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Some Jigs and Special Tools for Automobile Manufacture—I.

By Robert G. Pilkington.

There was a day, not long past, when a motor car manufacturer could sell almost anything that would run. The novelty of the new means of locomotion was so great that cars could not be turned out fast enough to supply the demand. Changes in design were so frequent that little thought was given to interchangeable manufacturing beyond that necessary to secure a large output. Small tools, fixtures, jigs, etc., were only supplied in crude form, and in as few cases as could be made to serve.

Happily for all concerned this day is past. Owing to a healthy increase in competition, an approximate standardization of design and an educated public, no manufacturer of note now cares to offer anything that is not the best he can make. As much attention is paid to the design and the accuracy of shop accessories as in any other line of manufacture requiring correspondingly good work.

The variety and large number of operations entering into the manufacture of a motor car make it an interesting subject for which to design tools, and for this reason this and succeeding articles will discuss a few suggested small tool designs. Most of these will be for the more important operations. It is not claimed that these tools represent any one man's designs, but are the result of experience wherever obtained. In the words of the author of a well known handbook, the writer "is a compiler rather than an authority." It is not expected that any suggestion will be adopted in its entirety. No two designers of equal skill will produce similar tools for any given operation, and some designers are so constituted that they dislike very much to find anything so good that they have to copy it. The best that can be hoped for from these discussions is that they will give some bright mind an idea.

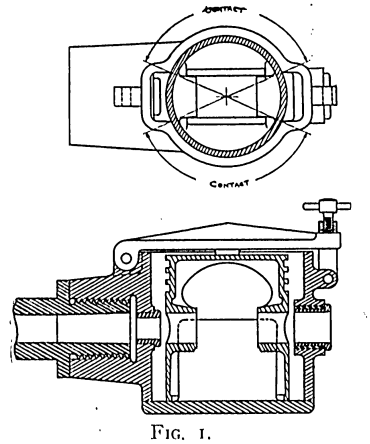

Fig. 1.

Note large area of contact between jig and work to prevent deformation.

The piston is the natural "beginning of things" in a gasoline car, and may serve as a subject for the first suggestions. The machining of the outside of the piston, considered as of the usual trunk type, presents no difficulties out of the ordinary. The diameter and the width of the piston ring grooves are the only dimensions calling for especial accuracy. However, there are two other operations that often do not receive the care they deserve.

It is of prime importance that the hole for the piston pin should be of correct size, have a fine finish and be exactly at a right angle to the line of motion. The piston pin and its hole should be of the same nominal size with a limit of variation of ± .00025 inch. This will give what is ordinarily known as a "wring fit." The slightest looseness of the pin the hole tends to increase and eventually to deform and destroy the piston. The small hole or holes in the piston pin bosses which locate the pin endwise should be accurately placed with reference to the outside of the piston. It is a too common experience to see a cylinder badly damaged by negligence in properly placing these holes.

Fig. 1 shows a drilling and reaming jig for machining the piston pin hole, adapted to use in the turret lathe. The reamer drill in this case will naturally be of Novo steel or its equivalent, while the floating reamer may well be of Styrian or a like quality. The latter steel will give the fine finish to the wall of the hole that is necessary. The cheap form of jig so often used for this operation is merely a V block with clamps, the whole adapted to use on a face plate. A serious objection to this fixture, aside from its time consuming qualities, is the insufficient contact it gives with the finished surface of the piston, and its lack of support. The contact, which is only a line contact, often marks the piston deeply. The heavy thrust allowable on a Novo drill deforms the light casting. The fixture shown avoids this marking and deformation by having a contact extending nearly around the piston,

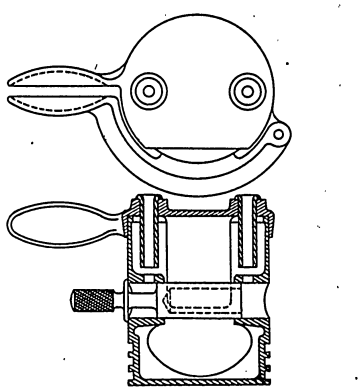

Fig. 2.

an ample groove being left on each side for the exit of chips as fast as made. One end of the jig is bolted on permanently and carries lugs which straddle the piston pin hubs and centre them with the tool. The other end is simply a yoke which swings aside for placing the piston, and clamps it firmly in place by means of the small yoke and screw.

On the entering side of the jig a slip bushing is used, two being furnished, of a proper size for the drill and reamer, respectively. In the close grained iron suitable for pistons, it is not probable that the drill will find sand holes or flaws great enough to make it "run out" seriously. It will therefore break through the first boss cleanly, bridge the space and start fair in the second, without necessitating the use of a bushing inside. If by chance it does run out the hole will probably not be so much out of alignment that the reamer will not correct it. The reamer is, of course, guided at the point and on the body, the style being too common to illustrate. It is a good plan to do this job on a lathe supplied with a compressed air jet for blowing out dust and chips, and to use it thoroughly after each piston is machined. The drill and reamer belonging to this job will ordinarily be kept together in a small box under their own check in the tool room, but if not it is a good plan to keep the reamer in a piece of brass tubing or in a tin tube made especially for it.

In drilling the hole or holes to locate the piston pin in its bearing the jig shown in Fig. 2 is used. This tool is of a simplicity commensurate with the operation to be performed. It is made in two parts, a body and a clamp which form handles convenient to grasp in one hand while the other feeds the drill. When so grasped the jig is held firmly clamped in place on

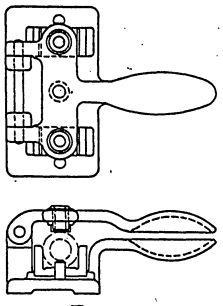

FIG. 3.

the piston and prevented from being pulled off in raising the drill out of the bushing. It will be noticed that a hardened steel guide pin is placed in the piston pin hole, serving to centre the bushings with the hole by means of machined surfaces straddling the guide pin.

The practice of locating the small holes by straddling the boss is no guarantee that they will be in alignment with the hole. If a maximum length of piston pin is desired it must be accurately located with reference to the cylinder bore, and it is better to locate the piston pin by means of a plain straight pin fitting straight holes in the piston pin and boss. No tap can be depended upon to cut truly enough to centre a set screw with its straight point. This will be especially noticeable if two locating pins are used. In making any jig it is the usual thing to use one point on a line as a base of all dimensions on that line, and in this case the base for locating bushings should be the centre of the bored portion which fits the piston.

In Fig. 3 the centre distance of the drill bushings will, of course, be the same as in Fig. 2, the base of operations being the centre of one of the bushings. The distances from centre to centre of bushings and from bushings to stops are important and determine the value of the jig. The stops are commonly hardened pins driven into the base of the jig and ground off, after assembling, to an accurate relation to the bushings. This jig will drill the holes in the piston pin to correspond with those in the piston. There is nothing especially novel in this jig, it merely representing the best practice. Grasping the handles clamps the piston pin into square grooved blocks. Where it is desired to drill holes accurately on the centre line of a round piece many shops prefer the square groove to the V, as it is easier to grind them, after hardening, to an accurate relation to the bushings.

The machining of a valve is too simple a process for especial comment, unless the valve is made in two pieces, as now often happens. It then becomes necessary to make a separate finishing operation of the seat to insure its accurate relation to the stem centrally, and to the lower end of the stem lengthwise. A simple test fixture for this purpose is shown in Fig. 4. D-D are tool steel blocks, hardened, and ground after being mounted on machine steel spindle B. C is a hardened tool steel piece pressed on B, and is, of course, ground after being pressed on. The length to be tested is A, the variation above and below normal being shown by a mark engraved on needle E, and marks F. Small pins G prevent the displacement of E.

A fixture made in this way is very simple and cheap, and there is no reason why the length A cannot easily be checked within narrow limits, the needle ordinarily giving a multiplication of 10 to 1.

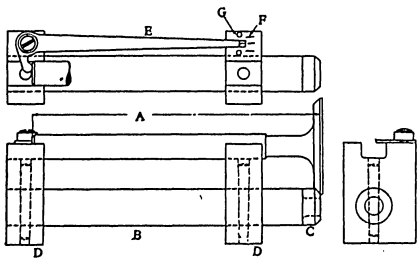

FIG. 4.

Some Road Tests of Cheap Fuels.

BY ALBERT L. CLOUGH.

The following road tests of various fuels were carried on by the writer at odd moments during the past summer, and are necessarily somewhat crude and inconclusive. It is believed, however, that they may be of some interest in showing upon what a wide range of fuels an ordinary car, with a common carburetor, will readily operate. They may furnish suggestions to some users as to how to reduce the fuel bill by the employment of cheaper grades of liquid combustible.

The car used was one which the writer has used for the past eight seasons for experimental and pleasure purposes. It has a double cylinder motor and a transmission of extreme wastefulness, four spur gears and a chain being concerned on all speeds. This accounts for the rather low mileages recorded in all experiments. The carburetor was of the so called Venturi tube type, with fuel pool and with no auxiliary air inlet. Distances were measured with a Veeder odometer, and the fuel under test was supplied from a small auxiliary tank mounted on the dash, holding 1 gallon, which was filled with a carefully measured quantity of fuel.

HEATER COIL PROVIDED.

It not being practical to provide a hot water jacket for the carburetor, a heater coil was arranged to warm the fuel before entering the float chamber. The cylindrical muffler on this car is hung transversely, directly under the head end of the horizontal twin motor, and three turns of the copper fuel pipe were taken about one end thereof. These coils were kept warm by contact with the muffler, and the fuel was heated in passing therethrough, before reaching the carburetor. This heater coil could be cut in or out of circuit at will.

The heater coils were originally vertical, circular coils, arranged as in the accompanying diagrams. But it was found, as really ought to have been foreseen, that when the car was stopped with the muffler hot no gasoline would be supplied to the carburetor when the attempt was made to start the engine again.

A VAPOR LOCK.

This was a case of "vapor lock" which is perhaps worthy of explanation. When the flow of gasoline ceases, upon the stopping of the engine, the fluid in the coils becomes excessively hot and a portion vaporizes, the vapor filling the upper portions of the coils, as shown in Fig. 1. When the tank pressure is again turned on a flow can take place only when the liquid in each coil reaches the topmost portion of the same. The tank pressure is thus opposed by the hydrostatic pressure of a liquid column in each coil, which may have a height of the full diameter of the coil. This condition is shown in Fig. 2.

If the combined height of the three columns of liquid in the coils is greater than the height of the liquid in the tank above the carburetor connection no liquid can flow to the latter. "Pigtails" are sometimes left in gasoline pipes, and if these are in a sufficiently warm position trouble such as the above may occur in practice. The vapor lock here referred to was done away with by using heater coils disposed horizontally around the muffler from end to end, thus preventing any back head from being developed.

As was anticipated, this muffler heating coil could not be successfully used with ordinary volatile gasoline, for an obvious reason. After hard running the muffler became very hot, and the gasoline furnished the float chamber was quite highly heated, so much so that the liquid in the standpipe and its passages vaporized under the reduced pressure existing during the suction stroke, and vapor instead of liquid entered the vaporizing chamber through the spraying nozzle, or at least liquid gasoline so highly expanded that its fuel value per unit of volume was much reduced. The quantity of fuel which could enter the mixing chamber, in the form of vapor, through the minute spraying orifice, was so small as to give an extremely weak mixture, developing very slight power and resulting in severe knocking. A good many owners of a popular runabout, the gasoline pipe of which runs in too close proximity to the exhaust piping, have experienced this same difficulty.

With fuels of low volatility the heating coils worked well, as a substitute for the water jacketed float chamber. In these experiments the carburetor intake pipe was arranged to furnish hot air taken from

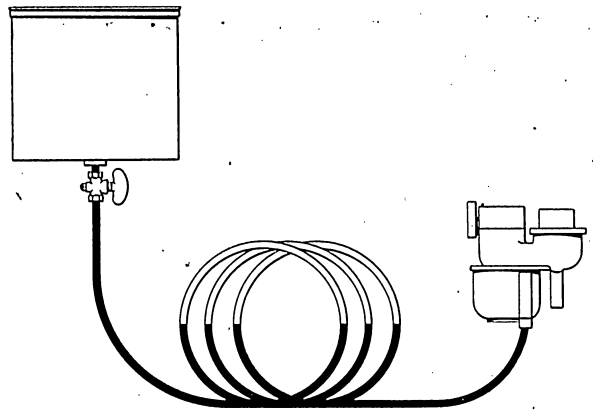

FIG. 1.

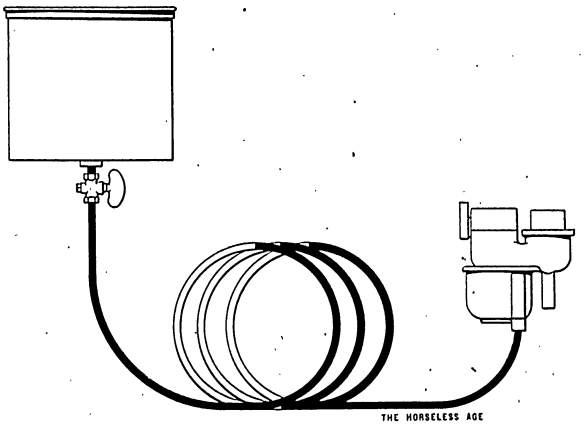

FIG. 2.

around the muffler, an adjustable cold air intake also being provided.

GASOLINE-KEROSENE MIXTURE.

A mixture of one part of ordinary 68 degree gasoline and one part of ordinary kerosene was first used, and was found to give practically the same mileage as straight gasoline, with no perceptible difference in the running of the car. The motor could be readily started on this mixture after standing overnight. A distance of 14¾ miles was covered with a gallon of the mixture, and the same distance to within a few hundred feet with "straight gasoline" in several consecutive tests. There was no difference in the two mixtures noted in the short distance run, so far as sooting of the plugs was concerned, and there was no missing of explosions with the kerosene mixture. No white smoke was noticed in the exhaust, when the kerosene mixture was used, nor was there any dripping at the carburetor of the heavier portions of the fuel. The odor of kerosene was quite noticeable. The same needle valve adjustment was used for the mixed fuel as for straight gasoline, as changes of adjustment did not seem to better the mixture. Hot air was used, but there seemed to be no necessity of preheating the fuel.

A great many motorists live where gasoline is very much more expensive than kerosene, and it is certainly possible for them to reduce their fuel bills by using a half and half mixture, and at the same time not sacrifice the ability to start the motor easily, at least in warm weather. In many localities gasoline costs at least one-half more per gallon than kerosene, and in some districts the discrepancy is much greater. With gasoline retailing at 18 cents and kerosene at 12 cents the half and half mixture costs 15 cents, and the fuel bill is cut down 16⅔ per cent., assuming that the same distance can be covered on a gallon of the mixture as upon plain gasoline. With a water jacketed carburetor and intake manifold the writer has no doubt that such a result could be at all times obtained. The half and half mixture ought to be excellent for commercial vehicles, as the odor of the exhaust would be a minor consideration in the case of such cars.

We all know the objections currently urged against the use of undiluted kerosene; that it preignites unless low compression is employed, that it "splits" and forms deposits in the cylinders, and that it is "nasty" to handle. It must be admitted that the last objection is a true one, but the half and half mixture showed no sign of preignition in about 30 miles of running, nor was any tendency manifested to form deposits on the valves or plugs. A long test would have to be made to furnish conclusive results. The power possessed by the vapors of volatile bodies in carrying along the vapors of less evaporable compounds may be involved in the use of the half and half mixture.

It is believed that conclusive experiments should be made and given publicity in regard to the use of these kerosene-gasoline mixtures.

ENGINE NAPHTHA.

A quantity of "engine naphtha" was obtained. This is a heavy naphtha which sells at 8 cents per gallon in the drum. It has a somewhat unpleasant odor, but the exhaust is not seriously obnoxious. The refiners recommend that it be preheated to a temperature of 100° Fahr.

However, it was found that the motor started readily on it when cold (summer temperature). In using the heater coil with this fuel no trouble due to gas instead of liquid passing the carburetor jet was experienced. So far as the power developed and the general running of the motor were concerned, no difference between this fuel and ordinary gasoline was noticeable. In the test made with this fuel a distance of 16⅜ miles was covered on a gallon, the same route and weight of passengers being adhered to in all these experiments. Some time had elapsed since the runs previously recorded, and, although the car had not been changed or adjusted in any way, some conditions may have changed. Therefore no close quantitative comparison should be made between this and the preceding mileages. With good jacketing of the carburetor and inlet passages a cheap naphtha of this grade should be at least as good a business proposition as ordinary gasoline, and probably very considerably better.

SOLAR OIL.

A sample of a very crude petroleum of a "keroseny" nature, known as "solar oil," and sold at 5 cents in the drum, was on hand, and, more out of curiosity than otherwise, a mixture was made consisting of equal parts of this product and engine naphtha. After coming in from the above described run and before the motor was entirely cooled, a gallon of this mixture was placed in the tank. The engine started very readily, and a distance of 14¾ miles was made before the gallon was exhausted. The motor developed full maximum power, as far as could be observed, and there was no missing. At nearly closed throttle, however, when the carburetor was operating by surface evaporation from the fuel pool, the mixture was slightly weak owing, it is presumed, to the low volatility of the mixture. At larger openings, when the jet action was effective, the operation of the motor was indistinguishable from its action with gasoline fuel. Although the heater coil was used, considerable of the fuel probably passed the exhaust unconsumed, as white smoke could at times be noticed. This gallon of fuel cost 6½ cents as compared with 11 cents for gasoline in drum lots. The distance traveled on the two fuels was the same. With thoroughly water jacketed gas passages I believe that a mixture of this kind can be successfully used on commercial cars. The odor is not pleasant, however, and there might be trouble in starting the engine cold, although I believe that the naphtha in the fuel pool would fractionate off and give sufficient vapor for the purpose. No trouble was experienced with the spark plugs in the distance run, and I do not believe that any difficulty would arise from this cause, in practice, if proper plugs were used.

BENZOL.

A sample of crude benzol was next obtained. This fuel sells at 12½ cents per gallon, in the drum, and its odor is rather curious. First one gets a whiff of the rather sweet characteristic smell of pure benzol, and then a waft of the highly disagreeable odor of carbon bisulphide. Two consecutive runs with 1 gallon of this fluid gave distances of 16⅝ miles, the car stopping

within a few feet of the same point on both trials. The heater coil was not used, starting was as easy as with gasoline, and the operation of the motor distinctly smoother, the full normal power being developed. My experience is that a noisy engine runs much more quietly on benzol than on gasoline.

