

Before making the test the motor was taken apart and well cleaned. The weight and sizes of the various parts noted as follows:

Weight of motor, with flywheel, carburetor and gas piping...lbs.	149
Weight of flywheel.....	50
Diameter of cylinder.....in.	3 3-16
Diameter of flywheel.....	16
Stroke	4

The cylinders are on opposite sides of the shaft, with the pistons connected to cranks at 180° apart. The ignition is by jump spark, with shifting contact.

The flywheel was fitted with a prony brake, and the speed taken by a tachometer.

RESULTS.

Pull at Rim of Flywheel.	Speed.	Horse Power Delivered.
15 lbs.	400	.756
27 lbs.	800	2.72
30¾ lbs.	1000	3.87
31 4-5 lbs.	1300	5.2

The engine is well balanced, and has little if any vibration. The carburetor is deserving of special mention, as it gives a mixture that will start the engine on the first turn of the crank.

This engine has since been mounted on a vehicle weighing, with the engine and transmission, 760 pounds. It propels this carriage at the rate of 10 to 12 miles per hour on country roads.

ALBERT BARNES.

[At the lower speeds the engine was evidently running on the throttle.—ED.]

Anti-Speed Legislation in Massachusetts.

Three bills to regulate the speed of automobiles have been introduced in the Massachusetts Legislature recently.

One, fathered by Representative Collins, of Great Barrington, prohibits a speed exceeding 10 miles an hour within the limits of any city or fire district, or 15 miles outside such limits, on any public way; also that the selectmen of any town may limit the speed to 10 miles "in the business district or thickly settled district of their town," provided they post notices to that effect.

House bill 646 accompanies the petition of H. E. Warner and others. This requires the registration and numbering of all vehicles other than those propelled or drawn by animals or persons, except railway cars, within two months from the passage of the act, on penalty of from $10 to $100 fine.

Owners of such vehicles must file with the metropolitan park commissioners sworn certificates, showing description, motive power, capacity for speed, owner and residence of owner.

Every such vehicle must bear four plates, one on each side, one in front, and one in rear, bearing the number, registered with the commission. The plates are to be furnished by the comission and the numbers must be in Arabic and at least 4 inches high.

Sheriffs, deputy sheriffs, police officers and constables are charged with the enforcement of the law.

House bill 883 is fathered by Representative Donohue, of Fall River. It prohibits a speed greater than 8 miles an hour within city or town limits, or 15 miles outside such limits, on penalty of $50 fine or three months' imprisonment.

All these bills are before the committee on roads and bridges, and were considered February 13, but no opposition appeared and the committee considerately postponed the hearing so that it might be "properly advertised." The date of the postponed hearing has not yet been fixed.

The Thornycroft Rights in America.

In an interview with R. H. Thorpe and John Platt, comprising the firm of Thorpe, Platt & Co., agents of the Thornycroft Company in the United States, these gentlemen emphatically denied the statements that have been appearing of late in the automobile press to the effect that Ralph L. Morgan, of the International Motor Car Company, has bought all the drawings and data on the Thornycroft truck, and procured an option on a full-sized working model.

As a matter of fact, the Thornycroft Motor Wagon Company of America, which is about to be incorporated by Messrs. Thorpe and Platt, will have absolute and exclusive control of the patents, good will, improvements and rights of the Thornycroft Steam Wagon Company, Limited, of England in the United States of America and her possessions. Messrs. Thorpe and Platt further say that no rights whatever have ever been given or assigned to any other person or corporation in America.

Colonel Pope, vice-president of the American Bicycle Company, in an interview said that his company had sold to Ralph L. Morgan a Thornycroft truck and the drawings of the same.

Damage Suit Turning on Insurance Liability.

Gibson Howard, Buffalo, N. Y., has brought suit for $5,000 against the Mobile Company of America.

Last August the Mobile Company occupied the barn and other buildings at No. 71 Cary street, owned by the plaintiff, as an automobile station. At midnight the buildings took fire and were damaged to the extent of $4,000. The Buffalo Association of Fire Underwriters has made a ruling that certain policies shall be void if gasoline is kept on the premises. The burned building was one of the places in which the insurance policy would not permit gasoline to be kept. The plaintiff claims that in renting the place the tenant agreed to conform to these rules of the underwriters. He was unable to collect any insurance, the underwriters holding that the terms of the policy were not lived up to.

The plaintiff claims that at the time of the fire his tenants, in violation of their lease agreement, had upward of 25 gallons of gasoline in the place, and that they were responsible for the fire, inasmuch as it was caused by gasoline fumes being ignited by a gas jet while the employees of the tenants were engaged in filling the tank of an automobile.

Canadian Touring Privileges Refused.

The Treasury Department has refused the petition of the Automobile Club of America for reciprocal regulations in regard to the transporting of touring automobiles across the Canadian border, on the ground that it would be detrimental to the revenues of the United States. The department consented, however, to allow automobiles whose owners were well known to the authorities to be taken across the border for a trip of two or three days' duration, and called attention to the fact that under the present statute automobiles of domestic manufacture might be taken over and returned free of duty.

The Cocks Bill.

The Cocks Automobile bill was taken up for final passage at Albany last Thursday. By a narrow majority it was amended so that violation of the act, instead of being

punishable as a misdemeanor, shall be punished by a fine of $50 for the first offense, and by a fine of $50, or imprisonment for six months, or both, for the second offense. This is the amendment advocated before the committee by President Shattuck, of the Automobile Club of America.

Senator Cocks proposed an amendment providing that the limit of speed outside of cities and towns should be 15 instead of 20 miles an hour, which was carried.

George F. Chamberlin states regarding the Cocks bill that the matter is in such shape that there will be an opportunity for further consideration on the provisions of the bill before it is finally passed by the Legislature. He hopes the automobile public may succeed in having the original amendment prevail, namely, the legality of a speed of 20 miles on country roads.

Joins Locomobile Company in Steam Patent Litigation.

It is reported that John Brisben Walker, of the Mobile Company of America, has united with the Locomobile Company in acquiring the rights to the Whitney steam carriage patents, and it is further said that he has agreed to pay $125,000 within a period of three years for his interest.

Call for the Chicago Meeting of Automobile Clubs.

The joint call of five of the leading automobile clubs for the meeting to be held at Chicago during the show has been sent by President Donald to the various clubs under date of February 21. It reads as follows:

DEAR SIR—It being the consensus of the undersigned bodies that an interdependent federation of regularly organized and active automobile clubs of the United States is essential to the development, introduction and use of motor vehicles, after due consideration it was decided to unite in an invitation to all active clubs, to be represented by two delegates each in a convention to be held in the rooms of the Chicago Automobile Club, Coliseum Building, Chicago, March 3 and 4. The meeting will be called to order at 11 o'clock a. m., 3d prox.

The contemplated premises for organization are, briefly, that all regularly constituted and active automobile clubs of acceptable repute be eligible to membership on an equitable basis of representation in all deliberative matters within the purview of the federation.

Conventions to be held annually in the East and West, alternately.

An executive and other standing committees to be instituted. It is proposed that the executive body meet once each calendar month.

The practical objects which it is believed may be attained by club co-operation are:

Enactments of liberal laws regulating the use of automobiles on public highways.

Protection of the legal rights of users of motor vehicles.

Improvements of public highways.

Development and introduction of the automobile.

Equitable regulation of automobile racing and trials of endurance and efficiency.

A medium for counsel and interchange of information, ideas and suggestions tending to the development and advancement of the art.

Delegate representation from your club is respectfully solicited.

The Central and Western Passenger Associations, comprising railroads operating in the Middle Western States and in the territory west of the Mississippi River, to and including Cheyenne and Denver, respectively, will return delegates to the convention at rate of one-third of the fare paid for going passage, provided they request from the ticket agent at the time of purchasing tickets certificates indicating their intention of attending the meeting. Requests have been made for like concessions from the New England Association, covering New England States; Trunk Line Passenger Committee, embracing railways operating in the States of Pennsylvania, Maryland, New York and New Jersey, and the Trans-Continental Passenger Association, covering territory between the Pacific Coast and the 100th meridian.

You will in due course be advised in event of favorable action by the several passenger traffic organizations referred to.

If the project is favored by your club, kindly as promptly as practicable communicate the names of your delegates to Mr. F. C. Donald, President Chicago Automobile Club, Chicago, Ill.

Yours very truly,

THE AUTOMOBILE CLUB OF AMERICA,
THE PHILADELPHIA AUTOMOBILE CLUB,
THE LONG ISLAND AUTOMOBILE CLUB,
THE RHODE ISLAND AUTOMOBILE CLUB,
CHICAGO AUTOMOBILE CLUB.

LONG ISLAND DELEGATES.

President William Wallace Grant and A. R. Pardington have been chosen delegates to represent the Long Island Automobile Club at the Chicago conference. L. R. Adams and F. B. Webb were named as alternates.

Catalogues Received.

Parts and Sundries.—Chas. E. Miller, 101 Reade street, New York city.

Ball Bearings.—The American Ball Bearing Company of Cleveland, Ohio.

Steam Carriages for Business and Pleasure.—Stearns Steam Carriage Company, Syracuse, N. Y.

Westfield Automobiles and Parts.—C. J. Moore Manufacturing Company, of Westfield, Mass.

The Marsh Motor Cycle.—Motor Cycle Manufacturing Company, Brockton, Mass.

Circular on "Apple Igniting Dynamos with Governors."—Dayton Electrical Manufacturing Company, Dayton, Ohio.

MINOR MENTION

The Tivy Manufacturing Company, Williamsport, Pa., are turning out an $800 steam carriage.

The Royal Motor Cycle Company has removed from Chicopee Falls, Mass., to New York city.

The Newport Engineering Works, Newport, R. I., has secured the local agency for the locomobile.

Clark G. Coats, Sioux Falls, S. Dak., is in the East investigating automobiles for public use in his city.

The Iowa Automobile bill, printed in our last issue, has passed the House in a slightly amended form.

The Beardsley & Hubbs Manufacturing Company, Shelby, Ohio, has increased its capital stock to $150,000.

A. H. Todd is organizing a company to operate motor stages between Griffin's Corners and Fleischmann's Station, N. Y.

W. H. Haddon, superintendent of the Mobile Company's factory almost from the beginning, has severed his connection with the company.

The Gray Manufacturing Company, Burlington, N. J., has incorporated under New Jersey laws to manufacture "bicycles, automobiles and machinery."

F. X. Mudd, F. M. Brinckerhoff and J. B. Burdette have been appointed by President Donald, of the Chicago Automobile Club, to take charge of the contests which will be held during the show.

Alexander Fischer, formerly superintendent of the Automobile Company of America, has opened a storage and repair depot at 239 West Fiftieth street, New York city. W. B. Raymond is in charge.