After finishing the last benzol run, one of the automatic inlet valves, which have very light springs, was found lightly stuck to its seat, but as this frequently happens with gasoline it is not specially significant. Benzol at 12½ cents per gallon, giving a mileage of 16⅝, is cheaper than 68 degree gasoline at 11 cents, giving a mileage of 14¾. It is in every way a fine fuel, and, as far as my experience goes, the best one to be had. The benzol tests above described accord very well in point of mileage with some the results of which I published some time since in these columns.

The writer has always been an advocate of the use of the heavier and cheaper grades of liquid fuel wherever practicable, on account of the economic advantage obtainable. Now that 76 degree gasoline is practically out of the market, and the 68 degree grade is found to answer all purposes perfectly well, there is rather less conservatism in regard to trying less volatile fuels. Anyone who has a car and a little leisure time can make his own tests of cheap fuels and decide for himself whether he can reduce his own motive power bills. It is to be hoped that active interest may be taken in this matter by owners, and the results of the experiments made public.

The chauffeur anxious to keep his employer's car in the pink of condition and to reduce his running expenses will use a rainy day to good advantage by painting the rims to protect the tires from rust. Prop up the two axles and remove all four tires. First clean the rims of all dirt and rust, and then give them a coat of japan. Apply another coat after five or six hours, and replace the tires only after the japan has become hard and no longer feels sticky when touched. Iron rust is very destructive to fabric and a protective coating on the rims, as here described, tends greatly to preserve the tire beads.

A commercial vehicle contest will be conducted by the German Imperial A. C. May 7 to 27, 1909. The trials will start at Berlin and lead through a considerable number of important cities, including Dessau, Nordhausen, Cassel, Bielefeld, Hanover, Bremen, Osnabruck, Wesel, Aix-la-Chapelle, Coblenz, Mannheim, Strassburg, Freiburg, Karlsruhe and Stuttgart.

Stresses and Factors of Safety in Torque Rods.

By David Landau and Asher Golden.

The very nature of the service that the torque rod has to perform is so comparatively simple that the stresses may be very readily determined, and no reason should exist for failure of these parts. Faulty design has been the cause of failure in some few instances, but more often lack of proper workmanship. The determination of the stresses and the factors of safety adopted by various makers for this part is of interest.

The shaft driven car has the torque reaction of the driving effort imposed on its own structure, and this reaction is transmitted through the agency of a torque rod. The reaction in some cases is taken through the rear springs and in some very recent constructions through steel tubes in which the propeller shaft is enclosed. In the above cases the spring or casing takes the reaction, and they must necessarily be designed to withstand the additional stress imposed.

The materials used for torque rods are generally steel tubing, steel castings, malleable iron castings, pressed steel sections, and in some commercial vehicles wooden beams.

The torque rod as generally made, Fig. 1, may be treated as a cantilever, fixed in the rear axle casing, and with a load applied at the other end equal to the maximum reaction. The bending and shearing actions are of the greatest consequence, although in some constructions (which constructions cannot be said to be correct) there is a slight torsion. The bending moments are at a maximum at the point of fixture to the case. The rod of Fig. 1 was designed to take the torque reaction of a 60 horse power motor, the gear ratios being such as to give a speed of 130 r. p. m. on the first gear to the rear axle shafts. The distance N was 31.125 inches. The pressure at the point B is

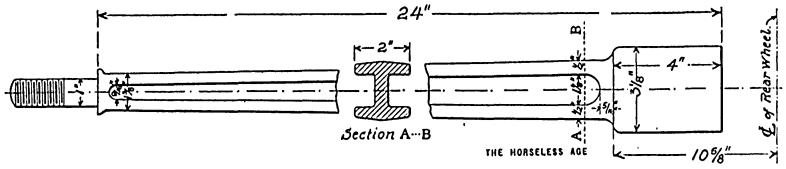

Fig. 1.

$$\frac{63025 \times 60}{130 \times 31.125} = 930 \text{ pounds.}$$

The section at any point along its length is subject to shear and bending, and the shear is the same throughout the whole length of the section. The smallest section is at B, which is 1 inch in diameter; hence its area is .7854 square inch. The unit shear is, therefore,

$$\frac{930}{.7854} = 1{,}180 \text{ pounds per square inch.}$$

The material from which this rod is made is malleable iron, and its tensile strength may be taken at 35,000 pounds per square inch; assuming the strength in shear to be .8 of that in tension, we have a factor of safety for shear of 23.7. Now considering the bending at the section A B, which is I section and distant 19.5 inches from the load, the bending moment at this point will be $930 \times 19.5 = 18{,}150$ pounds-inches. The moment of inertia of this section is 2.04; the distance from the neutral axis to the outermost fibre is 1.0625 inches; hence, the resisting moment of this section is

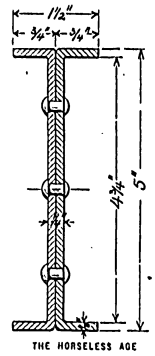

Fig. 2.

$$\frac{35{,}000 \times 2.04}{1.0625} = 67{,}250 \text{ pounds-inches.}$$

The factor of safety for bending is then $67{,}250/18{,}150 = 3.7$.

The question of cheapness combined with lightness was proposed by this same designer. The newly designed torsion lever is made of pressed steel frame channel sections placed back to back and riveted as shown in Fig. 2. The material is of low carbon steel; the section where the stress is a maximum is that shown in the figure. This section has a moment of inertia of 4.46. The tensile strength of the material is about 47,000 pounds per square inch. Hence the resisting moment of this section is

$$\frac{47{,}000 \times 4.46}{2.5} = 83{,}500 \text{ pounds-inches.}$$

The factor of safety is $83{,}500/18{,}150 = 4.6$. The weights of these two torque rods will be very nearly in direct proportion to their areas. The area of the first section was found to be 2.56 square inches, and the area of the second section 1.56; hence the ratio of the weights is $\frac{2.56}{1.56} = 1.64$. That is, the weaker section weighs 64 per cent. more than the stronger section. This is a simple means of increasing strength and decreasing weight and manufacturing cost.

The design shown in Fig. 3 is intended for a car the engine of which develops 24 horse power at 1,200 r. p. m. The gear

reduction on the first speed is 1 to 11.1. The rod is made of seamless steel tubing having an ultimate tensile strength of 82,000 pounds per square inch. The distance of the centre of the rear axle to the suspension of the torque rod is 27.5 inches. Then the pressure at the ball is

$$\frac{63025 \times 24}{\frac{1200}{11.1} \times 27.5} = 507.5 \text{ pounds.}$$

The bending moment at the point A, distant 22 inches from the point of application of the pressure, is $507.5 \times 22 = 11{,}160$ pounds-inches. Since the moment of inertia of a hollow tube or shaft is $.049(D^4 - d^4)$, we have by substitution, $I = .049(1.25^4 - .9375^4) = .0816$.

The distance from the neutral axis to the outermost fibre of the section is .56 inch; hence the resisting moment is

$$\frac{82{,}000 \times .0816}{.56} = 11{,}900 \text{ pounds-inches,}$$

and the factor of safety is

$$\frac{11{,}900}{11{,}160} = 1.07$$

Manufacturers of parts often make it a practice to supply the same torque rod for cars of various powers, so that the rods

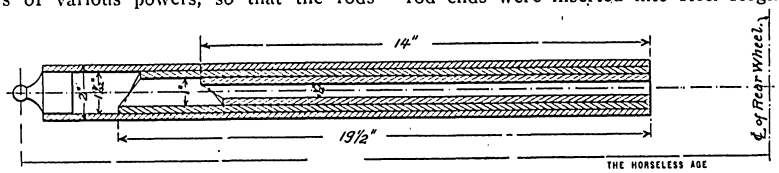

FIG. 4.

for cars of lower power will have higher factors of safety than the rods of higher powered cars. One manufacturer, however, while keeping the outside dimensions of the rod the same, increases the strength of the rod by a simple expedient of inserting tubes of varying lengths into one another, as shown in Fig. 4. The particular rod shown in the figure is intended for a 35 horse power car.

Now, assuming an engine speed of 1,200 r. p. m., the gear reduction on first speed is 11.1; the distance from the rear axle centre to the ball is 26.5 inches; the maximum reaction at the ball is found to be

$$\frac{63025 \times 35}{\frac{1200}{11.1} \times 26.5} = 770 \text{ pounds.}$$

The bending moment at the end A, which is distant 24.5 inches from the ball, is

$$770 \times 24.5 = 18{,}865 \text{ pounds-inches.}$$

The moment of inertia of the section at the point A is .778. The material of which these tubes are made has a tensile strength of 85,000 pounds per square inch. Then the resisting moment of the section is

$$\frac{85{,}000 \times .778}{1} = 66{,}130 \text{ pounds-inches,}$$

and the factor of safety is $66{,}130/18{,}865 = 3.4$.

The stresses in the torque rod shown in Fig. 5 are of a different character than those of the other rods. It will be assumed that the car is moving forward. Here the

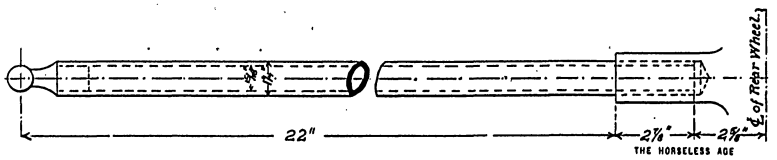

FIG. 3.

upper member of the rod is subjected to combined bending and compression and the lower member is subjected to combined tension and bending. The absolute value of the compression is the same as the tension. If P is the pressure at the point A, then the compression or tension in each member of the rod is P sin θ and the bending force is P cos θ.

It is seen from the above that the tension produced by placing the rods at an angle is small in comparison with the bending and may be safely neglected in the calculation of the stresses. By placing the two rods as shown in Fig. 5 a very light structure having a comparatively great resisting moment may thus be obtained.

The torque rod shown in the figure was designed for a small high powered runabout, where weight is of importance. The rod ends were inserted into steel forgings having a tensile strength (section AB) of 75,000 pounds per square inch. The torque reaction of the motor on this car produced a pressure at the point C of 376 pounds.

We can now determine the bending and tension at the section AB, where the bending moment is a maximum. The bending moment at this section is found as follows:

Referring to the force diagram, Fig. 5, we see that

$$P_t = P \cos \theta$$
$$P_b = P \sin \theta$$

The unit stress in the section AB due to tension or compression is $\frac{P \sin \theta}{A}$, where A is the cross sectional area of the section AB. The bending moment is then equal to L P cos θ; hence the fibre stress due to bending is $\frac{L P \cos \theta}{Z}$, where Z is the section modulus of the section considered.

The equivalent fibre stress is then found to be

$$f = P\left(\frac{L \cos \theta}{Z} + \frac{\sin \theta}{A}\right)$$

Applying this to the rod shown in Fig. 5 we have:

L = 29 inches
P = 376 pounds
θ = 9 degrees
Z = 2.6
A = .3068 square inch.

Substituting in the above equation, we then have

$$f = 376\left(\frac{29 \times .9877}{2.6} + \frac{.1564}{.3068}\right)$$
$$= 4350 \text{ pounds per square inch.}$$

Of this fibre stress that part due to tension, P, is

$$\frac{376 \times .1564}{.3068} = 192 \text{ pounds per square inch.}$$

Hence it is seen that we may safely neglect the tension or compression, as was pointed out above, and regard the torque rod as being subjected to pure bending only.

The factor of safety of this rod is 75,000/4350 = 17 (about).

Having determined the strength at the section of maximum fibre stress, it is now of interest to find the strength at some other point of the rod, as, for example, at a plane passing through the middle of the rod. At this point we have the following conditions:

L =	14.5	inches
P =	376	pounds
θ =	9	degrees
Z =	.9375	
A =	.2455	square inch.

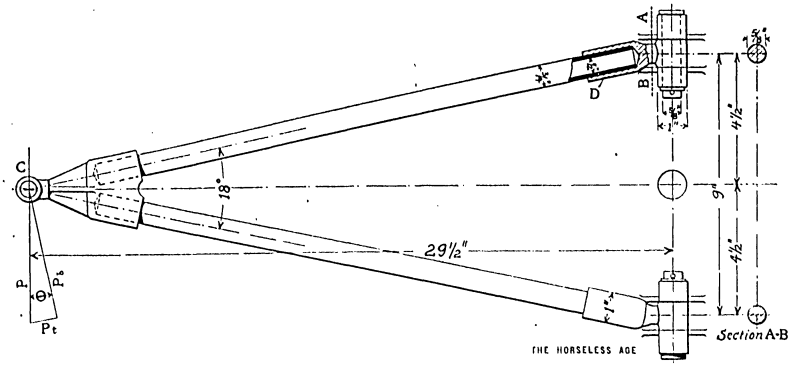

FIG. 5.

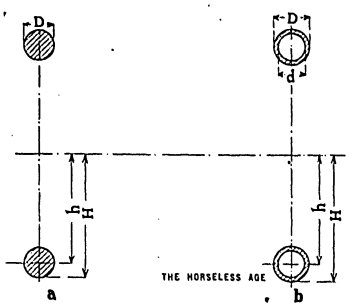

FIG. 6.

The fibre stress at this section, considering bending and tension, is then

$$f = 376\left(\frac{14.5 \times .9877}{.9375} + \frac{.1564}{.2455}\right)$$

= 5,990 pounds per square inch.

The material of the tubes has an ultimate tensile strength of 85,000 pounds per square inch. The factor of safety of the tube is then 85,000/5990 = 14.3. From this it is seen that the rod is nearly of uniform strength throughout its entire length.

In the history of this car there has never occurred an instance of breakage of these rods, although in one or two instances the brazed joints at D have pulled out.

The first section modulus used in the above numerical example was obtained from the following formula (see Fig. 6a):

$$Z = \frac{\pi D^2}{H}\left(\frac{D^2}{32} + \frac{h^2}{2}\right)$$

and the second section modulus from the formula (see Fig. 6b):

$$Z = \frac{\pi D^2}{H}\left[\left(\frac{D^2}{32} + \frac{h^2}{2}\right) - d^2\left(\frac{d^2}{32} + \frac{h^2}{2}\right)\right]$$

It is interesting now to discuss the torque rod, a section of which is shown in Fig. 7, and to study the effect of the variation of strength due to the removal of metal at the section *a*, *b* and *c*. Referring to Fig. 7, it will be found that the section modulus of the section through AB is

$$Z = \frac{B H^3 - b h^3 - t\left[(2d + 2c + D)^3 + (2c + D)^3 - D^3\right]}{6 H}$$

The following figures were taken from an actual case:

B = 1.75 inches
b = 1.625 inches
H = 6 inches
h = 5.75 inches
t = .125 inch
d = .5 inch
c = .375 inch
D = 3.5 inches

Substituting these numbers in the above formula, we find the section modulus to be 1.3. If we take a solid channel section of the same dimensions we find its section modulus to be 1.91. From this it is seen that by punching out the amount of metal shown in the figure the strength is decreased about 32 per cent. It will be found on further calculation that while the strength of the section shown has been decreased by 32 per cent., the weight has been practically cut in two. If we assume that the initial factor of safety before removing the metal was 14, then the factor of safety of the punched section will be .68 × 14 = 8.8. This factor of safety is sufficiently large, considering factors of safety in general in automobile practice.

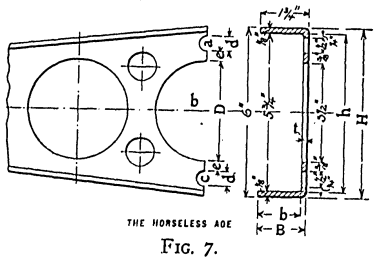

FIG. 7.

An investigation of the designs in which the propeller shaft casings act as a torque rod shows that the factors of safety of these constructions is in the neighborhood of 10. As regards the use of wooden beams on motor trucks, we have never investigated their factors of safety, but from the limited number of these in use and considering the exposure of the wood to the weather and washing, we cannot see any advantage in the use of wood for this purpose. A factor of safety of at least 15 should be used to allow for all contingencies.

A New Field in Honduras, C. A.

BY OBSERVER.

At one time the prospects seemed very bright for automobiles in Honduras; but that was before the revolution of Bonilla. The one suitable road was then in good order, comparatively speaking, and the general public seemed to be favorably impressed with the work of the few automobiles then in use. Inquiries were plentiful, and the leading merchants were considering the pros and cons of the question, with the true Central American tardiness.

During and after the war fiasco the roads throughout the country were allowed to fall into a bad state of repair, and the natural shortness of ready cash since that period has not been conducive to the good of the highways. Truly speaking, there is but one road that is suitable to automobile traffic, and at the present time a not too vigorous attempt is being made to bring it up to a fair degree of surface and grade. There are other roads, it is true, but the absence of bridges and the stony and narrow surfaces present almost impossible conditions to the automobilist. If the road which extends from the Pacific Coast to the capital, Tegucigalpa, were finished, an enormous field would be open. A short length has been built at the capital, and a few influential men are trying to see the matter through. Personally, I have no hopes of such a thing taking place in the near future; the average Honduranian does not take sufficient interest in his country to worry about such a thing as roads. So long as he can manage to spur his mule through the mud holes and up the precipices he says that the roads are "muy galan."

A short time ago the writer personally investigated the prospects and probabilities of an international road, joining Nicaragua, Honduras, Salvador and Guatemala. It did not take long to find out that insuperable obstacles were in the way of such a project. If such a scheme could be carried through, though, lots of cars could be used in the service.

TRANSPORTATION EXPENSIVE.

These Central Americans pay a good price to a mail contractor, while passengers can be charged a heavy price, and yet be carried cheaper than they can go on mule back. Freight also pays heavily, and the entire question simply hangs upon the state of the roads. For such a service a fairly light car would be the most serviceable, although some points would require to be specially attended to to suit the climatic and road conditions.

A few runabouts might be sold to some of the wealthier citizens, provided the first sample car turned out well; it would be closely watched by other intending purchasers. I am in favor of having three point suspension for this tropical work, as no rigid frame is able to withstand the frightful shocks and jolts a car gets down here. There would not be much scope for cars of over 30 horse power; in fact, I think that it would do a manufacturer harm to sell such a car, as the conditions will not permit a high speed at any time.

LOCAL REQUIREMENTS.

A car should be sold complete with all accessories, and a set of spare parts; these people don't understand paying big prices for insignificant pieces of machinery. Tops should be quoted for, as the sun is very hot, and a heavy price must not be asked because a car has a fancy body. Paint and varnish don't count for much down here, and a dealer should quote for plainly painted and furnished bodies. Some kind of spring buffers or checks are almost a necessity, and a very big clearance is essential. Solid tires are quite suitable for all classes of vehicles, pleasure and commercial; pneumatics will not stand up to the work. A carburetor to use coal oil would be a "talking point," and double ignition should be fitted. A thermo-siphon system should be fitted, provided it has been "tried out" in a hot, mountainous country like this.

As to lubrication, this should be absolutely automatic and independent of the driver, or else the car will get a bad reputation as a "bearing" user.

Cars sold down here must be thoroughly tested before shipment, as there is very little labor here suitable to do it, besides the bad opinion it would give of the manufacturer's products. By the way, catalogues and printed matter should be in Spanish, and a few testimonials of other tropical users would add much weight to your statements. National prejudice is equally divided between European and American products.

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Another Commercial Vehicle Competition in Prospect.

The offer of a $2,000 trophy by Powell Evans, of Philadelphia, to be competed for annually by commercial vehicles, as announced in our last week's issue, makes it likely that another commercial vehicle contest will be held in this country next year. It will then be five years since the last contest of this nature was held, and there has certainly been enough progress made in commercial vehicle construction in the intervening period to warrant the organization of another trial. Besides, quite a number of the old established touring car manufacturers will shortly enter the commercial vehicle branch, and the impetus to the commercial vehicle by a trial covering the chief industrial centres of the East and extending over several weeks would come at an opportune time. In our opinion such a trial must be regarded mainly as a means of propaganda, for as a test of economy of operation and commercial practicability it would hardly be conclusive, no matter what the regulations might be.

Without questioning for a moment the good intentions of Mr. Evans or depreciating his worthy action, we do not think that a perpetual trophy is the most desirable basis for organizing a commercial vehicle trial. There is naturally a vast difference between a commercial vehicle contest and a speed trial, and rules of sport can have no place in the former kind of competition. In the first place, it would be absolutely necessary to divide the entrants into several classes, as it would be impracticable to run 500 pound livery wagons and 5 ton trucks in the same class. In fact, a considerable number of classes is necessary, if all the vehicles are to be required to run at about their normal average speed, as there is quite a difference in the speed of trucks and omnibuses on the one hand and between rubber tired and steel tired trucks on the other. But to make the event a success prizes must be offered in each class, or, at least, there must be a number of winners, and there seems to be no more reason for offering a trophy in one class than in another. We also believe that if such contests were held annually the manufacturers would soon be asking for a respite.

The effort to evolve a single winner in each class might also meet with some difficulty, as in several of the recent reliability trials for touring cars. What if a number of cars in any one class came through the contest with perfect scores? In that event it would neither be satisfactory to select the winner by a vote of the remaining contestants, as was done in one of the early Glidden tours, nor to break the tie by pitting the survivors against each other in a speed trial on the Long Island Motor Parkway, after the fashion of recent English and German pleasure car trials. The only logical method of breaking a tie would be to continue the trial under the original conditions until only a single perfect score remained, and the prospect of a long drawn out "run off" would not be encouraging to prospective entrants. Logically, there should be no necessity for a single winner —and right here we have the main reason why a perpetual trophy does not meet the requirements of a practical contest. Cash prizes and medals would be more to the point, as there would be no difficulty in making awards in case of a tie.

Finally, a word should be said with regard to the question of speed in such a trial. Average speeds of from one and one-half to twice the speed of equally loaded horse drawn vehicles should be required; but it would be a repetition of an old mistake if the awards were to be made on the basis of maximum average speed. It would encourage uncommercial speeds, and though the trial would probably be more extended than the two A. C. A. commercial vehicle trials in 1903 and 1904, its duration would hardly be sufficient to make the metal fatigue effects due to high speeds apparent. The proper procedure would seem to be to penalize all involuntary stops, and this would necessitate the provision of official observers, without whom a practical trial is hardly conceivable at this late day.

The Assembled Car and the Tendency Toward Specialization.

The question of the assembled car is one which has often been referred to in these columns, and upon which discussion is decidedly rife at the present time. It is certain that the time has long passed when the assembled car can be ignored as an immensely important factor in the industry, and it is a fact that a considerable portion of the public is becoming interested in the relative merits of the car which is produced in all its essential parts in a single plant and the vehicle the important essential parts of which are produced in outside factories devoted to these particular specialties and later assembled in the shop of the company which gives its name to the finished machine.

Some manufacturers still cling to the statement that all parts of their cars are produced in their own factories, an assertion which, as a matter of fact, should not be and is perhaps not intended to be taken literally.

As a contrast to the familiar statement above referred to may be mentioned that of one of the largest producers of low priced cars who takes pains to impress upon the public that his motors are not built in his own plant, but by a manufacturer making an exclusive specialty of engine building, the motors being turned out in accordance with the automobile company's specifications under the direction of the automobile company's engineers. Such an assertion as this shows that the manufacturer making it has faith that the public appreciates the advantages, economical and technical, to be gained by the practice of entrusting to specialists the manufacture of motor car elements requiring highly specialized knowledge and wide experience. As an analogue of the assembled automobile may be mentioned the electric trolley car. The builders of these cars are, almost

without exception, assemblers. The car body is constructed in the car builder's plant, but the trucks, motors, controllers, heaters, and practically all other parts of the equipment are produced by the truck makers and the large electrical manufacturers, and the car builder assembles these essential parts upon the structural part of the car which he has produced. Hardly anyone would feel like denying that the General Electric Company or the Westinghouse Company, with their immense plants and worldwide experience, can build better motors and controllers than can the car manufacturer if he should try to produce them in his own restricted plant.

Universal, underlying economic tendencies are inflexible and irresistible and fully applicable to the industrial world. The movement toward minute differentiation in manufacturing is going farther and farther each year, restricting each manufacturer more and more closely to a single, narrowly defined line of production. The old adages, "every man to his trade" and "jack at all trades good at none," are merely homely expressions of the now accepted law that the economic efficiency of each producer is at its maximum when he produces that for which he is by knowledge and experience best fitted to produce, and nothing else. It is further to be remarked that highly differentiated production is specially characteristic of American manufacturing methods, and responsible in great measure for their success.

It would seem that the above considerations must apply with increasing force to the motor car industry, especially as standardization of design becomes more closely realized. There may always be a restricted demand for cars built exclusively in the home factory, but it is not easy to see how the industry, as a whole, can resist the tendency toward becoming in a greater degree designers and assemblers.

Controlling the Glare of Searchlights.

The dazzling effect produced upon other users of the road by the powerful gas headlights and searchlights now in common use upon motor cars has repeatedly been alluded to in these columns. The use of such lamps, throwing a concentrated, nearly parallel beam, is so objectionable that the evil has been recognized by the authorities in some cities. Nevertheless a light beam of this character, capable of illuminating objects at a considerable distance, is almost a necessity in country driving at night. For driving through lighted streets a widely diffused beam capable of lighting the road for a short distance in front of the vehicle, and warning opposing traffic of its approach, is all that is desirable.

Lamps have been for some time on the market which throw two sets of beams, the diffused divergent ones for lighting the highway immediately in front of the car, and the concentrated beam of nearly parallel rays for long distance lighting. Such lamps are excellent. On entering or leaving cities, from or into the country, in order not to offend fellow travelers, it is courtesy to extinguish and relight the gas lamps, and this involves some inconvenience. This difficulty seems to be neatly overcome in a recent device applied to double ray lamps by means of which the concentrated beam may be cut off from the driver's seat by the dropping of an opaque screen back of the gas flame of each lamp. The operator is thus enabled without inconvenience to use only the diffused beam when passing through traffic, and to resume the use of the long distance projected beam when in the open country. Automobilists probably do not fully realize the inconvenience which their projectors cause traffic moving in the opposite direction unless perchance they themselves have at times been dazed and bewildered by the glare of the lamps of other cars. In the interest of road courtesy it behooves all operators to use every care to make their lighting arrangements as inoffensive as possible to fellow users of the highway.

Revolutionary Changes and the Interests of Owners of Old Models.

Owners of cars have always considered it their good fortune if the manufacturers of their machines did not make any changes of importance from one season to the other, and this sentiment found particularly frequent expression in connection with the well known curved dash runabout, which throughout its lease of life of several seasons retained substantially the same outward appearance and general arrangement of mechanism. This stability of type and general form tends to induce the view that the car has been found satisfactory by its makers, and it also tends to maintain the selling value of used cars, partly as a direct consequence of the above effect and partly because a model three or four years old, which closely resembles the latest model of the manufacturer, cannot be called out of date. But progress is essential, and the manufacturer is under no moral obligation to his former customers to stick to his old designs, if he sees a chance for a marked improvement.

This question of the effect of revolutionary changes in design on the owners of the manufacturer's former models has recently been revived in England, in connection with the adoption of the valveless Knight engine by the Daimler Motor Company. No doubt the action of the company will tend to slightly reduce the selling value of used cars of its make, and those owners of its cars who pride themselves on driving only up to date cars may feel compelled to buy vehicles with the new engine. It is obvious, however, that a radical departure from what may be called conventional design cannot have nearly so far reaching an influence on the selling value of old models as a change the other way. A freakish or unconventional model soon loses practically its whole value when abandoned by the manufacturer.

Cold Weather Precautions.

With the approach of cold weather it is well to remind motorists to look out for the cooling system of their cars so it will not be injured by freezing. Although every owner of a car knows that a water cooled machine will not stand exposure to frost unless special precautions are taken, numerous cylinders are cracked and radiators injured by frost each year, and it is especially in the late fall that such accidents occur. It is well to introduce the non-freezing solution into the cooling system as soon as the temperature drops below the freezing point during the night, as then a sharp frost may occur any time, and the non-freezing fluid is practically equally efficient and no more troublesome than ordinary water.

Probably the choice of a non-freezing liquid will this year be mainly between a denatured alcohol solution and a salt solution, as being the cheapest and generally most satisfactory fluids known. A 20 per cent. alcohol solution will stand freezing temperatures down to about 5° Fahr., and a 30 per cent. solution to about —9°. A 20 per cent. salt solution, rendered slightly alkaline by the addition of a little sal soda, has also been recommended in these columns. It shows 22 degrees Baumé when tested with the hydrometer, and will withstand 15° below zero, it is claimed. Extensive tests by several independent parties have shown this solution to be non-corrosive.

Some Notes on the Runabout Situation in France.

By P. Maisonneuve.

Ever since the beginning of the automobile movement some farsighted spirits have seen the future open to the motor vehicle as a practical means of conveyance aside from any considerations of sport. Unfortunately the imperfection of the early cars and the unsuccessful trials timidly made with business vehicles led to the conclusion that the automobile was destined to become merely an object of sport and luxury. This condition of affairs obtained in France until about 1905. But from that time on there has been a certain interest shown both in commercial vehicles for heavy goods and passenger transportation, and in the light business automobile for individual use.

In the following article I shall confine myself to the latter type of vehicle, which corresponds closely to the light runabout

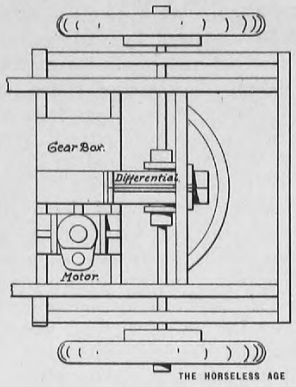
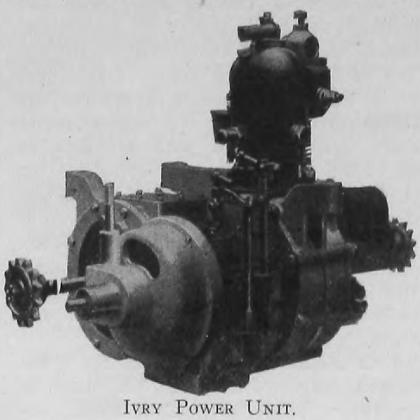


Fig. 1.

as manufactured in the United States. I believe that in America vehicles of 20-50 horse power are sold also under the name of runabouts. This latter type of car is very rare in France, where it is referred to as a "voiture légère type special course."

It is a most peculiar thing that in France, in spite of the demands of the public, the big manufacturers at first refused to bring out a low priced serviceable vehicle. There were then on the French market a certain number of voiturettes, but with the exception of a few makes (De Dion, Sizaire-Naudin, etc.) they were built by second rate concerns not disposing of the necessary capital to properly develop a new type of car. For this reason these voiturettes in the majority of cases are simply reductions of larger cars and often frail and unreliable. And yet in order to develop an ideal voiturette for use on the excellent highways of France, it would have been sufficient to take as a model the little 4½ horse power De Dion chassis then on the market, and to improve it in a few particulars.

As will be seen from Fig. 1 the characteristic feature of this small car consists in the use of a motor and transmission unit placed toward the rear of the vehicle and driving the differential gear directly. As is well known, the driving axle of the De Dion-Bouton cars comprises a spring suspended central portion which is connected



Ivry Power Unit.

to the two wheels by shafts with universal joints. The most important improvements to be made in this type of chassis are as follows: (1) A simple sgliding gear or planetary gear should be substituted for the individual clutch change speed gear. (2) Another type of body is desirable, as the vis-a-vis does not appeal to the fancy of the purchaser and gives the vehicle an out of date appearance. (3) An inclined wheel steering gear should replace the vertical steering column.

This basis for the establishment of a practical, low priced runabout was at hand since 1903, but it is only recently that it has been taken advantage of by a French manufacturer, viz., the Compagnie Générale d'Electricité, Ateliers d'Ivry. The voiturette manufactured by this firm is equipped with a power unit comprising a single cylinder motor with magneto, a change speed gear with two sliding sets, and a differential gear with shafts and sprocket pinions, the whole forming a single, substantial unit fixed to the frame, which latter carries no other mechanical attachments, except the steering gear.

The two conditions which should always be aimed at in the design of runabouts are low cost of construction and low upkeep cost. The second requirement necessitates the use of the higher grade of materials and first-class workmanship. The cost of production must be reduced by manufacture on a large scale and the use of economical assembling methods. In the writer's opinion, the division of the mechanical parts into several units, which may be allowable for touring cars, cannot be permitted in light runabouts. It is necessary to combine all these parts in a single unit, which can be secured to the frame by means of four bolts; in no case should there be more than two assemblies, viz., the motor in front and the change gear and differential at the rear, but suspended from the frame.

The writer does not favor shaft trans-

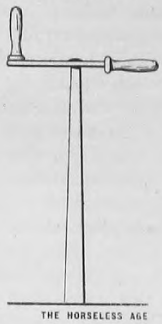


Fig. 2.

mission for light runabouts, for the reason that in spite of the relatively low speed of such vehicles the rear axle must withstand

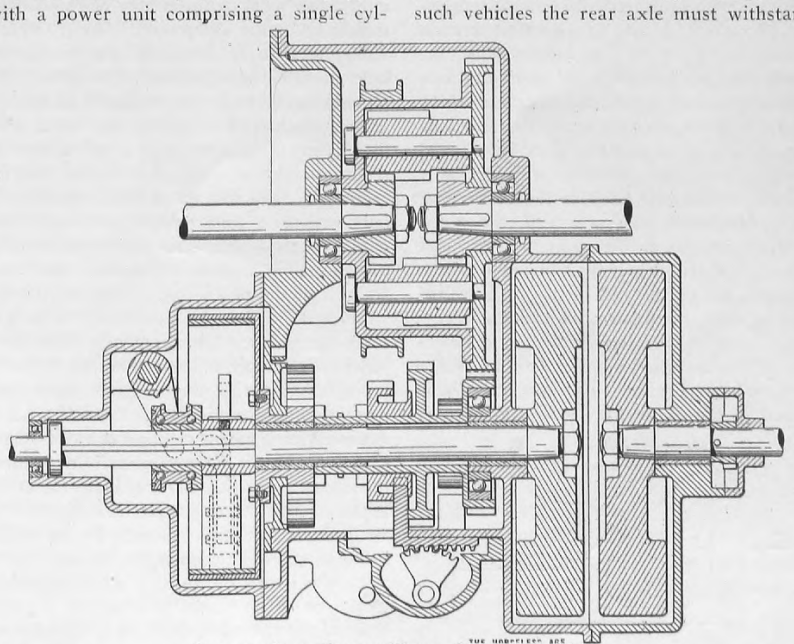


Fig. 3.—Ivry Power Unit, Sectional View.

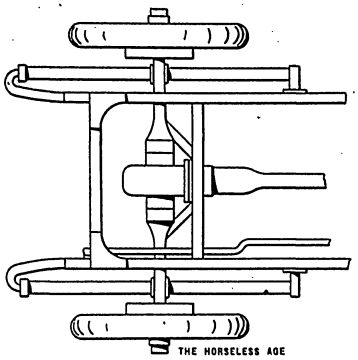


FIG. 4.

considerable stresses, which are the greater the heavier the axle. Now the shaft driven axle is heavier than the chain driven axle, and in the majority of cases it is not so strong. The several substantial rear axles of which the writer knows are rather expensive in construction, whether they belong to the De Dion type, with transverse universal shafts, or comprise a truss system of the Peugeot type, as shown in Fig. 4. The Chenard & Walcker combination of separate driving and carrying axles gives very good results in practice, and the large scale of production of this firm permits of fairly low cost of manufacture in spite of the complicated design, and these vehicles are among the lowest priced on the French market. The only objection to the chain is that it is exposed to dust and mud, but it may be effectively protected by suitable chain cases.

Since about a year ago a tendency toward gear changing rear axles has been manifest in France. This idea is in line with the tendency to combine various portions of the mechanism into a single unit, and from this viewpoint is justifiable, but from a strictly technical standpoint it represents poor practice, though in actual use it offers certain advantages. It is indisputable that the mechanical parts directly fixed to the axle are subjected to shocks and stresses which must have a destructive effect. Now this is exactly what takes place in a speed changing rear axle which carries not only the differential gear but also the entire gear box. Moreover, the wear of the tires, whether they be of the pneumatic or solid rubber type, is largely proportional to the unsuspended weight resting upon them. In spite of these disadvantages, which are certainly not ignored by the manufacturers employing this system, these vehicles find a ready sale in France. This system is embodied in the Sizaire & Naudin voiturette.

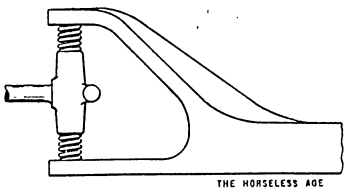


FIG. 5.

the Darracq taxicab and the new Brouhot light cars.