The Wright Taper Roller Bearing Company recently organized at Buffalo, N. Y., has elected the following officers: President, Lewis J. Bennett, of the Buffalo Cement Company; vice-president, James P. Wood; secretary, Albert G. Thorne; treasurer, Eugene A. Georger.

The Brush patent, owned by the Electric Storage Battery Company, of Philadelphia, has again been sustained. Judge Lacombe, sitting in the United States Circuit Court for the Southern District of New York, recently granted an injunction restraining the Porter Battery Company, of Chicago, Ill., from the manufacture, sale or use of storage batteries infringing the Brush patent.

The Dayton Electrical Manufacturing Company have issued a circular in which they refer to the suit brought against them by the Motsinger Device Manufacturing Company, and state that they will defend all users and purchasers of their machines against all comers. They also reproduce a letter from Forée Bain, a Chicago patent lawyer, to the effect that

their governor does not infringe the Motsinger patent 642,869.

The United States Department of Agriculture has just issued a bulletin on "Earth Roads" (No. 136).

Ward Decker, E. R. Hinkley and Stuart Darrow, Owego, N. Y., are building three automobiles for local use.

The United States Mobile and Power Company, Worcester, Mass., is in the hands of the mortgagee, G. H. Whitcomb.

Dr. Joseph H. Desmarais, Bristol, Conn., in collaboration with his brother, is reported to have perfected a gasoline automobile motor.

The De Dion-Bouton Motorette Company, Brooklyn, N. Y., are reported to have paid off over $14,000 in judgments during the past few days.

Charles E. Miller writes in answer to a communication appearing in our last issue that he is able to furnish lava for sparking plugs in any quantity.

March 3 and 4 have been named as the dates for the convention of automobile clubs which is to be held at Chicago for the purpose of forming an association.

According to the *Sphinx*, a newspaper published at Cairo, Egypt, motor 'buses are being employed there to show tourists the sights of the city and surroundings.

H. C. Baxter, Brunswick, Me., who inquired about Southern roads through our "Communications" recently, writes from Savannah, Ga., that he finds the roads thereabout excellent.

Edward W. Pope, formerly with the Pope Manufacturing Company, has purchased an interest in the Robinson Motor Vehicle Company, Hyde Park, Mass., and assumed the office of treasurer.

The Maxwell Engineering Company, Rome, N. Y., has secured the selling agency for the Rivett clutch for the automobile trade, manufactured by the Faneuil Watch Tool Company, Faneuil, Mass.

Sydney W. Elston and Everson Stout were severely injured at the Indianapolis show last Saturday by falling off the incline in an automobile to the floor 22 feet below. The machine struck bottom up.

The Golden State Automobile Company has been organized at San José. Directors: M. M. Barngrover, Le Roy Bean, H. W. Lupton, P. W. Bettinger and L. B. Ballery. Capital stock, $50,000; subscribed, $50.

The Seashore Automobile Company, 27 Third avenue, Long Branch, N. J., has been organized with $125,000 capital by Hartwig I. Phillips, John W. Flock and Harry S. Slocum to introduce motor vehicle transportation at the beach.

The C. J. Moore Manufacturing Company, Westfield, Mass., has been incorporated under Massachusetts laws with a capital of $35,000, all paid in. C. J. Moore is president, James Noble, Jr., vice-president and John M. Sauter treasurer. The company will manufacture the "Westfield" steam automobile in five styles, ranging in price from $1,000 to $1,800, and a general line of automobile parts. The "mechanical" tire invented by President Moore will be used instead of pneumatics. A factory 50x200 feet will be erected this summer.

The Holyoke Automobile Company, Holyoke, Mass., are building a tonneau with a carrying capacity of four to six passengers which will weigh about 200 pounds complete, and will be entered in the Long Island Endurance Run if it can be finished in time.

Last Wednesday a verdict of $280 was given by a jury at Mineola, L. I., against C. H. Mackey, a wealthy resident of Roslyn, L. I., whose automobile had scared a team of horses belonging to Samuel Goldberg, the plaintiff, and caused them to run away. Goldberg sued for $368.

Bids will be opened on February 26 for a five, eight or ten year franchise to operate pleasure motor vehicles between Gordon and Wade parks, Cleveland, Ohio. Automobiles large enough to accommodate from fifteen to twenty-five people will be used and the fare charged will be 5 cents.

The Knox Automobile Company, Springfield, Mass., inform us that they are now working two shifts of men and producing four carriages a week. Arrangements are being made to turn out one machine per day. The company recently sold eighteen four-wheelers in Boston, and has booked orders for about fifty machines all told.

Several of the exhibitors at the Indianapolis Automobile Show which opened Monday ran their machines overland to Indianapolis. Among these were the Haynes-Apperson Company, the Union Automobile Company, of Union City, Ind., and the Rea Machine Company, of Rushville. The present management have incorporated and will give a show annually.

A. D. Proctor Smith, Carlton Mabley, Emerson Brooks, William C. Reick and Jerome B. Haynes have incorporated the Charron, Girardot & Voigt Company of America, with $500,000 capital, $100,000 preferred and $400,000 common stock. The principal office of the company is at Monticello, Sullivan County, N. Y., and the place of business is at 713 Seventh avenue, New York city, where Smith & Mabley have heretofore done business under that name.

The Fisher Automobile Company, of Indianapolis, have filed a suit against the American Bicycle Company for $125 damages, alleging that they ordered a 40-volt rheostat of the defendant, and instead an 80-volt rheostat was delivered, and when it was used to charge an automobile the batteries were burned out and the plaintiffs were put to an expense of $125 in making the necessary renewals. The plaintiffs allege that they did not discover that an 80-volt rheostat instead of a 40-volt had been sent them until the batteries in the automobile were burned out.