The latter vehicle is particularly interesting for the reason that it employs belt transmission. The motor is provided with a pulley for carrying the belt, as is also the change gear shaft on the rear axle. Three of these small vehicles fitted with cab bodies took part in the recent commercial vehicle contest and showed up excellently. The belt is a perfect transmission device, as in transmitting motion it absorbs any abrupt variations, but few manufacturers have been successful with it. Brouhot places the belt between the motor and the change gear, with the result that the tension in the belt is light, while the speed is high, consequently the danger of the belt stretching or breaking is largely eliminated. It is also advisable in using the belt drive to have the two pulleys connected of substantially the same diameter.

It is absolutely necessary that the transmission devices of an automobile should be somewhat flexible, so that the sudden impulses of the motor and shocks due to road obstructions transmitted to the driving shafts, differential and change gear may be

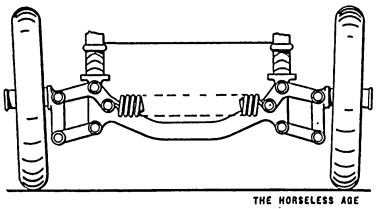


FIG. 6.

absorbed. Among all the runabouts on the French market the writer knows of only a single one in which the need of a flexible transmission mechanism has been taken into account. In this vehicle a coiled spring is interposed between the crown of the differential and the differential itself, which spring absorbs most of the inequalities in motion. The interposition of a shock absorbing device into the transmitting mechanism considerably reduces the wear and liability to breakage of these parts, and is really imperative in a light business vehicle.

One or two French manufacturers sell light cars with solid rubber tires, and even with steel tires, thus catering to that section of the public who are disgusted with the frailties of the pneumatic. But simply substituting solid tires for pneumatics does not solve the main problem, that of vehicle suspension. Numerous elastic wheels have been brought out during the past few years, but none of them has given satisfactory results. An interesting recent solution of the suspension problem for light vehicles is presented in Fig. 5. By this arrangement the axle stubs of the steering axle are allowed a vertical motion with respect to the axle, being balanced between spiral springs. Each rear wheel runs on an axle stub connected to the end of the axle by means of parallel links of the same length, the top links forming one arm of bell cranks, the other arms of which are connected together by a coiled spring under tension (Fig. 6). This suspension is the invention of an Italian engineer, M. Granieri. Although such arrangements are not to be recommended for high speed vehicles, they are perfectly suitable for low speed, light and moderate powered cars, as they permit of dispensing with the use of pneumatic tires.

Increase in the Capacity of Storage Batteries with Increase in Temperature.

Various investigators have observed different rates of increase in the capacity of storage batteries with a rise in temperature. Thus Heim found an increase of 2.6—3 per cent. for a rise in temperature of 1° Cent. Gladstone and Hibbert obtained an increase in capacity of 50 per cent. by increasing the temperature from 15 degrees to 37 degrees. On the other hand, M. U. Schoop and the Accumulatoren Fabrik A. G. obtained only an increase of 1 per cent. for a temperature rise of 1 degree. As these great differences cannot be explained by variations in the active material and conditions of the tests (age, design, thickness of plates, current density, density of the electrolyte, etc.), a new series of tests have recently been carried out by Otto Hildebrand on Planté and Faure electrodes with varying current densities and concentrations of electrolytic. It was found that it is impossible to deduce from test results a generally applicable law regarding the variation of capacity with temperature, and that the determination of such laws for individual types offers great difficulty and requires much time. In a general way the test results admit of the following conclusions: The type, the age and the previous history of the storage battery, as well as the degree of temperature, have an influence on the increase in the capacity with the temperature. The latter is greater at low than at high temperatures (50° Cent.). The capacity of Planté electrodes is less affected by variations in temperature than the capacity of Faure electrodes. The former are more sensitive to variations in the rate of discharge than the latter. Continued temperature increases reduce the capacity and life of a storage battery. In the neighborhood of 15° Cent. the increase in capacity amounts to at least 1 per cent. per degree centigrade.

At a recent meeting of representatives of the German Imperial A. C., the Bavarian A. C., the Hungarian A. C. and the Austrian A. C., the route for the next year's Prince Henry Cup contest was tentatively laid down as follows: Berlin, Breslau, Carpathian Mountains, Budapest, Vienna, Linz, Salzburg, Munich. For the hill climb a suitable course would be selected in the Carpathian Mountains, while the level race would again be held in the Forstenrieder Park. The route will first be submitted for approval to Prince Henry of Prussia, and will be finally decided upon at a meeting to be held in Vienna in November.

A Plea for the American Chauffeur.

By Xenophon P. Huddy, Counsel for the Professional Chauffeurs' Club of America.

A new class of persons, representing a new calling, has sprung up in the United States. As a necessary outgrowth of the development of the automobile, the chauffeur has come into existence. Chauffeurs constitute quite a large class; at least the public would be so impressed if all the registered automobile drivers in the United States could be assembled together in a single convention hall, for instance.

THE CHAUFFEUR IS ENGAGED IN MANUAL LABOR.

The chauffeur is now a factor to be reckoned with. His calling is sometimes designated as a professional occupation, he being referred to as a professional chauffeur. This designation is not strictly correct, however. The chauffeur is the possessor of a trade and follows a mechanical occupation. He is engaged in manual labor. To properly and correctly classify the chauffeur's calling it would be necessary to place it among the great branches of labor. In fact, it has been held by the highest courts of England, under the employers' liability law, which gives certain rights to employees engaged in manual labor, that the chauffeur is employed in manual labor and comes within the provision of the law. We may, therefore, correctly call him a laboring man, and he is eligible to the labor class in this country.

NUMBER OF CHAUFFEURS IN UNITED STATES.

The number of persons engaged in driving automobiles for hire is by no means small. In most States of the Union chauffeurs must register in order to engage in their calling. Official records of all the licensed chauffeurs may be found at the capitals of these States covering a period of about six years past. In the State of New York, for example, during the past two years, about 20,000 chauffeurs were registered with the Secretary of State at Albany. It may be estimated that there are today in this country from 75,000 to 100,000 registered automobile drivers, the majority of whom are driving automobiles for their living. This constitutes a large class of citizens, who, if they are properly organized—which, by the way, is now being done—may constitute a powerful force in directing not only legislation but the machinery of the Government.

FOREIGN BORN AND UNNATURALIZED CHAUFFEURS.

Of this large number of individuals engaged in the chauffeur's calling possibly 25 per cent. are of foreign birth, and some of these are not naturalized. Perhaps 5 per cent. would be a fair estimate of the proportion who are not citizens of the United States. Since the chauffeur's calling is one of manual labor, it would be illegal for an owner of an automobile or the proprietor of a taxicab service to import foreign chauffeurs into this country under contract to work here. A chauffeur is not a domestic or menial servant. It is known that foreign chauffeurs do come to the United States and work for wages very much lower than the prevailing wages for American automobile drivers, but very little trouble has as yet been experienced in this respect. The American automobile drivers are on the alert to protect themselves against foreign competition. One or two instances are now known where foreign drivers have been imported for service in this country.

WAGES.

The wages of chauffeurs vary from $14 in some cases in the country districts to $50 a week in the larger cities. In some instances they are demanding more than $50. Aside from the regular wages, a great many automobile drivers receive their board and lodging, and their expenses are paid while they are touring. The calling is one which demands fair wages, at least. Liberal wages are generally paid, not only because a good chauffeur must necessarily be a man of intelligence and mechanical experience, and a safe driver, but people who hire automobile drivers can usually afford to pay liberally. Many automobile drivers—in fact, I may say most of them—were, previous to entering their present calling, engaged in some mechanical line of work. Many of the best of them were expert machinists. Some have been engineers on electric railways, others have been engineers on steam locomotives; the best of them usually had excellent mechanical training.

SOCIAL POSITION.

Socially the chauffeur's standing is neither one of great dignity nor is it one of inferiority. He, of course, is employed generally by an employer of some financial standing, and often of more or less social position. He is by no means on a level with the coachman, but stands far above him. The chauffeur is oftentimes a great companion for his employer, and in many instances he is far better educated. From my experience as counsel of the Professional Chauffeurs' Club of America, which is the representative organization of automobile drivers in the United States, I have come in touch with many hundreds of chauffeurs, and have found that the majority of them are men of keen insight and good education, and many of them are capable of speaking four or five languages. There are very few who have not traveled throughout Europe, and many of them go abroad every year. They have seen the sights of the world and are able to converse intelligently on all subjects. They are keen business men. Most of them are married and have families. Their calling is one that takes them away from their homes, and this seems to be the main objection which many chauffeurs have against their occupation. They are unable to enjoy their homes as much as men who are engaged in other pursuits. Necessarily, the chauffeur's calling takes him from place to place at the will of his employer. One day he may be in the city of his home, and the next day hundreds of miles away, and probably the week after thousands of miles. He may spend the greater part of one year in Europe and the next he may spend in California.

THEY ARE LIBERAL SPENDERS.

Ordinarily the chauffeur is quite liberal with money (sometimes not his own). He travels geenrally with an employer who spends money freely, and soon learns, to his misfortune, to disregard the value of money. This is one of the most pitiable aspects of the chauffeur's calling—his tendency to throw away the money which he has earned instead of saving it for the future. He generally buys expensive meals, because he has been accusomed to buy them and have somebody else pay the bills. He buys expensive clothes, because he sees his employer wear costly garments. He generally dresses in the best of taste, because he learns to do so from those whom he accompanies. He knows what is the proper thing to do under all circumstances, socially and otherwise. He knows how to conduct himself in the presence of ladies, because his keen observation has taught him what the correct thing is. He knows how to be polite and courteous, more so than his employer, in a great many instances. He attends social functions, and although not a guest he generally enjoys all the privileges of such functions, except those belonging to the guests who are invited. In fact, his environment during the course of his employment does everything to uplift him, and when he gets out of employment, or if he should take up another line of business, he finds himself burdened with expensive tastes.

ORGANIZATION OF CHAUFFEURS.

With many thousands of men in this country pursuing the same calling, it is natural that the desire to organize should have manifested itself. There is a mutual sympathy between people doing the same thing and working for the same objects. We already have in this country a national chauffeurs' organization, the Professional Chaffeurs' Club of America, which has a large clubhouse at 158 West Sixty-fifth street, in New York city. There are now about 1,000 members in this organization. In various other cities there are allied clubs. No one is permitted to join the association without first passing a severe examination, which is conducted by the examining committee composed of expert mechanics and drivers. This club is the representative organization of automobile drivers of America, and is now working to organize all the chauffeurs in the United States. It is working for fair and just legislation, for good roads and the general uplifting of the chauffeur. It advocates that before a chauffeur be given a license, he should be compelled to pass a strict examination

covering qualifications, including hearing, eyesight and heart action, as well as mechanical ability and knowledge, and ability to drive safely. This latter qualification should cover the rules of the road and the automobile law of the State in which he drives.

The chauffeurs have commenced to realize that it is absolutely necessary that they should make the driver's license of value and not easy to obtain, and the privilege to be appreciated once it has been obtained. The laxity of the present requirements under the law permits any person to obtain a license, as, for example, in the State of New York, where a mere child may obtain a chauffeur's license, and even a blind person may become a chauffeur under the law. These are glaring instances of the looseness of our laws and the lack of protection not only to the public, but to those who drive automobiles for their bread and butter.

LEGISLATIVE STAND TAKEN BY CHAUFFEURS.

The chauffeur believes that all who drive automobiles on the public highways should possess the same qualifications and pass the same examination required by law, whether they are owners of automobiles or paid operators. Why the citizen who drives an automobile to support his wife and children should be subjected to greater restrictions than an owner of a motor vehicle who drives, is a question not easy to answer. The trained chauffeur is more of a mechanic and a better driver generally. If any distinction is to be made between the two classes, the situation should be the reverse. "But," it is said, "the chauffeur enjoys a franchise, a special privilege, which he should pay for; consequently he must become licensed and pay a fee or tax." This is what the American Automobile Association says. Very good. Then let the chauffeur be represented in the enactment of automobile legislation. "Taxation without representation is unjust. To regulate and tax the chauffeur's calling without permitting him to have some voice in the matter is disregarding the chauffeurs' rights as United States citizens. What right, may we ask, has the American Automobile Association to put through legislation regulating the trade by which the automobile driver earns his living? Has it come to pass in this free country that one class of citizens may rule another class with impunity? The chauffeur has been batted about here and there at the will of those who framed the present automobile laws in the several States, and he will still continue to be subjected to the will of others to his detriment, unless he asserts his citizenship rights and exercises the power which is at his command.

When the American Automobile Association attempted to obtain the enactment of a federal automobile law which would grant an interstate license to automobilists only owners of automobiles were considered in the bill. The chauffeur who drives for his bread and butter was totally ignored. Under the proposed law he would be compelled to pay for the individual State licenses, while the owner would be relieved of this responsibility. There can hardly be found a parallel to this instance of attempted injustice. In all probability the chauffeur was overlooked, but such neglect is inexcusable. The American Automobile Association was simply pursuing its ordinary tactics of proposing legislation with no regard for the automobile driver in so so far as permitting him to have a voice in the measures.

THE CHAUFFEUR IS GENERALLY THE SCAPEGOAT.

To be able to lay the blame on the shoulders of the chauffeur who drove the car when it was being operated illegally, or at the time it happened to collide with another person on the public highway, is at times well worth the salary which is paid by the owner to the driver. Moreover, it is not pleasant to have a criminal record attached to one's name. Therefore motoring is made more enjoyable if the stigma of criminal conviction is not apt to be connected with it. When an automobile is stopped because it exceeded the speed limit, the chauffeur, the man who is at the wheel at the time of the arrest, is accused of violating the law. He is compelled to answer to the charge, and in nine cases out of ten he is found guilty. Ordinarily, the speed at which he was going at the time of his arrest was sanctioned by the owner who sat in the tonneau, at least there was no objection made to the rate of speed, consequently it was acquiesced in. But the owner is not held criminally responsible for the violation of law. He may and often does pay the chauffeur's fine. However, he is not compelled to go into a filthy court room, wait all day for his case to be called and then be stamped with a criminal record. The chauffeur is often made the scapegoat upon whose shoulders criminal and civil responsibility are thrown for the purpose of protecting the man higher up, who oftentimes is not only depraved morally but is unworthy of association with clean minded men. Probably no one is as well acquainted with the conduct of the members of the fashionable set as the chauffeur. Reluctantly we are compelled to admit that the automobile is often devoted to immoral purposes. Those who thus use it seem to think that it affords a shelter or shield of protection from publicity, and it probably does, unless an accident happens, which generally reveals some kind of a scandal.

GRAFT.

The chauffeur, speaking for the class, is not a grafter. He did not originate the custom of paying commissions to employees who buy automobile supplies, nor is it a general rule among the better class of men that secret commissions are accepted without the consent of their employers. There is a great deal to be said in favor of giving chauffeurs commissions; equally as much as can be said against it. Garage keepers and supply men are all in the same boat, so to speak, and there can be little objection on the part of automobile owners if their chauffeurs do receive commissions; provided, of course, purchases are made to the best interests of the employers, if they themselves are unable to get any reduction in prices if they buy directly. The period of the grafting chauffeur is passed. Most certainly the representative chauffeurs' associations will not stand for their members receiving illegal commissions on supplies purchased for employers, and it cannot be rightfully said that the chauffeur is in any sense of the word a grafter. I personally know of many chauffeurs who receive commissions on supplies purchased, but generally it is with the express knowledge of their employers.

Let us give the chauffeur a "square deal."

Baker Motor Vehicle Company of New York Fails.

A petition in bankruptcy was filed last week against the Baker Motor Vehicle Company of New York, 1788 and 1790 Broadway, New York. Among the creditors are the Electric Storage Battery Company, with $7,464; the Diamond Rubber Company, with $1,439, and Anthony G. Imhoff, with $600. These were represented by Willard P. Jessup, who filed the petition. James N. Rosenberg was appointed receiver and ordered to continue the business until further notice.

The company was incorporated under New York laws on August 16, 1907, with a capital stock of $20,000, with Nathaniel Platt as president, to act as New York agent for the Baker Motor Vehicle Company of Cleveland, Ohio. The liabilities are reported to be $100,000, and the assets from $20,000 to $30,000. It is stated that the Baker Motor Vehicle Company of Cleveland, a creditor for $25,000, claims that it has a prior lien on the assets over all the other creditors. The question as to the rights of the various creditors will probably have to be decided by the courts.

Union Carriage Company Enters Auto Field.

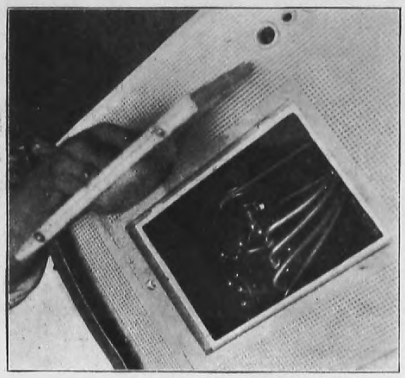
The Union Carriage Company, of St. Louis, which has been building horse vehicles for the past seventeen years, has been experimenting with automobiles for more than a year and expects to market 500 cars the coming season. The first lot of twenty-five cars are now coming through the factory and will be ready for shipment to agents in about two weeks. The Union car will be guaranteed for a year from date of the original purchase. The officers of the company are: Geo. E. Deeds, president; W. C. Ingram, vice president; Geo. A. Laws, secretary; John B. Keough, treasurer.

NEW VEHICLES AND PARTS

Rambler 1909 Models.

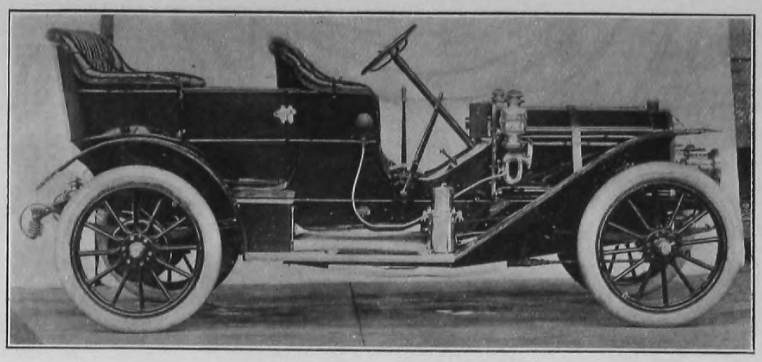
The Rambler line for 1909 consists of a 34 horse power, four cylinder, five passenger touring car, Model 44, successor to the 1908 Model 34; an entirely new 45 horse power, four cylinder model, furnished either as a roadster, seven passenger touring car or limousine; a 22 horse power, two cylinder model, the Rambler "utility car," to succeed the 1908 Model 31, and a two cylinder runabout, Model 47. Models 44 and 45 are alike in design, differing only in engine size and power, wheel base, tire size and body capacity. Changes from 1908 design are matters of either refinement or convenience only.

The engine of Model 44 has a 4½ inch bore and a 4½ inch stroke. As used in 1908 this engine delivered 32 horse power;



Trap Door in Floor Over Oiler.

by increasing the valve size and carburetor capacity 34 horse power is now obtained. The most distinctive motor feature is an offset crank shaft. On account of this, it is claimed, and the straight line drive, it is possible to throttle the four cylinder Rambler models to 3 miles per hour on the high



Rambler Model 44, Thirty-four Horse Power Touring Car.

gear, and the power at low engine speeds is greatly increased. The flexibility and power at low speeds are further augmented by adding 26 pounds to the weight of the flywheel rim.

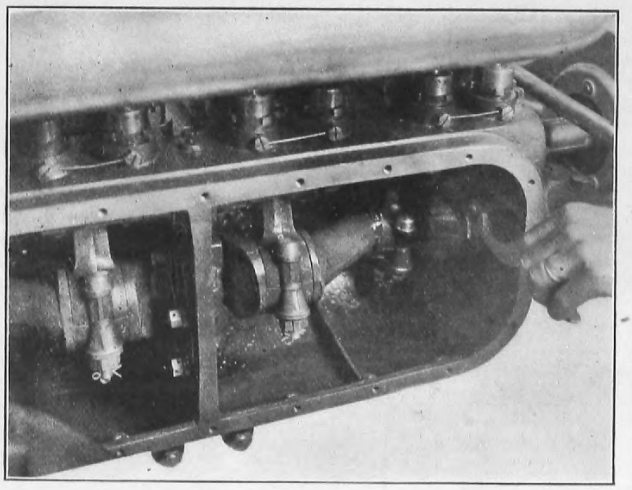
The cam gears have been doubled in width. The drive gear is of rawhide, of great width and claimed to be absolutely silent. The crank case is of one piece, the shaft and assembled bearings being inserted from the rear end. These bearings are of the marine connecting rod wedge type. This permits adjustment from the handhole opening. The handhole is located at the right side and is 8x23 inches, of sufficient size to give perfect access both to main and connecting rod bearings. With this design necessity of removing the mud apron and oil pan, a long and awkward task, is eliminated. The front guards are of the quick detachable type, so that the engine handhole cover and bearings can be reached from the side of the car without any inconvenience.

In the 1908 engine the exhaust manifold was set at an angle of abount 45 degrees. The new exhaust manifold is raised and permits better access to the valve stems and adjusting nuts and springs. The timer is raised somewhat, so that it can be more easily reached. Flexible cable is now used for the primary as well as for the secondary current.

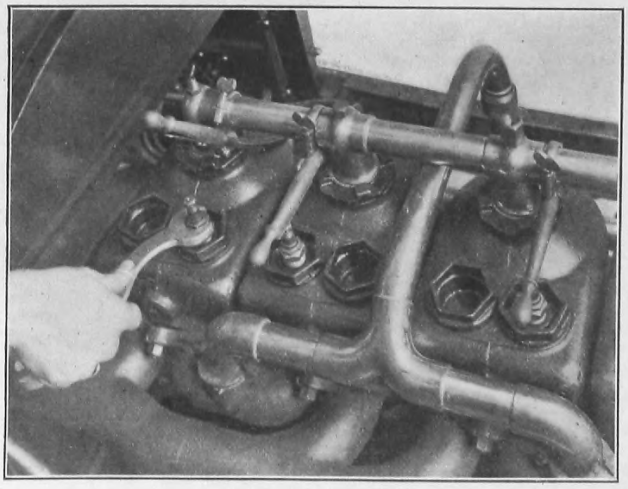
A new and convenient device is provided for a spark plug terminal. The wire terminates in a fibre block. This block is in turn retained in a bracket attached to the upper water pipe. A thumb screw locks the bracket in any desired position. A metal strip fastened to the fibre block completes the circuit between the wire and the plug. This metal strip is placed on the flat metal spark plug top. Should missing occur because of soot at the spark plug points, raising the fibre block a little will create a spark gap, and the missing can be temporarily overcome without changing the plug. If it be desired to remove the plug the fibre block is raised clear from the plug, so that the wire does not have to be disconnected or changed to remove the plug. The arrangement is both mechanical and convenient.

The pump is now driven from a separate shaft on the side opposite to the cam shaft. The pump also is entirely detached from the gear case, so that should a leak arise water cannot enter through the cam gear or crank case. This pump shaft is arranged to permit the fitting, if desired, of a magneto. The standard Bosch high tension magneto will be carried in stock. The magneto is placed at sufficient distance from the crank case and the oiler to permit perfect access to it for inspection and adjustment.

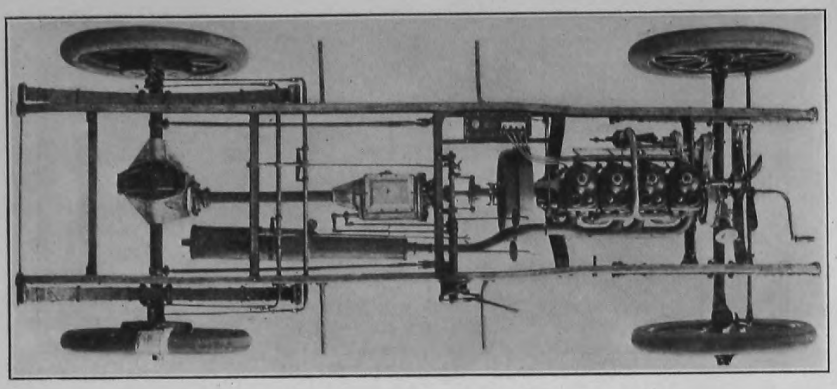
The relief cocks for the cylinders, instead of being of the ordinary pet cock



Large Handhole in Crank Case.



Terminal for Secondary Wire.



RAMBLER MODEL 44 CHASSIS.

type, are provided with check valves, which are held closed by springs and the compression from within the cylinders. The greater the pressure against the check valve, the tighter they will come. Lubrication is provided by a force feed oiler, of 50 per cent. greater capacity than that of 1908. The oiler is also located a little farther back, to permit better access to the magneto. It is placed in an oil tray to catch any slopover and flying oil from the flywheel, and the clutch is taken care of by a metal flywheel guard.

The balanced type of inverted cone clutch formerly used has been replaced with the direct thrust type. This cone is made of pressed steel instead of aluminum, thus being less susceptible to variation that might result from severe use, and is provided with surface increased about 50 per cent. This clutch differs from other cone clutches principally because of its greater amount of surface and by virtue of a provision for varying the tension of the clutch spring. The adjustment, as the illustration shows, is easily accomplished by means of three accessibly located nuts. Should there be any tendency of the clutch to start slipping the tension of the spring can be increased to overcome it. The adjustment can easily be made on the road at any time, thus eliminating the necessity for burning clutch leathers. The studs which can be seen extending from the inner circumference of the clutch cone contain spiral springs placed under the leather to assure gradual engagement of the clutch.

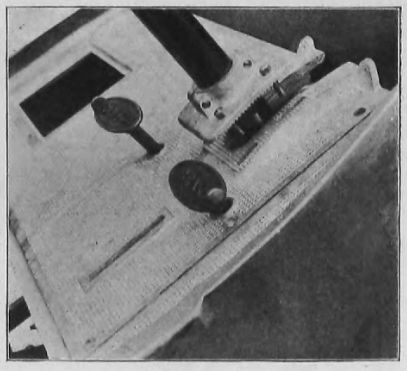
A rosewood block is placed in the bearing provided for releasing the clutch, the friction of this block acting as a brake to stop the clutch spinning when released.

The clutch can be released by a pedal or the brake lever. The throw of the pedal has been reduced about 50 per cent. from 1908. The connection between the brake lever and clutch is so arranged that the clutch is entirely released by the first two inches movement of the lever. The brake can, therefore, be so adjusted as to act independently of the clutch. That is, the clutch can be released and held out by the brake lever without applying the brake, further movement of the lever making no change in the clutch position. The illustrations well show the great leverage provided by the Rambler design of pedal.

The change gear itself is the same as in 1908, the only change being in the shifting mechanism. The rocker arms and brackets formerly located at the rear of the gear box, to carry the shifting levers, have been abandoned, and gear shifting is now accomplished by direct thrust through sector gears and rods. The present arrangement is much simpler and more positive.

The reverse gear is engaged by a lever position directly back of that for the first forward speed. To prevent an inexperienced operator going into reverse when it is desired to change from first to second speed, a bell crank is located so as to interfere with the backward movement of the lever which engages the reverse, and which extends downward from the lower operating sector gear. When it is desired to engage the reverse gear, this obstructing crank can be removed by pressing a small button in the floor.

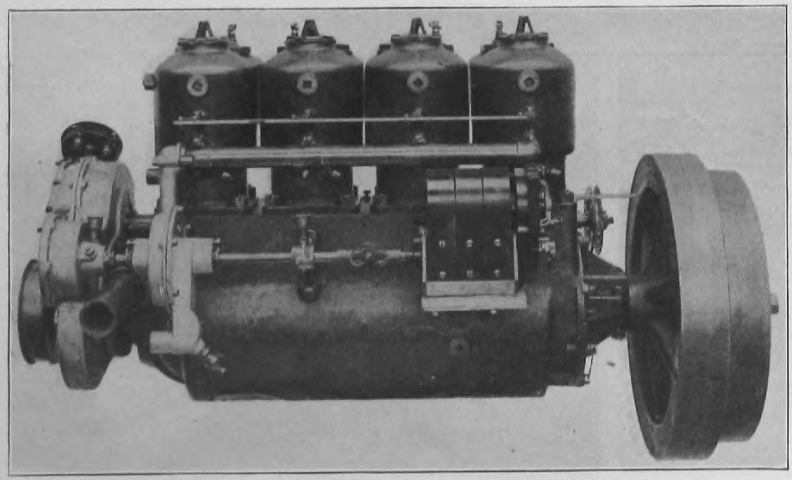
In order to retain the grease in the gear box a stuffing box is placed on the propeller shaft just back of the rear bearing, and another around the large front bearing located in the housing, through which the grease has heretofore had a tendency to get out. Stuffing boxes are similarly located on the rear axle shafts to retain in the differential the grease placed there for lubrication. The rear hubs are increased in diameter, to correspond with the front, and the hub caps are now interchangeable.



ALUMINUM FLOOR AND ADJUSTMENT OF STEERING COLUMN.

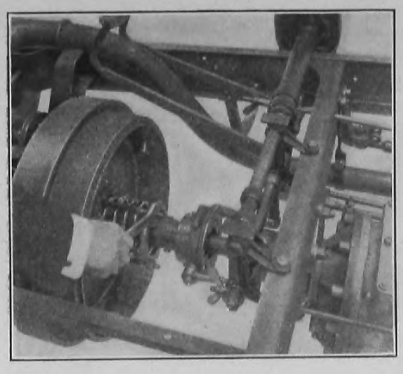
The gear box is supported by a bracket attached to a cross girder, which provides a sliding joint at its attachment to the gear box. This bracket is now secured to a girder by three bolts. When these bolts are removed the gear box can be lowered, and access be had to both the clutch and universal point. Simplification of the method of attaching this bracket greatly lessens the labor of taking down the clutch and universal joint.

Probably the one new Rambler feature which will be most appreciated by owners is the provision for brake adjustment. Both the foot and lever brakes are adjusted by shortening the rods which connect the lever and pedal to the equalizing shafts. At the front end of these rods are placed large thumb nuts that can be easily reached by raising the aluminum front floor and adjusted, as the illustration shows, by the hand. This arrangement makes brake adjustment possible on the road without stopping the car.



RAMBLER MODEL 44 MOTOR,

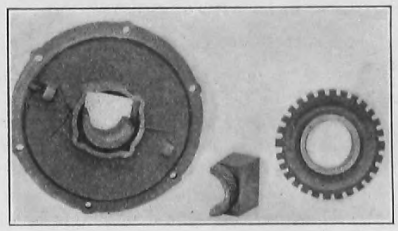
Showing separate pump shaft, pump detached from cam gear case, and magneto location.



Adjusting Rambler Clutch.

The brakes are of the same size as before, but the leverage is increased by changing the position of the brake shoe and band operating lever. The brackets supporting these levers were before of such design as to limit the backward position at which the brake levers would be at rest. The brackets have now been hollowed out, so that when at rest the brake levers stand at an angle to the brake rods of 45 degrees, and when the brakes are applied, at 90 degrees. That is the position which provides the greatest leverage.

The Rambler steering outfit is based on the same nut and screw principle as employed for six successive years. For 1909 the steering parts are heavier. Better provision is made to guard against and compensate for wear. Downward thrust is provided for by a ball thrust bearing located at the top of the steering column. Wear in the nut and screw is guarded against by the use of a hard bronze nut. In the



Centre Engine Bearing, Self Centring. (Model 41.)

earlier models babbitt was used. The steering arm is carried well out to the frame, so that the connecting rod to the steering knuckle does not interfere with the mud pan and travels nearly parallel with the frame in a straight line.

The new Ramblers are particularly noticeable for their features of increased comfort or convenience. One of the most important of these is an adjustable steering column. The wheel can be placed in any desired position to suit the purchaser, and then securely locked in place by means of the brackets shown in the illustration. This illustration also shows the upper section of the aluminum floor. Both this and the horizontal sections will for 1909 be aluminum. The large square opening is a provision made for boiler inspection. This opening is closed by an aluminum cover.

Improved riding qualities are secured in the new models by springs which are called triple action. Besides the flexibility provided by the auxiliary coils these springs are unusually long.

The body is of the straight line type, with front and rear seat backs of nearly uniform height. The tonneau doors are provided with a special lock—a Jeffery patent—which operates as nicely as any house door latch and holds the door securely in place when closed, it is claimed. A detachable toe rail is placed in the tonneau. A simple design provides latitude for a variation in position of 10 inches, with a possibility of instant change without use of wrench or screwdriver.

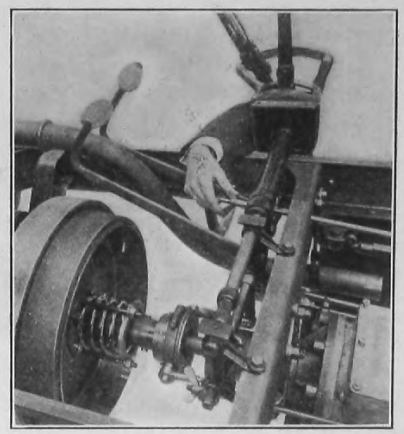
The two cylinder Rambler models for 1909 will be known as Model 41 (furnished either as a five passenger touring car or a two passenger runabout), and Model 47, a strictly runabout model—furnished for two or three passengers. Very little change from 1908 construction has been made in these models. The unit power plant is continued in the same form. The Rambler tilting body gives easy access to every part beneath it, including the main engine bearing, which is of the self centring type, and adjustment is accomplished by drawing together the two halves placed in a tapered box, by turning in the adjusting ring. A floating type rear axle is used. The car weight is carried on heavy roller bearings, located on the axle tube, instead of within it. The aluminum rear axle housing of the last two seasons has been replaced by a heavy forged yoke, which provides greater strength without need for a truss, and gives a much higher clearance. The lowest point of this car is the rear sprocket, and as this is located to one side of the centre it clears the ridges which centrally located sprockets would encounter. Then the wheels are 34 inch in diameter, and there is 15¼ inches from the ground to the axles.

The rear wheels are provided with pressed steel drums for the brakes, 13 inches in diameter and 2½ inches wide. This provides about double the braking surface of earlier models, and hereafter the rear wheel brake will be used for the primary brake, and that on the transmission only for emergencies. A sheet steel mud apron provides thorough protection to the carburetor, timer and the other mechanism. A wire net apron was used before.

To add both to appearance and the comfort of driving, the steering wheel has been increased in diameter from 14 to 17 inches. The wheel now is also built up of solid mahogany. Slight alterations have been made in the carburetor, which is of the simple puddle type, and in the valve timing, to increase the power. Although still rated at 22 horse power, greater power than this is now actually delivered, it is claimed. The wheel base of this model is 106 inches. The wheels are 34x4 inches, and with the special type of full elliptic springs, with scroll ends, it is claimed that unusually good riding qualities are provided.

Thomas 1909 Models.

The E. R. Thomas Motor Company, of Buffalo, offer a very complete line for the coming season. It comprises seventeen regular and some special models. This variety is obtained by placing different styles

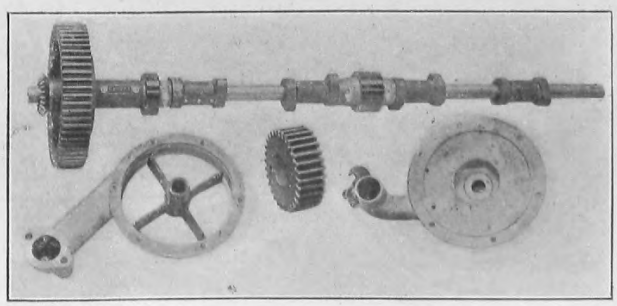


Adjusting Rambler Brake.

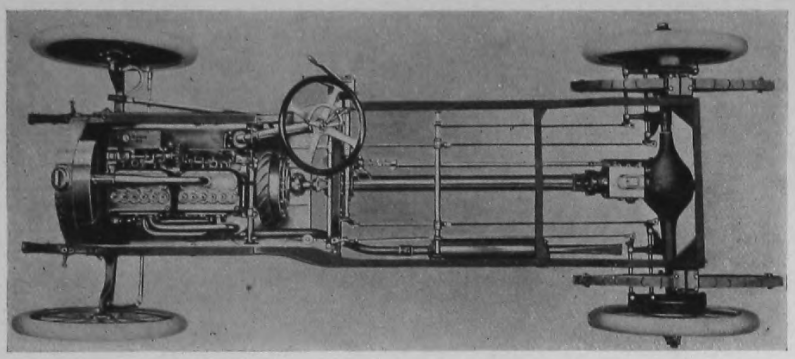
of bodies on several sizes of chasses. These are designated by a compound numeral descriptive of the motor. The first number represents the number of cylinders, and the last the horse power rating. We will take up these chasses in the order of decreasing size.

THE SIX-SEVENTY.