NEW VEHICLES AND PARTS.

The Foster Exhibit at Chicago.

The Foster Automobile Manufacturing Company's exhibit at the Coliseum in Chicago will consist of one light roadster, one standard touring wagon, one four-passenger surrey and a heavy speed car.

The light roadster has been brought out to meet a popular demand for a carriage somewhat lighter than the company's touring wagon, but possessing its characteristics of speed and durability.

The centre of gravity has been lowered about 12 inches and the wheel base lengthened to 72 inches. By the use of straight front and rear axles and half springs, rigidly attached to the steel frame which supports the machinery, the construction has been simplified. By omitting the front and rear arches and reaches considerable weight has been saved, it is claimed.

The engine, the company's regular enclosed self-oiling type, is on the left of the carriage, and the chain passes back to the spur compensating gear without interfering with the burner. This construction permits the boiler being hung very low and of the use of a deep burner for securing perfect combustion before the gases enter the boiler flues.

The front hood is hinged to the toe board and parts from the body along the inclined rail shown in the cut. It contains two 5-gallon seamless steel tanks tested to 400 pounds pressure, which can be used for air or fuel at the discretion of the driver, and both may be filled if necessary. Air pressure is maintained by the engine and the gasoline vapor is passed through a fire regulating device giving the advantages of both automatic and hand control.

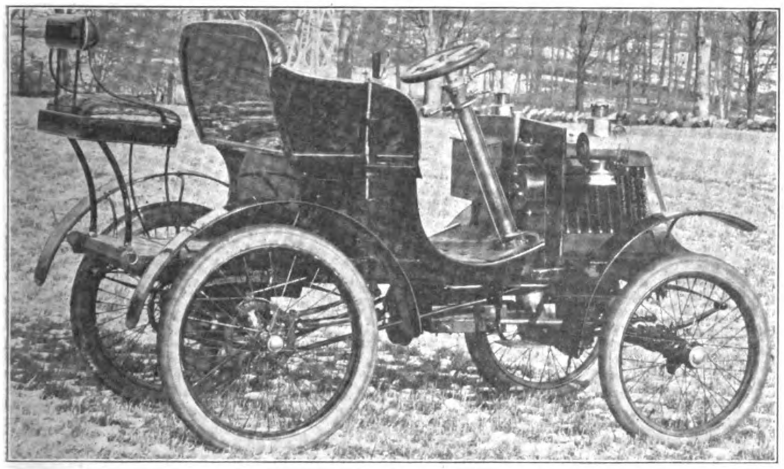
Side steering is used and this machine is fitted with a new and powerful double acting brake.

The water capacity is 25 gallons.

On account of the long wheel base and low centre of gravity the machine, it is claimed, can be handled with the utmost ease at high speeds, and the reduction in weight, while maintaining the same strength of parts, makes the high speed not only possible but safe.

The Knickerbocker Car.

The illustration herewith shows the "Model 1" of the Ward Leonard Electric Company, of Bronxville, N. Y. It is built on French lines, having a vertical motor in front under a bonnet and chainless transmission to the rear axle by a shaft with universal joints. The transmission gives three forward speeds and a reverse and drives direct on the high speed. Other features are the thermo-siphon circulation, the inclined wheel steering and the hub brakes. In one respect this vehicle differs from the general design of French light carriage—it has full elliptic



KNICKERBOCKER MODEL NO. 1.

springs, instead of semi-elliptics, and very easy riding is claimed to be the result of this method of suspension.

A rumble seat is attached to the rear of the body. The maximum speed on the level is claimed to be 30 miles an hour, and the mileage with one charge of supplies 125 miles.

Milwaukee Steam Carriages at the Chicago Show.

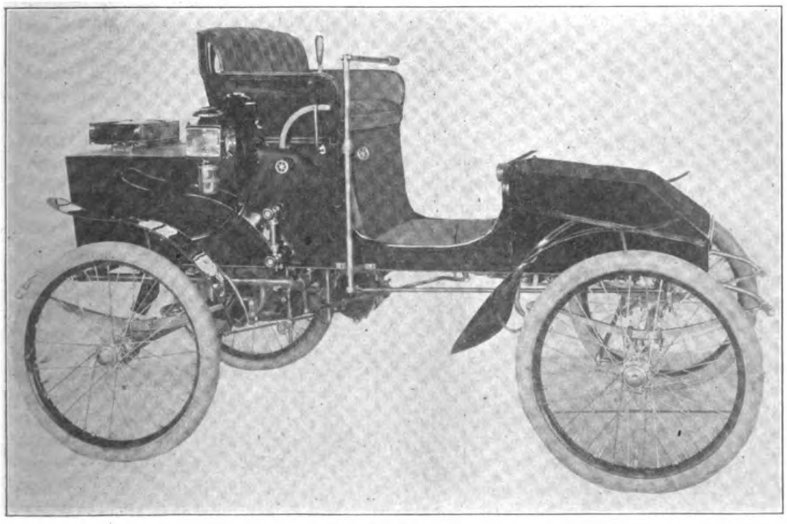
At the Chicago Show the Milwaukee Automobile Company will exhibit a line of its 1902 models, comprising pleasure and commercial vehicles. The exhibit will include a heavy touring car, designed to compete with heavy gasoline vehicles of American and European manufacture, and a mail delivery wagon, designed specially for the use of rural carriers.

The exhibit will be in charge of J. H. Dousman, assisted by W. C. Eldridge, the company's Chicago sales agent, and a corps of operators from the Milwaukee factory. The space taken covers a segment of the speeding track at the south end of the building 18x30 feet in area.

The Devantery Oil Can.

Frank F. Weston, of 83 Chambers street, New York, is placing on the market the Devantery oil can which we illustrate herewith. The can consists of an oil reservoir, an oil pump, a spout and a cock. To fill the can—which has a capacity of one quart of oil—the cap is removed by unscrewing. As soon as the can proper is filled the cap is replaced and the pump worked a few strokes. As soon as the cock is opened the lubricant will flow from the spout in a stream, the velocity of which can be regulated by the cock. Naturally, the cock has a tube fitted to it that almost reaches the bottom of the reservoir, so that practically every drop can be forced from the can.

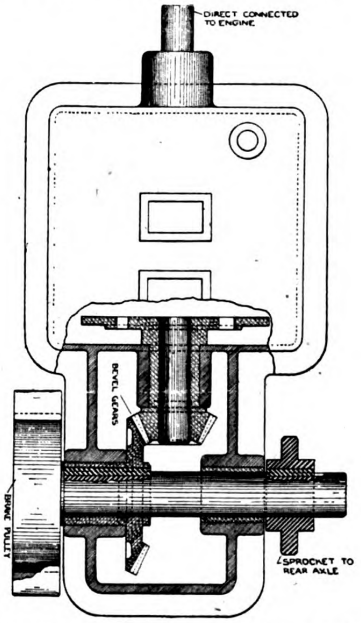
This can is specially adapted for the filling of oil cups and ought to prove convenient when replenishing the supply of oil in gasoline engines equipped with splash lubrication. In cold weather oil will not flow well from the ordinary can, and is liable to be spilled when the lid is removed and the can tipped up to increase the flow.



THE NEW FOSTER ROADSTER.

Dyke's Transmission Gear.

The sketch below shows the transmission gear designed by A. L. Dyke, of St. Louis, for his new vehicle, with motor in front. The change gear shafts run fore and aft of the vehicle, and as the power



is transmitted to the rear axle by a chain, a pair of bevel gears is required to drive a transverse shaft from the longitudinal transmission shaft. This transverse shaft carries the bevel gear inside the casing and a sprocket and a brake outside the casing on the two sides respectively.

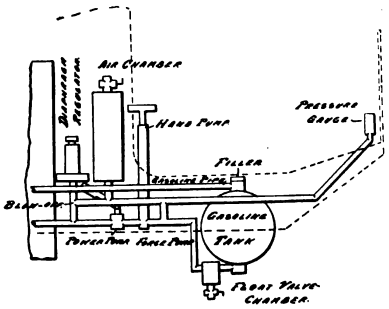
Trufant's Fuel Supply System for Steam Carriages.

W. E. Trufant, of Whitman, Mass., has designed a new system of fuel supply for steam carriages for which he informs us a patent has been allowed. The sketches

below show the general scheme of piping when one or two tanks are used. The system is based on the fact that water is safe and easy to handle in a pump, is heavier than gasoline and will not mix with it.

Water is pumped into the gasoline tank and the fuel taken from the top of the tank. There is a diaphragm regulator and an air dome between the pump and the tank, to regulate the pressure, so that there is no attachment in the gasoline pipe except the usual diaphragm regulator.

Water will not absorb the air in the air dome and any leaks anywhere except in the gasoline pipe are water leaks and are of no consequence, until they become so great that the pump cannot maintain the proper pressure. In case of a leak in the gasoline pipe only so much would run out as would relieve the pressure in the small

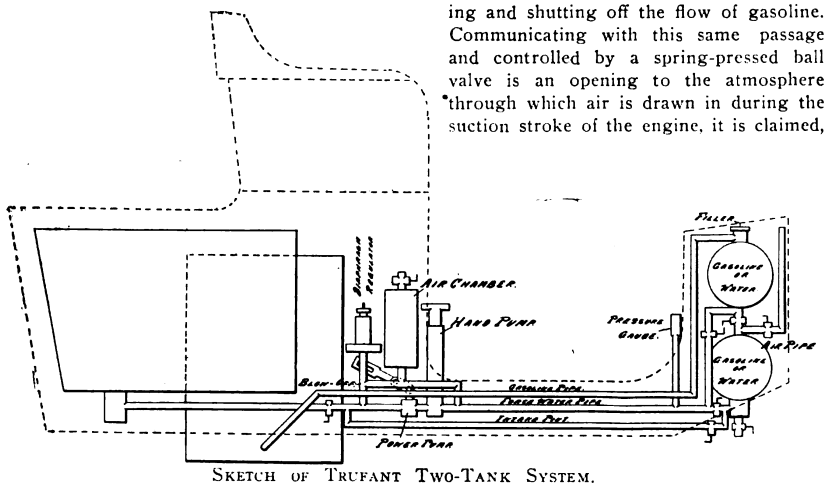


air tank, for the gasoline pipe comes from the top of the tank.

Where one fuel tank is used the fuel is pumped from the carriage water tank into the fuel tank, and when the fuel tank is filled the water is let out through the float valve at the bottom of the tank. This float sinks in gasoline and shuts when the water has run out. When two tanks are used they may both be filled with gasoline when taking long trips; but in ordinary running the lower one is filled with water, and this is pumped into the upper tank, so that when the upper tank is to be filled with gasoline all that needs to be done is to open the valve between the two tanks and let the water that has been pumped back into the lower tank.