This is a very large car, built especially for the hardest touring conditions, to carry heavy passenger and baggage loads over



Rambler Cam Shaft, Cam Gear and Pump.



THOMAS 6-40 CHASSIS.

all sorts of roads. Also for use with closed bodies by those who wish every luxury of equipment.

The motor has individual "T" head cylinders, and is water cooled by gear pump circulation. Extra good air circulation is provided for by a double fan system, consisting of a gear driven fan in front and blades on the periphery of the flywheel. A double system of ignition is furnished, consisting of a Bosch high tension magneto and an Atwater Kent spark generator. The clutch is the well known Thomas triple disc, with cork inserts and automatic brake. The change gear is a four speed selective, with annular ball bearings. The final drive is by side chains. The axles are I section forgings. Wheels are 36 inches in diameter. The tire sections vary with the style of body employed. All springs are long semi-elliptics, and are provided with rebound clips. In addition to these, shock absorbers are regularly fitted. The steering gear is a large diameter worm and sector. Expanding brakes are provided on the rear wheels and contracting brakes on the countershaft. The wheel base is 140 inches, and the tread is standard. Great attention has been paid to neatness of detail and the arrangement of small parts.

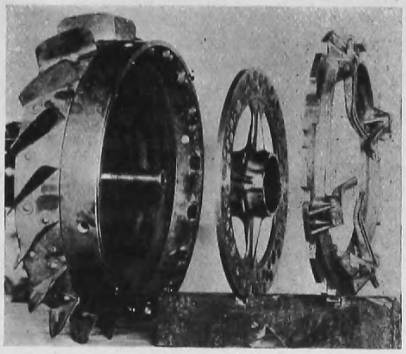
THE FOUR-SIXTY.

The four cylinder model is similar to the six, except for such changes as are made necessary by its smaller size. It has a wheel base of 127 inches. It differs from the Thomas car which won the New York-Paris race only in a few minor details. In fact it will be seen from the foregoing that these two models are very similar to the corresponding 1908 models, differing from them mainly in small details.

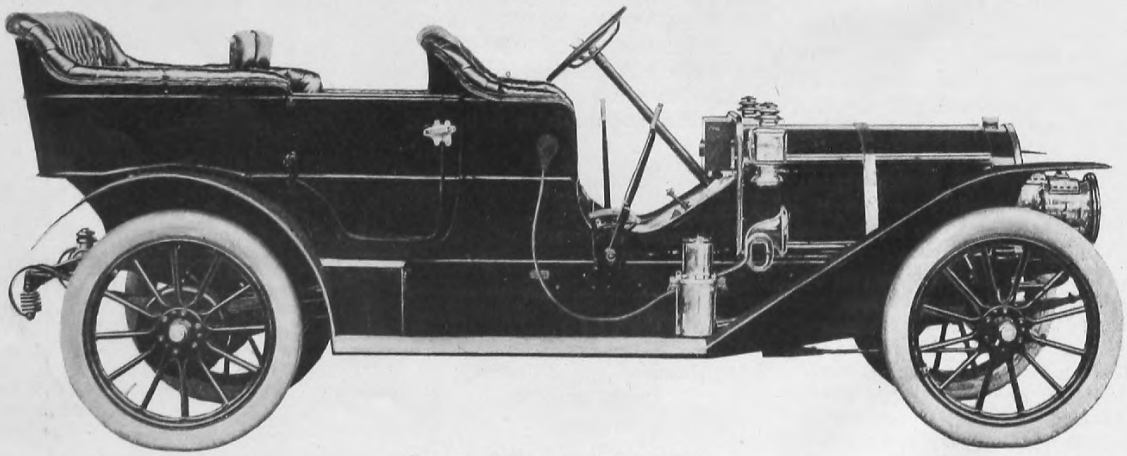
THE SIX-FORTY.

This is an entirely new model, no previous car of this size having been built by the Thomas Company. It has been designed with the idea of getting a very high car of considerable size. The cylinders are cast in two units of three cylinders each. The crank case is of the barrel type, with large hand holes on the cam shaft side. The nickel steel crank shaft is carried on three annular ball bearings. Cooling and ignition systems are similar to those of the larger cars, except that only the flywheel fan is used. The clutch is the standard Thomas plate type. Shaft driving is employed on this lighter car. The propeller shaft has two universal joints and moves independently of its encasing tube, which also acts as a torsion member. A very compact three speed selective change gear is housed with the driving bevels. Gears, axle shafts and rear wheels have annular ball bearings. The front wheels have taper roller bearings. Semi-elliptic springs are used in front and scroll full elliptic in the rear. They are made of vanadium steel and fitted with rebound clips. Steering is by

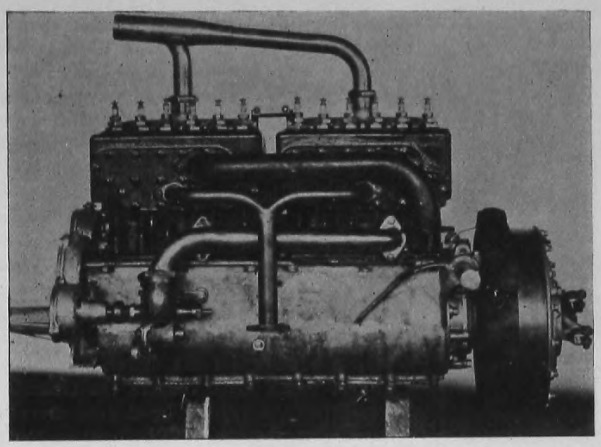
WATER CIRCULATING PUMP.

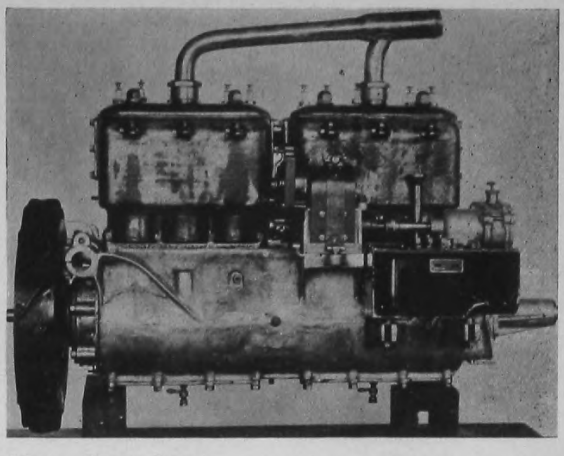


THOMAS PLATE CLUTCH.



THOMAS 6-40 WITH SPECIAL BODY.





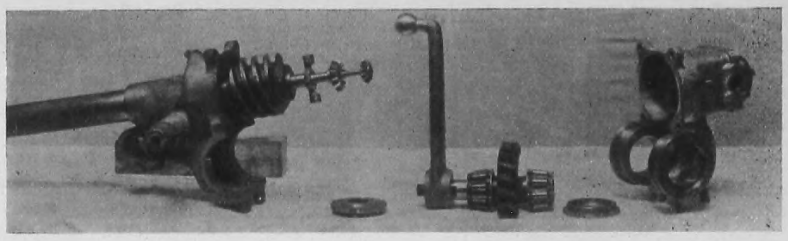
VALVE SIDE—THOMAS SIX-FORTY MOTOR—RIGHT SIDE.

worm and sector gear. Both sets of brakes are on the rear hubs. The wheels are 36 inches in diameter. The front wheels have 3½ and the rear ones 4 inch tires. The wheel base is 122 inches and the tread is standard. The frame is given an unusually large drop, which brings the centre of gravity low, even with the large wheels and good spring clearance.

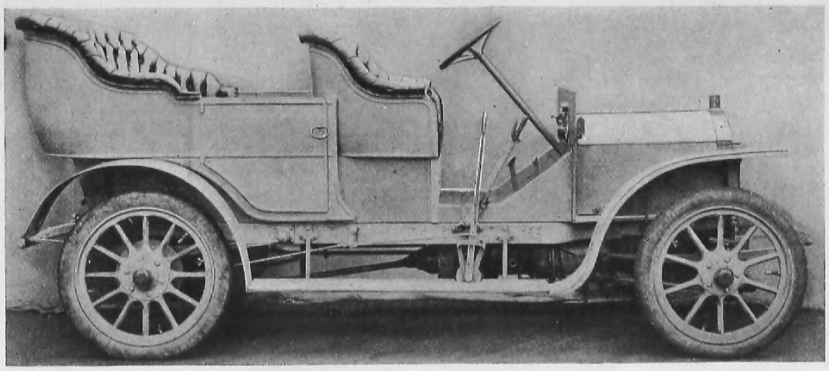
THE FOUR-SIXTEEN.

This model is intended mainly for city use. The chassis is similar to that of the well known Thomas taxicab, which has been fully described in these columns. It has a wheel base of 103 inches and 54 inch tread. The wheels are 32 inch, with 4 inch tires. The motor is of the new block construction. Clutch drive shaft and change gear are similar to those used on the 6-40 models.

A description of all the bodies offered with these chasses would be far beyond the scope of this article. It is sufficient to say that the variety offered should meet the needs of practically every purchaser. The body illustrated on the 4-60 is a special design, and is not regularly furnished.



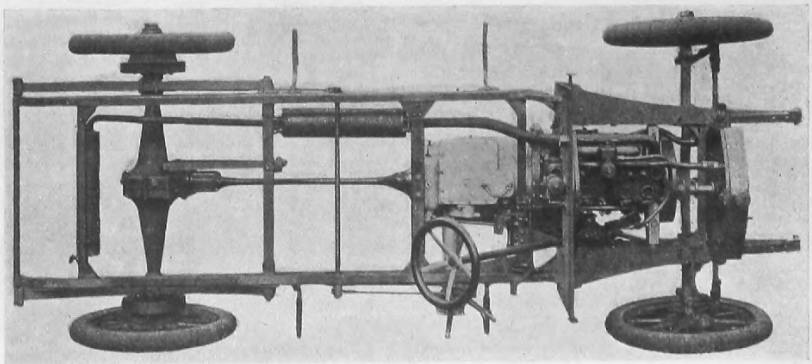
THOMAS STEERING GEAR.



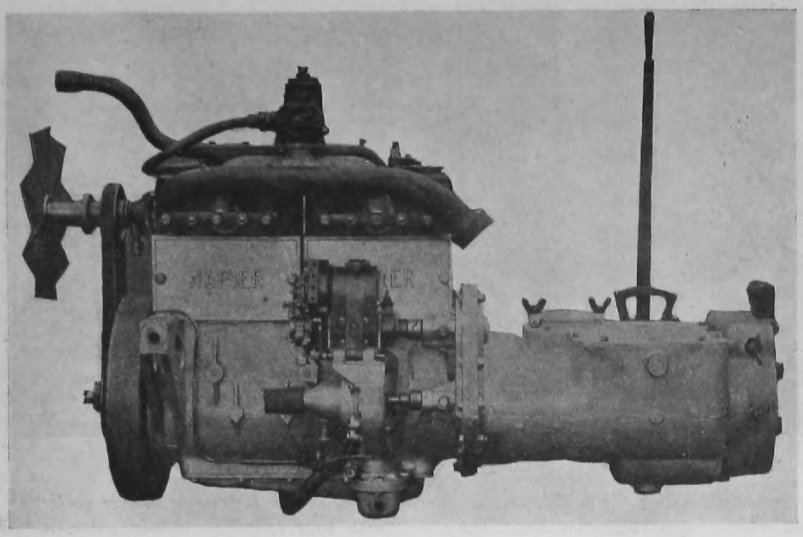
FIFTEEN HORSE POWER NAPIER TOURING CAR.

The 15 Horse Power Napier.

The Napier Works at Acton, England, have made a distinct departure from their former practice in bringing out a four cylinder, 15 horse power, worm gear driven car for 1909. This car is the result of an increasing demand for a lighter car than their regular six cylinder models. The motor is of the four cycle, water cooled type, with four cylinders, cast in pairs, with integral heads and water jackets. The bore is 3¼ inches, with a stroke of 5 inches, and the motor is rated at 15 horse power. The inlet and exhaust valves are located side by side in a pocket in the side of the combustion chamber, and are actuated through push rods from the cam shaft inside the crank case. Large removable oil and dust tight plates cover the valve springs and push rods, thus affording them perfect protection. The crank case is cast in two parts, the lower part forming the oil reservoir. The cam shaft gears and gears for driving the magneto and water pump are at the rear of the motor, the flywheel being placed in front. The housing for these gears is an integral part of the casting which forms the housing for the clutch and change gear mechanism,



FIFTEEN HORSE POWER NAPIER CHASSIS.



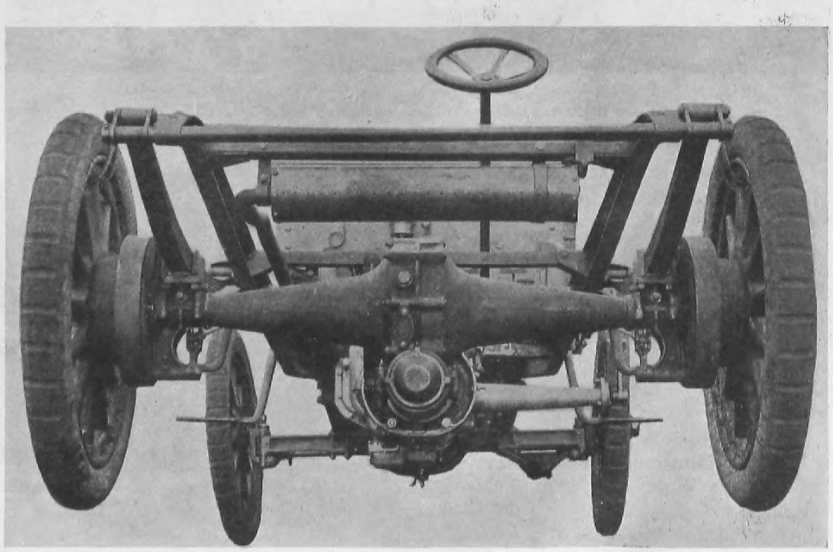
Fifteen Horse Power Napier Engine, Ignition Side.

thus making a unit of the motor, clutch and change speed gears, the whole being supported on the frame on the three point principle, two lugs, cast integral with the forward part of the crank case, forming the forward support, and the rear end being bolted to one of the cross members of the frame. A rotary, gear driven pump circulates the cooling water, with a fan in front to create the air draught. The fan spindle is secured to a bracket bolted to the forward cylinder, runs on ball bearings, and is belt driven from a pulley secured to the flywheel. The carburetor arrangement is somewhat peculiar. The float chamber is located on the right hand float of the engine, and is secured to the crank case. From the float chamber a pipe leads up and over the engine to the mixing chamber and throttle located on the inlet manifold over the engine. The pipe from the float chamber is water jacketed for about a foot of its length, the water jacket of the forward pair of cylinders being tapped for the hot water supply. With this arrangement a correct mixture is said to be obtained at all engine speeds with a marked economy of fuel. Lubrication is effected by a mechanically operated pump, just below the water pump, forming part of the crank case. This pump draws oil from the reservoir in the bottom of the crank case and forces it to all the bearings of the engine, the oil returning to the sump by gravity. A pressure gauge on the dash indicates at a glance whether the oil is circulating. Both the inlet and exhaust pipes are of large size, reducing to a minimum wire drawing in the inlet pipe and back pressure in the exhaust. Ignition is by a high tension Bosch magneto, shown just above the water pump. It is readily removable by loosening the strap which passes over the field magnets. Power is transmitted through a multiple disc clutch to the change gear mechanism, contained, as before mentioned, in a single housing and running in oil. The top of this case is provided with a large removable cover, which is, in turn, provided with a hand hole for inspection and application of lubricant. The change gear mechanism provides three speeds forward and reverse, and is operated selectively. A tube integral with the gear case projects outward, and has secured to it the change speed gate quadrant, thus forming a neat and protective casing for the gear shifting shaft. The final drive is by a Cardan shaft, fitted with one universal joint, to the live rear axle. The rear axle drive is by worm and wheel gearing, the worm being secured to the under side of the differential casing. The rear axle casing is a tapered construction of large size, fitted with mechanical anti-friction bearings. The axle is of the full floating type, the wheels being secured to the driving shafts by tapered, castellated ends. The torque rod, shown in the top view of the chassis, is secured to the cross member of the frame by a hinged pin, secured between two coiled springs, and is splayed for attaching to the axle. The frame is of pressed steel, channel section, tapered at the front to give greater steering range. It is supported on semi-elliptic springs, front and rear. The front axle is an I-section drop forging, with a slight drop at the centre. The wheels are of wood, artillery type, fitted with 32x3½ inch tires in front and 32x4 inch tires in the rear, and run on ball bearings. Two sets of brakes are fitted, a service brake of the contracting type acting on the transmission and two internal expanding brakes acting on each rear wheel hub. Steering is by wheel through a worm and segment, the steering column being rated to bring the wheel in a convenient position for the driver. Inasmuch as this worm drive reduces the clearance considerably, a regular bevel gear drive is fitted when the car is to be used in countries where road conditions require more clearance. The Napier firm this year manufacture two, four and six cylinder models.

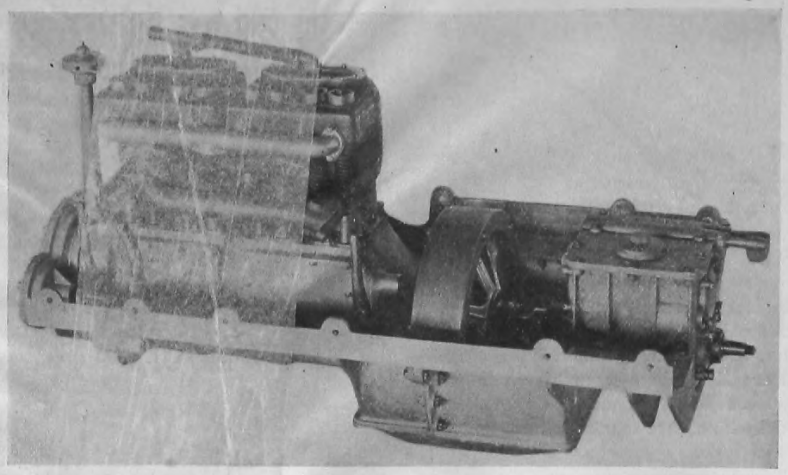
The Mora Light Four.