The valves shown in the sketch with two tanks are to be used when water is pumped from the carriage tank into the lower gasoline tank, and then the water taken from the lower gasoline tank and forced into the upper gasoline tank.

Mr. Trufant has been using this system in his own carriage for several months, and states that he has found no objections to it, but that his mileage has increased at least 10 per cent., owing probably largely to the better fire caused by the more even pressure on the fuel and to higher steam pressure.



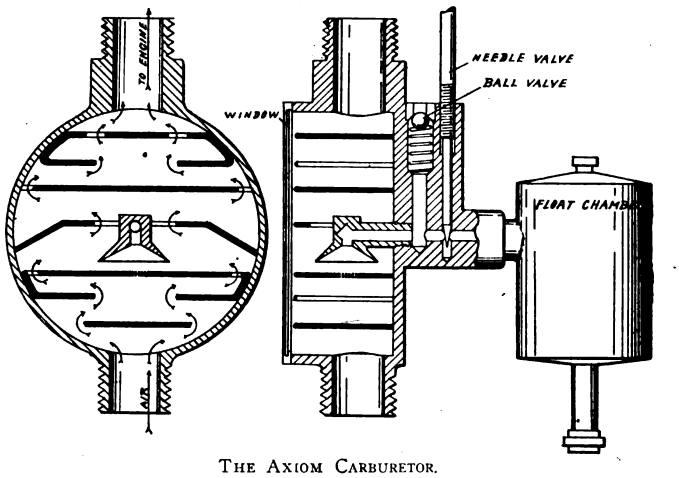
SKETCH OF TRUFANT TWO-TANK SYSTEM.

The Axiom Carburetor.

The chief point of novelty in this carburetor is that the process of vaporization can be observed through a transparent front cover to the vaporizing chamber. The carburetor is of the constant level, float feed variety, the float in the separate float chamber being of the usual construction. In the passage from the float chamber to the vaporizing chamber is inserted a hand-controlled needle valve for regulating and shutting off the flow of gasoline. Communicating with this same passage and controlled by a spring-pressed ball valve is an opening to the atmosphere through which air is drawn in during the suction stroke of the engine, it is claimed, with which the gasoline mixes even before it reaches the vaporizing chamber.

The gasoline enters the vaporizing chamber through a spout with a downwardly projecting conical opening resembling the form of an umbrella. The vaporizing chamber is of cylindrical form arranged with the two bases vertically. The air is drawn in through an opening below and the mixture leaves through an opening on top. In the cylindrical vaporizing chamber are placed strips of 1-16-inch sheet brass so arranged that the air in passing through the chamber has to follow a circuitous path, as indicated in the drawing by arrows, which aids in the spraying and vaporizing of the gasoline and its mixing with the air. A number of fine holes are drilled through the plate or strip of brass directly below the "umbrella."

When the carburetor is in operation the mist of gasoline can be observed in the compartment in which the "umbrella" is located at each suction stroke of the engine.



THE AXIOM CARBURETOR.

This carburetor is made in various forms and sizes from ½-inch pipe connection up, by the Axiom Carburetor Manufacturing Company, of 106 East Twenty-eighth street, New York city.

Suit Against the Lead Cab Directory.

The suit brought by Richard Seigman, through his attorneys, Colt & Howell, against the directors of the Electric Vehicle Company for alleged illegal dividends had a hearing before Vice-Chancellor Pitney in the Chancery Court in Newark, N. J., last Thursday, February 20.

The amount involved is $800,000, which the plaintiff asks that the directors be compelled to pay back into the company's treasury.

Corbin & Corbin, attorneys for the defense, asserted that the action was not properly brought, and that if actionable the case should be tried in a court of law.

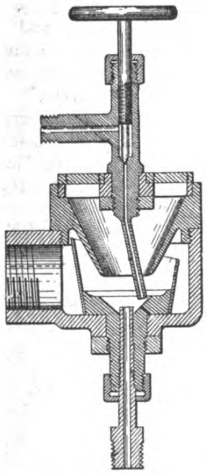
Briefs will be submitted.

MOTOR VEHICLE PATENTS ∴ ∴ OF THE WORLD ∴ ∴

United States Patents.

693,462. Combined Carburetor and Gasoline Regulator.—John C. Titus, of Marion, Ohio. February 18, 1902. Filed August 28, 1901.

This device comprises a hollow carburetor body having a horizontal outlet, a gasoline cup disposed in the base of the body and having its rim disposed inwardly



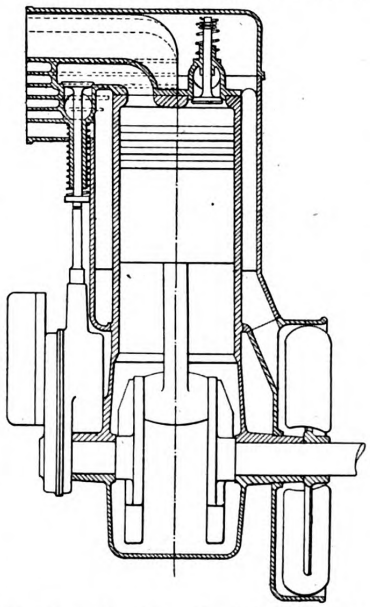
away from the wall of the body and having a rim portion at and as high as the outlet; a top to the body, having a portion projecting down into it and concentrically within the gasoline cup has a funnel shaped air opening vertically through it; a gasoline nozzle is arranged to deliver into the gasoline cup, and a valve controls the flow through the nozzle.

If the gasoline valve be opened and a quantity of gasoline be allowed to enter the cavity and then a drait of air be drawn through the air opening and the outlet, the air entering the carburetor will impinge downwardly upon the gasoline in the cavity and will evaporate it, the mixture passing over the rim and out at the outlet. If the rim were of uniform height around the base of the air opening, the flow of air would be favored by the outlet, and the attack of air upon the gasoline would be somewhat one-sided in the cavity, thus interfering with the perfection of the carbureting. By giving the front of rim a superior elevation the influence of the outlet on the air current is neutralized, and there is a fairly concentric attack of the air upon the gasoline.

It is found in practice that in using this carburetor, if the air inflow to the air opening is unrestricted at the time of starting the engine, some difficulty arises, which is removed by temporarily throttling the air inflow. This is done by partially closing the register valve when starting the engine, the valve being later fully opened.

As thus far considered the bottom of gasoline cavity has been assumed as stopped up. This would require very accurate and delicate adjustment of the gasoline valve in order that the amount of gasoline delivered in the cup should be just right for each charge; but by the use of an overflow pipe the charge of gasoline in the cavity is received around the upwardly projecting end of the pipe, the surplus overflowing through the pipe. By adjusting this pipe vertically the retained charge may be adjusted to a nicety, quite regardless of any delicate adjustment of the gasoline valve. The sidewise deflection of the gasoline nozzle prevents the flow of gasoline directly downward into overflow pipe.

693,529. Cooling Explosive Motors.—Thomas Myers, of New York, N. Y.



February 18, 1902. Filed February 14, 1900.

A system of forced air cooling, which is well described by the single claim:

In an explosive motor, the combination of a cylinder, a plurality of ribs extending longitudinally upon the same, a jacket surrounding the cylinder and provided with an air inlet near the exhaust, an annular space arranged between the jacket and the cylinder surrounding the lower part of the latter below the ribs, a fan mounted upon the crank shaft to rotate therewith, a casing for said fan, and a passage communicating from the aforesaid annular space to said fan casing; together with ribs upon the head of the cylinder surrounding the exhaust passage, said ribs being arranged to deflect a current of air into the passage existing between the various longitudinal ribs.

693,577. Universal Joint.—Alexius Vivinius, of Brussels, Belgium. February 18, 1902. Filed March 6, 1901.

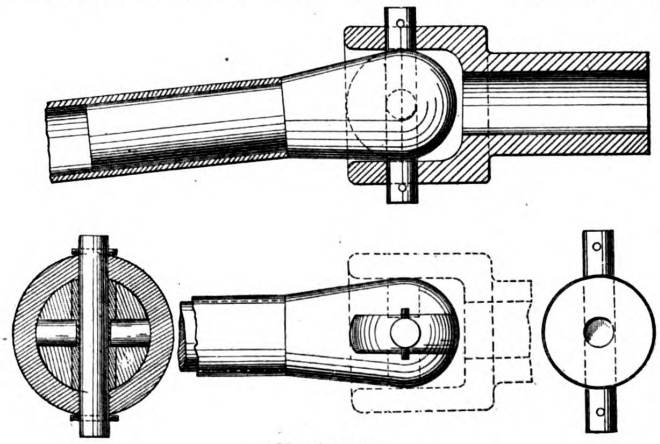
The universal joint, serving to connect two sections of a shaft, comprises a hollow cylindrical sleeve made of forged steel and secured to the end of one section and in line with the same. The enlarged end of this hollow socket receives the rounded head of the second shaft section. This rounded head is provided with a large and deep grove, in which may rotate a swivel, formed of a spherical segment and rotating on a pivot pin extending diametrically through the walls of the socket and held in place by means of small transverse pins.

It will be understood that when the head oscillates on the swivel friction is produced over the entire flat surface of the swivel. When the oscillations are produced in a plane at right angles with the above oscillations, the friction will be distributed over the entire length of the pivot. The improved construction will therefore reduce the wear and tear of the engaging parts to a minimum.

Longitudinal movements of the head may be avoided by means of pins screwed into it and engaging corresponding recesses provided in the sides of the swivel.

693,591. Automobile.—George O. Draper, of Hopedale, Mass. February 18, 1902. Filed August 2, 1901.

Refers to body construction. The objects of the invention are to provide the body of an ordinary motor-vehicle with a movable rear compartment, having seats



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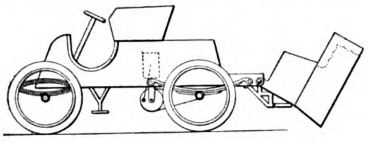
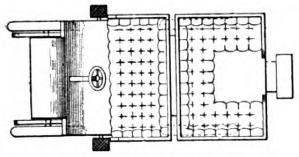
therein which can accommodate four or more extra passengers and to provide a front seat for three instead of two. These

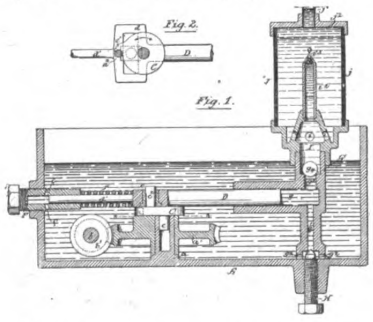




objects are accomplished by widening the foot rest and seat portion of the body of the vehicle, so as to provide the same with overhanging portions which extend beyond each side of the vehicle body proper, the foot rest portions extending over the front wheels and taking the place of the usual mud guards. The steering device can be placed centrally of the seat, so that the person riding in the centre can do the steering.