This car is similar in many respects to the corresponding 1908 model. Its motor has a 4 inch bore and 5⅛ inch stroke. The cylinder, valve and manifold construction are plainly shown in the accompanying illustrations. The crank shaft is of the three bearing type, and all these bearings are supported on the base of the motor. The upper part of the crank case is merely a distance piece which holds the cylinders in place and retains the oil. The pistons are unusually long and are bronze bushed for the piston pin, which is held fast in the rod and by a tapered bolt. Lubrication is by splash, the oil being fed by a pressure oiler through two sight feeds on the dash to the compartments of the crank case. A third sight feed is furnished, which ordinarily is closed, but may be opened wide to raise the oil level in the crank case should unusually heavy going render this necessary. Water circulation is by gear pump.

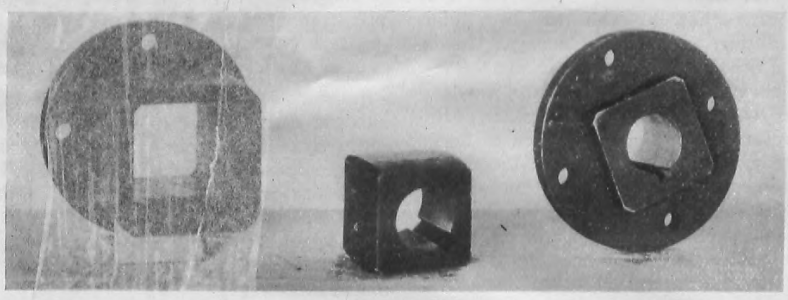
The clutch is a leather faced cone with cork inserts. A three speed selective



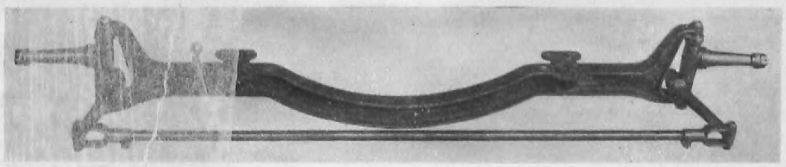
Rear View of Fifteen Horse Power Napier.



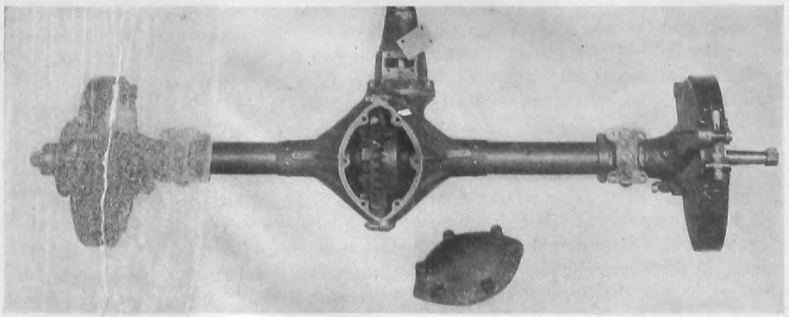
MORA MOTOR AND CHANGE GEAR ASSEMBLY.



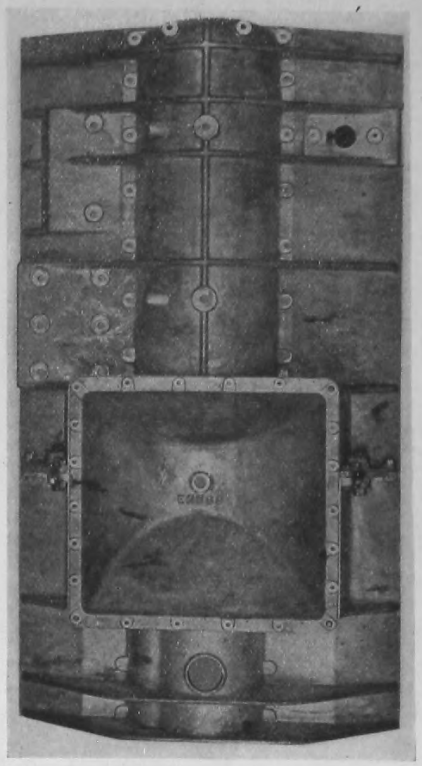
UNIVERSAL JOINT.



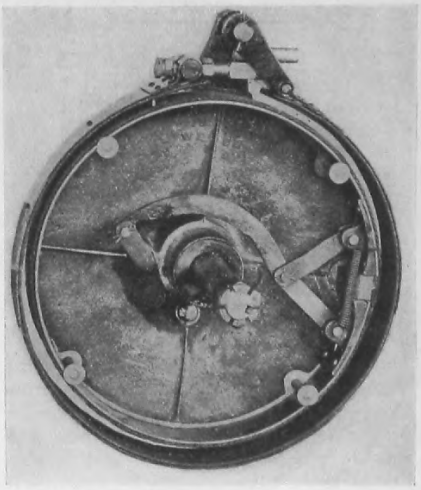
I BEAM FRONT AXLE.



REAR AXLE AND DIFFERENTIAL, MORA LIGHT FOUR, 1909.



MUDPROOF ALUMINUM PAN CONSTRUCTION.



DETAIL BRAKE CONSTRUCTION.

change gear is lined up with the motor by fitting in ways machined in the rear end of the power plant support. This cast supporting pan has been a feature of the Mora for some time past. Transmission to the rear axle is through a hardened steel block, square in the direction of rotation and rounded fore and aft; this slides in a square hole in a hardened steel casing fixed to the change gear shaft.

The rear axle is a modified Weston Mott construction, with four pitch driving levels mounted on special ball bearings. A neat adjustment is provided for the bevel pinion. The brakes are all on the rear axle and act on drums 14 inches in diameter. They are operated through long equalizers sliding in slots in the frame. The front axle is forged, and the wheels are fitted with ball bearings. A dropped pressed steel frame is used, which is a new departure for the Mora Company, armored wood having been employed on previous models. The front springs are semi-elliptic and the rear are of the platform type. Steering is by a combination of bevel gears with an internal gear and pinion. The emergency brake is interlocked with the clutch, but the foot brake is not interlocked.

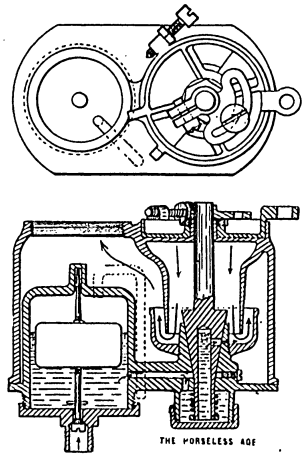
A specially designed carburetor is used. It has a single nozzle concentric with the float. The regular air supply passes through holes in the side of the nozzle chamber, and a cylindrical shutter may be operated to close these holes for starting. Auxiliary

air is admitted through a spring retained poppet valve.

The tires are 32x4 inch. The wheel base is 110 inches and the tread is standard. For this "light four" the Mora Company furnishes either a roadster body with room for four passengers and a touring trunk, or a "Racy-type" body with individual detachable rear seats.

The Harris Carburetor.

J. Harris, 2 Clinton street, Cleveland, Ohio, has brought out a new mixer or carburetor in which the gasoline feed is acted on whenever the throttle position is changed. A sectional elevation and a top view of the carburetor are shown herewith, these being reproduced from the drawings of the 1½ inch size of carburetor. By referring to the drawing it will be seen that the ordinary spray nozzle or standpipe is replaced by a conical plug valve. In the housing of this valve is a slot, and as the height of this slot is below the normal level of gasoline and the float chamber, when the engine is not running, the cup surrounding the valve will fill up with gasoline to the same level as the float chamber. This pool of gasoline at the

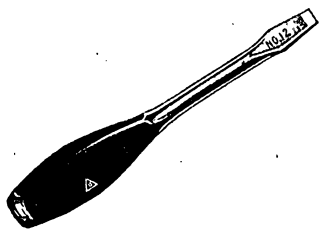


HARRIS CARBURETOR.

bottom of the cup serves as a priming means in starting the motor. The air is drawn in at the top of the mixing chamber and is controlled by a register valve. The flow of gasoline through the slot is controlled by the plug valve, and the air throttle and gasoline valve are connected together on top of the mixing chamber by a slotted quadrant and screw, as shown. The inventor claims that if the air and gasoline valves have been once properly adjusted to each other the carburetor will give a correct mixture of all throttle openings, as whenever the throttle valve is moved the gasoline valve is also moved in the same sense. This size of carburetor when made in brass weighs 3½ pounds.

The B. & S. "All Steel" Screwdriver.

A new and improved screwdriver complete in one piece has been brought out by the Billings & Spencer Company, Hartford, Conn. It is drop forged, of steel



throughout, and the point is carefully tempered. The handle is of special design, insuring a positive and easy grip. The claims made for the new tool are that there is nothing about it to loosen or get out of order, and that it is simple, light, effective and durable. These screwdrivers are made in eleven sizes, including two of heavier model with square shank for the application of a wrench.

Book Review.

Geschwindigkeitsmesser (Speedmeters), by Fr. Pflug. Published by Julius Springer, Monbijouplatz 3, Berlin. Price, 9 marks, bound in cloth.

This work is the result of the speedometer competition organized by the Mid-European Motor Car Association of Berlin in 1905. It deals not only with the various speedmeters and speed and distance recorders used on automobiles, but also with similar instruments used in railroad service. The subject matter is suitably classified, and the general treatment is a very satisfactory one. The author first takes up the need and the requirements made of speedmeters in railroad, automobile and street railway service respectively, then discusses the methods of mounting and driving in the various services. In the following chapters the various principles on which speedmeters may be based are described. The author mentions the following classes: Speedmeter with pump, speedmeter with variable liquid level determined by centrifugal force, electro-magnetic speedmeters, electric speedmeters, centrifugal governor speedmeters, speedmeters with disengaging means for the indicating hand, speedmeters with friction disc drive and clockwork for comparison, and miscellaneous types of speedmeters.

The greater part of the book is descriptive, and no less than 312 illustrations are used, but as quite a number of these are manufacturers' cuts the effect is not a very happy one. Fairly complete accounts are given of three prize competitions for speedmeters, that of the Great Berlin Street Railway Company in 1901, that of the Mid-European Motor Car Association in 1905, and that of the A. C. of France in 1906. A review of the more important German patents on speedmeters and a reference list to articles on the subject in current periodical literature complete the volume.

A. L. A. M. Standard Spark Plug.

The A. L. A. M. standard spark plug, which we illustrated in our issue of October 7, is said to have been adopted by nearly all of the members of the association. The mechanical branch has spent much time in determining the desirable features and dimensions. The so called Autocar spark plug, which was used for a number of years, had a seven-eighth inch, eighteen straight thread, the form or profile of the thread being the so called United States standard, with flat top and bottom of a width equal to one-eighth the pitch. This was the extent of the standard, and there was considerable opposition to standardizing any more than this of the spark plug. But as time went on it became clear that certain other elements of the spark plug should be defined. At first the mechanical branch decided on a "preferred construction," but recently it decided to standardize certain further features and dimensions, still leaving other matters as preferred construction.

The diameter of the thread, seven-eighth inch, was considered necessary in order to leave the spark plug manufacturers plenty of room for insulating material in the plug. The straight thread, in combination with a shoulder or flange which seats upon a gasket close to the cylinder, always gives a gas tight joint when the plug is screwed into the cylinder the same distance comparatively. In this connection the pitch of the standard, 18, is proper. It will be recalled that the pitch of the seven-eighth inch diameter A. L. A. M. standard screw is 14, but there another function, namely, holding power, and not a gas tight joint, is the desideratum.

The stock used in the manufacture of the plug is 1⅛ inch round, the hexagon head, having a short diameter of seven-eighth inch, being milled on this stock. The shoulder, which is intended to seat upon a copper asbestos type of gasket, has the same diameter as the round stock from which the plug is made, and is one-eighth inch thick or deep, having a face, the part seating upon the gasket, one-eighth inch wide. The blank, that is the portion below the shoulder or flange, has a minimum length of one-half inch. The dimension of this portion of the plug cannot be standardized, owing to the requirements of different types of engines, as water cooled and air cooled and those having different thicknesses of water jacket, etc. There was considerable sentiment against even stipulating a minimum dimension for this blank.

The question of whether the spark plug should have a recess adjacent to the shoulder was a subject of sustained debate in the mechanical branch. If no recess were provided it would mean counterboring the cylinder, and many thousands of engines which have been in use for some time are not counterbored.

In determining the diameter of the packing gland nut head, that is the separable portion of the plug which holds the insulation in place, one determining factor was that the distance across the corners of this smaller hexagon should be less than the distance across the flats of the larger hexagon, in order to make it possible to remove the plug from the engine with a socket wrench.

COMMUNICATIONS

Frame Beam Formulæ.

Editor HORSELESS AGE:

The writer has noted the criticisms of one of your correspondents of the formulæ used in the article on "Frames," which appeared in the issue of August 26. The writer does not hesitate to admit that the formula found in connection with the armored wooden frame is incorrect, and regrets that the error was allowed to pass through without his proper revision. But while your correspondent has criticised he has failed to show the correct procedure in regard to the treatment of beams of this character. I believe that your readers will be interested in the correct discussion of this matter.

In the well known formula, $f = \frac{M c}{I}$, for determining the stress in a beam, it is assumed that the material of the beam is homogeneous. For any other condition this formula must be modified. In the case of the armored wooden frame the modified formula affects the ultimate result only slightly.

Let us take a steel tube of rectangular section, Fig. 1, having a very thin strip of wood of area dA attached rigidly to the bottom, as shown, and at a distance y from the neutral axis. Let f_w and f_s denote, respectively, the stresses on a fibre of the wood and a fibre of the steel. Also let

E_w = modulus of elasticity of wood,
E_s = modulus of elasticity of steel.

Then by Hooke's law,

$$\frac{f_s}{E_s} = \frac{f_w}{E_w} = y$$

From this we have

$$f_w = \frac{E_w}{E_s} f_s \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The moment of the stress acting on the area dA is $S = f_w y\, dA$. Substituting in this the value of f_w from (1), we have

$$S = y \frac{E_w}{E_s} dA$$

That is, if we increase the area of the section of the casing in the ratio $\frac{E_w}{E_s}$, then we may consider the fibre stress over the whole section of the beam as being directly proportional to the distance from the neutral axis. We then have the section shown in Fig. 2.

If, now, we add enough of these wooden strips to completely fill the casing, dA becomes A (area of cross section of the core), and we can apply the same reasoning as in the case of the single thin strip. We then have the section shown in Fig. 3. If, now, we call I′ the moment of inertia of this new section, then the actual fibre stress becomes

$$f = \frac{M c}{I'}$$

A numerical example will make this clear.

Let E_s = 30,000,000 pounds per square inch.
E_w = 2,500,000 pounds per square inch (about).

We will assume the dimensions to be as shown in Fig. 4. The ratio

$$\frac{E_w}{E_s} = \frac{2{,}500{,}000}{30{,}000{,}000} = \frac{1}{12}$$

The depth of the shaded portion of the steel section is the same as that of the wooden core, 3.75 inches. Hence we find the increased area of the steel to be

$$\frac{3.75 \times .125 \times 2}{12} = .078125 \text{ square inch};$$

the factor 2 is for the two portions A and B. The combined area of these portions is

$$2 \times 3.75 \times .125 = .9375 \text{ square inch.}$$

Therefore the total modified area is

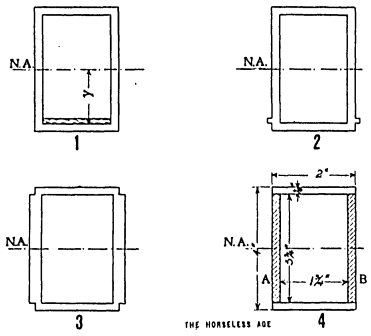
$$.078125 + .9375 = 1.015625 \text{ square inches,}$$

from which we find the thickness of the modified steel section to be

$$\frac{1.015625}{2 \times 3.75} = .1354 \text{ inch,}$$

as against .125 inch for the original thickness.

The moment of inertia of the steel section without the core is 2.976 and the moment of



FIGS. 1 TO 4.

inertia of the modified section is 3.068. Hence, the actual fibre stress in the steel is

$$\frac{2M}{3.068} = \frac{M}{1.534} \text{ pounds per square inch,}$$

as against

$$\frac{2M}{2.976} = \frac{M}{1.488} \text{ pounds per square inch.}$$

for the original steel section.

In regard to the formula $Z = \frac{39}{E.L.} W$, I regret very much that your correspondent has found this objectionable. I feel certain that engineers will be very thankful to him if he can suggest something better. His chief objection seems to be that the length of the frame is not taken into consideration. I beg to advise your correspondent that the length of the frame is considered, and in this way: The lengths of automobile frames as usually made vary between the limits 130 inches and 160 inches; that is, for the type of car for which the formula was found, namely, medium runabouts and touring cars, there are a few which have a length of less than 130, as well as a few having a length greater than 160 inches, with three or four as long as 190 inches; but practically 90 to 95 per cent. of the frames have lengths lying between the limits first given. We may then safely take a mean of these limits, or 145 inches, and regard this as the length of our ideal frame, in which case the length of the frame may be eliminated from our formula.

The formula given has been applied to a number of successful frames and found to be entirely satisfactory. It may be true that, as your correspondent says, the fact that "the formula has been derived from frames which have 'stood up' is no criterion that the frames were properly designed, as they may have been heavier than necessary." The fact that these frames have "stood up" is, however, a criterion that they were not too weak. Out of a number of frames examined some were found to have a constant much less than 39 and others much greater. Inquiry in regard to the former led to the same result, namely, that these frames invariably failed after short service. On the other hand, frames having a higher constant than 39 were found to have a higher factor of safety than was warranted.

In conclusion it will be of interest to have your correspondent give us a rational formula for the design of a frame, said formula to take into consideration the following conditions:

1. The frame regarded as a continuous beam supported at four points and irregularly loaded.
2. The length of the frame.
3. The width of the entire frame structure (this is necessary, since the width of the frame will affect its rigidity and, therefore, its strength).
4. The effect of cross members on the strength of the frame.
5. The additional stress imposed by the twist of the frame when one wheel passes over an obstacle. In other words, the extent of the twist must be determined, and from this an equivalent bending moment.
6. Offset and bends in the frame.

There are other factors, such as temperature, but it will be sufficient to take into account only those given above. No reasonable being would dare to undertake the problem. A result might possibly be obtained, but it would be of no value to an engineer.

The writer is pleased to note that the article has aroused some interest in this subject. He did not expect that it would be free of criticism. ASHER GOLDEN.

Is There a Scavenging Action in Four Cylinder Motors?