To the rear of the body of the vehicle is connected in some suitable way a rear compartment, which when in operative position covers the rear portion of the main body, this rear compartment having overhanging portions which stand out over the rear wheels. The rear compartment is provided with an entrance way at its rear end and seats surrounding the other three sides thereof, the compartment being of such a size as to accommodate four or more persons.

693,727. Oil Pump.—Wilhelm A. Maybach, of Cannstadt, Germany. February 18, 1902. Filed March 28, 1901.



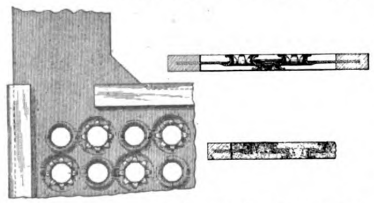
Refers to a pump for forcing lubricant to various parts of a machine.

Oil is placed in the reservoir A, and the cup J is almost entirely filled with water, the same being retained therein by a ball valve. On turning the shaft *b* the worm thereon causes the worm wheel to revolve on its bearing, and the pin a^2, which projects from the upper face of the hub of the worm wheel, engages the projection *c'* of the crank C. At the beginning of the suction stroke of the pump this pin a^2 is in a position 180° distant from that shown in Fig. 2, and the continued revolution of the shaft *b* causes a relatively slow movement of the pin and of the crank, which is made to turn in a direction indicated by the arrow in Fig. 2. During this suction stroke oil is slowly drawn into the pump cylinder, the cross sectional area of the opening into the latter being regulated by the valve H. As soon as the pin has caused the projection of the crank to pass over a dead point situated in the long axis of the plunger D the spring causes the plunger to move suddenly forward, the crank being moved 180° almost instantly, since the block *e* slides in the guides of the part D and transmits motion of the plunger to it. As the worm wheel continues to revolve, the pin a^2 comes up to and engages the projection *c'* and commences another stroke.

During the suction stroke of the pump oil is drawn into the cylinder *g* during a comparatively long period of time, and during the expelling stroke of the pump the plunger endeavors to force this oil out of the cylinder in a very much shorter time. The suction passage is so proportioned as to make this impossible, and the ball valve is lifted and part of the oil escapes into the chamber I. Some of the water in this chamber is displaced thereby, and flows out of the opening *i i* to the interior of the cup J and the oil enters the tube i^2, escaping from the orifice i^3 thereof in globules, easily visible through the glass sides of the cup. As the pump continues to operate oil collects in the upper part of the cup, and finally filling the same flows out under pressure to the bearings or other mechanism to be lubricated. It will be seen that the amount of oil forced from the pump cylinder into the chamber I at each stroke may be varied by the valve H, since the amount of oil flowing back into the reservoir through the suction passage depends upon the area of the opening at the valve end of the passage and upon the amount of the compression of the spring *f*, and this may be varied at will by screwing the bearing plug F in or out.

693,757. Storage Battery.—William Taylor, of Philadelphia, Pa. February 18, 1902. Filed July 28, 1900.

Refers to a battery which shall be "comparatively very light, yet mechanically strong in proportion to its electrical capacity." A thin sheet of lead is torn or punctured to form a series of openings. During the puncturing or tearing tangs



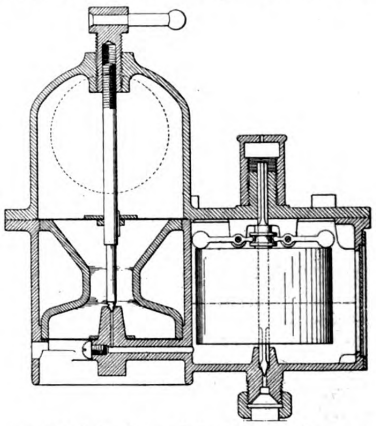
or prongs are formed, which are pointed at their ends and project from opposite faces of the sheet. The points of these tangs are bent inward toward the sheet, and the portions of the sheet adjacent to the shanks of the prongs are offset from the points of the same, and form retaining pockets.

The support may be manufactured by first punching the sheet lead, and thereby producing pointed prongs flaring outwardly from each other, with their points sticking upward, and then subjecting the sheet to pressure, whereby the points are turned downward and the offset pockets are produced. The presence of the retaining pockets and the fact that the points are directed inward toward the sheet insure firm and proper electrical and mechanical contact between the sheet and the active material. Grooved strips of hard rubber are applied to the edges of the plate in order to impart to it mechanical strength, and the faces of the strips lie substantially flush with the bent portions of the prongs.

Strips of hard rubber also serve to protect the portions of the lug which are exposed to the surface of the acid or electrolyte.

693,773. Carburetor for Explosive Engines.—Arthur F. Bardwell, of Mount Vernon, N. Y. February 18, 1902. Filed October 20, 1900.

A constant level carburetor in the vaporizing chamber of which is located a detachable bushing having a contracted neck and flared at its upper end; a valve seat is located even with the lower portion of the neck and a screw valve carried by the cap plate and guided by the bushing is arranged to rest upon the seat and



to control the flow of liquid from the gasoline chamber to the carbureting chamber. Wire gauze screens are placed over both ends of the bushing.

693,365. Power Transmitting and Braking Device.—John C. Blevney, of Newark, N. J. February 18, 1902. Filed March 13, 1901.

The rear axle is a driving or differential axle. Its two parts have attached to them at their inner ends brake wheels on which spur teeth are cut, internally on one wheel and externally on the other. An intermediate driving wheel carries brake flanges and compound pinions engaging the spurs; a brake strap is adapted to engage the brake wheels and driving wheel.