Editor HORSELESS AGE:

I have read with interest the many able articles on gas engine design which have appeared in your paper, particularly the articles on valve timing. I understand that the practice now is to cause the exhaust valve to open before the crank has reached

the outer centre (say about 30 degrees) and to close it slightly after the inner centre has been reached so as to take advantage of the scavenging action of the momentum of the exhaust gas column. I can see how such a force could be present, under the above valve conditions, in the case of a single cylinder engine, but how it can exist in a four cylinder engine exhausting into one pipe I cannot understand.

It would seem to me that some time before the scavenging stroke in one of the cylinders has been finished the exhaust valve in another cylinder completing its combustion stroke would have opened, and a heavy rush of gas, under a pressure of perhaps 40 pounds, would have filled the exhaust pipe. If there is any back pressure it would be strongest at this moment, and yet this is the time when another cylinder is taking advantage of the momentum of its own exhaust gas column. Would not the rush of gas from one cylinder completely offset any possible momentum resulting from the previous explosion in another cylinder? SUBSCRIBER.

[This matter was rather fully discussed in an article in our last week's issue (which, of course, you had not seen when you wrote your letter). There is undoubtedly a slight injector action with the usual form of exhaust manifold. Suppose, for instance, that the forward cylinder is exhausting, then the column of gases will rush through the manifold from the front at considerable speed, and owing to their inertia the gases cannot instantly reverse their direction of flow into the branch of the manifold to one or the rear cylinders which joins the main body of the manifold at an angle of, say, 45 degrees. This injector action would, of course, be increased by so arranging the manifold that the discharge from all of the branches is parallel to the main channel of the manifold and the discharge opening in the centre of the latter, instead of in the side wall. There would be practically no such injector action if the branches of the manifold join the main body at right angles, as is often the case.

It is to be doubted whether there is much object in the average engine in keeping the exhaust valve open longer than a few degrees past dead centre, as the pressure remaining in the cylinder at the end of the exhaust stroke must necessarily be less than the pressure in the cylinder whose exhaust valve has just been opened, and it is doubtful whether at this time there really is an injector action with the average form of manifold.—ED.]

Hart, Mich., Exceeds Waukesha's Auto Record.

Editor HORSELESS AGE:

I notice that an item in your issue of October 7, page 511, claims for Waukesha, Wis., the largest number of automobiles in proportion to population, that city having one to every 220 people. Now this little village of Hart, located in the fruit belt of Michigan, has one automobile to every forty-five inhabitants, having thirty-five autos and 1,600 people. We have no mineral waters nor good roads, nor are we visited by any large number of automobilists, but we do claim to produce the greatest variety of food products and the best class of citizens, whom we compel to drink pure, unadulterated artesian well water, because we have no saloons. There are many little towns that will beat Waukesha's record. The use of the automobile is spreading very fast in the country.

L. P. MUNGER, M. D.,
President Oceana Auto Club, Hart, Mich.

An Appreciation of the Runabout Number.

Editor HORSELESS AGE:

I consider the Runabout Number of THE HORSELESS AGE one of the best special numbers ever issued by you. After reading what the various physicians from all over the country have to say, I think it will be conceded that they are almost unanimous in their general specifications of the car most suited to their business. A few years ago such a condition of things could not have existed. The Runabout Number is full of meat to be digested by manufacturer, user and prospective user.

W. WEBSTER ENSEY.

A Cork Insert Brake.

Editor HORSELESS AGE:

Referring to H. L. A.'s inquiry concerning cork inserts being used in brake bands, you stated in the September 30 issue of THE HORSELESS AGE that such were in use by the F. B. Stearns Company, Matheson Motor Car Company and Chadwick Engineering Company.

Kindly be advised that the Premier Motor Manufacturing Company has successfully used cork inserts in connection with the brake shoe for the past season. In fact, we were among the first to use cork inserts, and some time ago the National Brake and Clutch Company, in a published article, called especial attention to the efficiency of the Premier brakes, as well as the general satisfaction which had resulted from the use of the cork inserts.

We are sending you under separate cover a photograph which is a fair illustration of the Premier brake bands. From this you can get an idea of the cork inserts such as are used in our internal brake shoe band. We are also sending a circular just issued by the National Brake and Clutch Company concerning cork inserts. On page 13 you will find that special reference is made to the Premier brake.

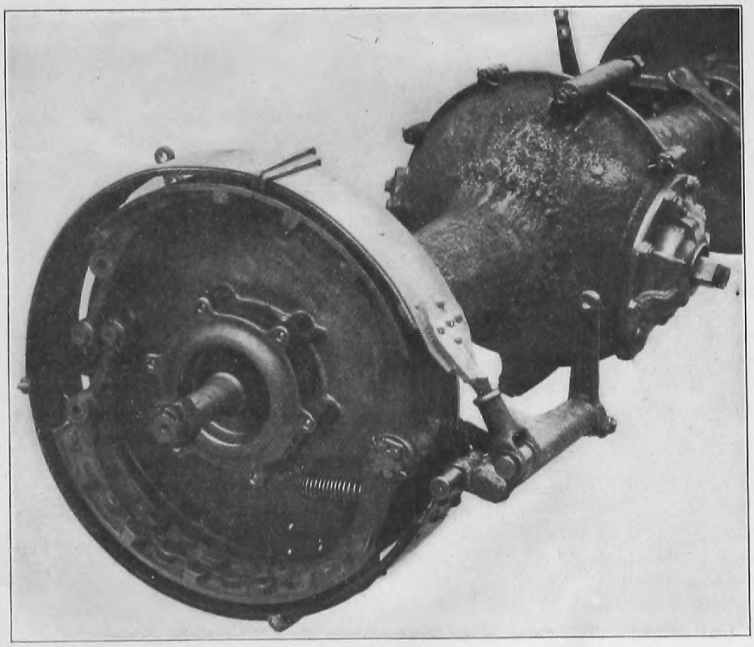
PREMIER MOTOR MANUFACTURING COMPANY,
R. W. Macey, Jr.

Unequal Splash Lubrication of Opposed Cylinders.

Editor HORSELESS AGE:

In your issue of July 22, page 114, you answer a correspondent who had trouble with heating one cylinder of a double opposed motor, and close by saying: "The sooting may be due to the fact that this cylinder may receive more oil than the other one, as often happens in double opposed motors with splash lubrication."

I am having a serious time with a motor of the same construction, but find myself unable to prevent the one cylinder from obtaining more than its share of oil—that is, always on opening the drain cocks after running even a few minutes the right or forward cylinder will show from a teaspoonful to a tablespoonful of oil, whereas the other hardly ever discharges oil, even when experimentally and for a short period the oiler



PREMIER "CORK INSERT" BRAKE.

to the right cylinder has been cut down to two drops per minute.

The machine is practically new and has not been abused. The piston rings are anchored in place, and the openings cannot be turned to the bottom. A suggestion would be thankfully received.

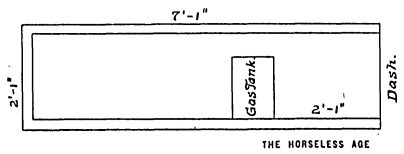
E. R. SHEPHERD.

[The only possible remedy that occurs to us is to place a baffle plate of sheet steel between the overlubricated cylinder and the crank case, with a slot in it to allow for the passage of the connecting rod. This expedient is resorted to in some vertical motors with splash lubrication to prevent overlubrication of the cylinders. If the piston should overtravel the cylinder bore it would of course be impossible to place the plate between the cylinder and crank case, but it might then be possible to secure it in place in the crank case. In any case it would be necessary to lay it out to dimensions very accurately.—ED.]

Wants to Buy a Taxicab Body.

Editor HORSELESS AGE:

I wrote you some days ago regarding a taxicab, but after overhauling my 1906 Autocar I find it in good condition, and I have about decided to put a low priced taxicab body on this chassis. I enclose you meas-



urements; and can you assist me to buy one of these bodies complete of some body manufacturer? The only ad I noticed in your paper is of an aluminum body, but I think they would be too high priced for me.

H. A. HUBBARD.

The Cameron Car in the Sweepstakes Races.

Editor HORSELESS AGE:

On page 538 of your October 14 issue mention is made of the Sweepstakes races, held on Long Island October 10. Referring to the Nassau Sweepstakes, you say: "The Cameron, which suffered somewhat from tire and mechanical trouble, was second."

We beg to correct this, and advise that our car did not stop for a single second on any account whatever from the start to the finish of the race. We enclose herewith a little circular in reference to this event, and if you will take the trouble to notice the performance of the Cameron you will see that we made the course in the most regular manner, there being but 11 seconds difference between any two of the four laps.

We have laid a great deal of stress on this feat, as it is absolutely a fact, as stated in our circular, that we made the four circuits with more regularity than any of the competing cars, large or small. On this account, and also because we were the only air cooled contestant, we trust that you will correct the line referred to above.

CAMERON CAR COMPANY,
H. W. Doherty,
Sales Manager.

Road Congress Deliberations.

The main topic of discussion at the International Good Roads Congress, which met in Paris last week, was the destructive effect of automobile traffic on macadam roads. It was held that when the traffic was confined to horse vehicles the roads tended to remain in repair, because the narrow iron tires crushed the stone and so formed new filling material to replace any that might be removed in the form of dust or mud. The broad tires of automobiles, on the other hand, exert a strong suction effect, which is estimated by Colonel Bromwell, superintendent of public buildings and grounds at Washington, at no less than 200 pounds per square inch, with the result that the filling material is drawn out from between the stones and blown away.

There was a marked unanimity as to the character of road required to withstand the ravages of auto traffic. Most of the delegates agreed that it must have a well trained solid foundation, and be built of some hard aggregate bound together by tough, elastic binder, waterproof and free from dust or mud. The road should be hard enough for automobiles, yet soft enough for horses' feet. How to realize this ideal road, however, caused much diversity of opinion.

Aside from methods of road bed construction, there was a general agreement upon the following points: Main highways must in the future, wherever possible, be air lines between important centres, with branch roads connecting up to the main lines for local traffic. There should be no curves on the main roads of smaller radii than 300 feet in the open country and less than 150 feet in the hills. Reverse curves should be avoided, also steep grades with curves, and level railway crossing and the outer edge of curves should be raised. Opinions as to width varied greatly, but the average was a minimum of about 30 feet.

In his paper on the subject Colonel Bromwell pointed out that if park roads cannot be modified to meet the new conditions they will rapidly deteriorate and become useless. Colonel Bromwell's idea is that park roads should be so constructed as to meet the somewhat contradictory requirements of being smooth and elastic in surface for horse vehicles and smooth and hard in surface, and not too slippery, in order to be suitable for the motor traffic. The road of the future, he thought, should be composed of some tough elastic material, bound together by another material possessing similar qualities. Such roads would cost more originally, but the maintenance would be less.

To obtain an ideal road Colonel Bromwell suggested the interposing between the base course of the macadam and the top course of a layer of asphaltic or tar compound, carried for convenience in a sand base. If the top course was then rolled and compacted the compound could be forced up into the interstices of the upper course, thus thoroughly binding the stones together and forming a top course of asphaltic or tar concrete. Just enough top dressing should be applied to fill up the larger interstices of the top course, and this top dressing should contain little or no dust or very fine material.

The congress created a permanent international committee to collect and disseminate the results of experiments. There was a marked tendency during the congress in favor of legislation to compel automobile manufacturers to build motor cars incapable of exceeding the speed limits. The next meeting will be held in Brussels in 1910.

More Combination Rumors.

Of the two amalgamations in the automobile industry, heralded some time ago, the Wayne-Northern combine has been completed, while the Maxwell-Buick negotiations have apparently fallen through. At least this conclusion was drawn from the announcement of a $500 runabout model by the Maxwell-Briscoe Company a few weeks ago. There are, however, renewed rumors of automobile combines in the air. Thus it was reported around late last week that negotiations were pending looking toward a combination of the Cadillac, E-M-F, Chalmers-Detroit and Maxwell interests. Benjamin Briscoe was in Detroit on Friday, which may have been one of the facts on which this rumor is founded. Another rumor is to the effect that the Buick and Olds companies are considering a proposition to combine. There can be little doubt that negotiations of this sort have been carried on for some time betwen various firms in the automobile industry, but, of course, in matters of this kind "there is many a slip."

Fort George Hill Climb Postponed.

The New York Automobile Trade Association has postponed its Fort George Hill Climb from Saturday, October 17, to Tuesday, November 3 (Election Day), owing to the fact that the mayor of New York city vetoed the bill granting permission for the climb. In a message to the Board of Aldermen the mayor said: "I am of the opinion that the speed regulations in this city should not be dispensed with except under the proper supervision of the police commissioner, at the request of responsible clubs or associations." A new bill has been drawn up and is expected to meet every objection of the mayor. The motorcycle event has been cancelled for the reason that on the new date set for the event the Federation of American Motorcyclists will hold its national championship contests. It is announced that in all probability the events will be contested under the rules and with the sanction of the American Automobile Association.

Commercial Applications.

Motor Farming in Western Kansas.

By J. W. Morrison.

In Cheyenne County, in the northwest corner of Kansas, two gasoline farm motors are being used to do the work of the farms, and they are claimed to do it much more cheaply and expeditiously than it could be done by men and horses. The motor tractors not only pull plows and discs to break up the heavy prairie sod, but they are used in harrowing, seeding and harvesting. And when the crops are harvested the motor tractors are used instead of horses to haul the grain to the nearest railroad towns.

Two men who had heard that these things were being done out in what has been called the "Great American Desert" started on a tour of exploration to find out. After driving many miles over the almost pathless prairie a cloud of dust attracted their attention, and on a nearer approach they heard the chug, chug of the motor and saw one of the machines at work. It was moving easily along, tearing into shreds a great swath of tough turf. On the seat of the motor sat a young man, H. C. Denny, who, together with his father, G. W. Denny, owns 3,500 acres of land 13 miles south of St. Francis. The travelers drove nearer for a closer view of the motor. In the immense drive wheels were spikes 3 inches long, that gave a firm hold on the ground and enabled them to exert the immense pulling power required of them. Hitched behind were two discs weighted down with sacks of stone.

"How much ground do you cover each time you circle the field?" the young man was asked.

"These two discs cover 19 feet of ground," said the farmer-engineer. "Father has just gone with our only team, however, to get another disc, as the motor is not doing all the work it can. When we hitch on the other disc we will cover 26 feet. The field is a mile long, and each time we go around it with the three discs we turn up 8 acres of sod."

The young man said he needed no helper. Enough water was put in in the morning for cooling purposes, and the tank held enough gasoline to last two days. The motor weighed between 5 and 6 tons. Its driver said a steamer of the same power would weigh 18 tons.

The elder Denny came back with the third disc. It was attached to the motor, which moved easily away, leaving 26 feet of sod undisturbed for ages torn to shreds. As the strangers watched the elder Denny talked:

"If you hire it done it costs $2 an acre to break prairie with a team, or you give probably 50 cents an acre and the first crop, which is more than $2. We have not kept accurate account, but my estimate is that when it is as dry as it is now we use 2 gallons of gasoline to the acre. I expect to thresh my grain by motor power and haul it to town in wagons strung behind the motor or in a big tank on trucks. I can pull two tanks easily that hold 300 bushels each. Our Western prairies lend themselves readily to the hauling of big loads.

"My estimate is that it will take $4 worth of gasoline to haul 500 bushels of wheat the 13 miles to town and bring the motor back home. The man's time, oil and other other expenses will bring the cost up to $9, possibly $10. With teams the same amount of hauling would cost $30.

"Yes, of course, they are expensive yet, more expensive than they will be later, just like automobiles. This one cost me $2,800. An automobile? Oh, yes, I own an automobile, too."

Seven miles down the Republican River from St. Francis another motor was found. This one belongs to Jerry Lyons, who owns 1,900 acres.

"Coal costs $9 a ton here," said Mr. Lyons, "and with the engineer, fireman, water and coal haulers I found a steamer too expensive. What we farmers want is more crop with less expense, and we want to work without being too dependent on hired help. I've lived here twenty years. They are using motors in North Dakota some, but they're a new thing. I talked with a man from there who said they started one motor plowing on one section of ground and sixty horses and twelve men on an adjoining section, keeping track of the expense. The breaking done with teams cost $2.85 an acre; that with the motor 65 cents.

"Yes, I expect to harvest with it, but I'll do my fall plowing of the ground at the same time, hitching my binder far enough behind the eight plows to drop the bound bundles on the plowed ground behind the plows. Then when I'm through harvesting I'm through plowing.

"What is the comparative cost of teams and a motor? My experience is that with a gasoline farm motor I can do all farming operations at one-fourth the cost with which the same work can be done with men and teams or a steamer.

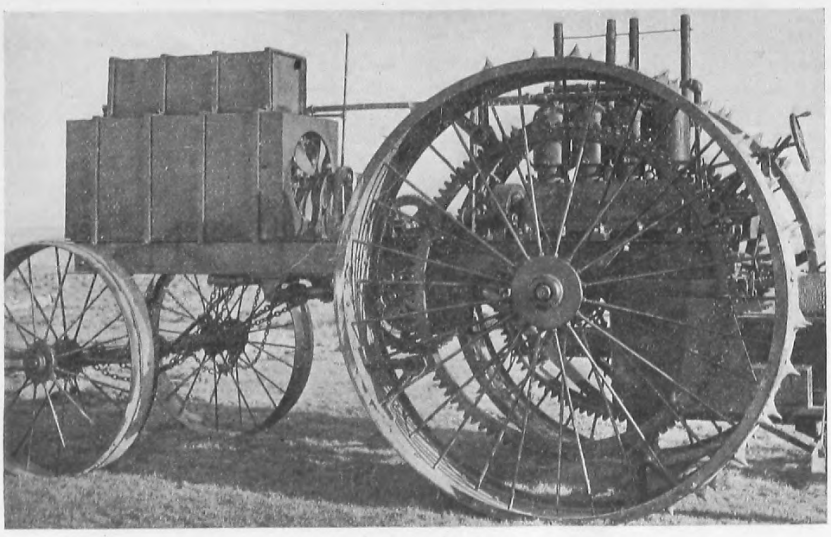
"I measured my land, and I measured my gasoline, and I broke this heavy river bottom sod—with mold-board plows, mind you, not disc plows—4 and 5 inches deep, with 1½ gallons of gasoline to the acre. My neighbors breaking the same kind of sod with horses find that it takes three or four good horses on one plow, and they average about an acre a day, which agrees with my figures that it costs me with teams $3 an acre to break river bottom sod. I can get gasoline at 16 to 17 cents a gallon. You can figure it out for yourself—25 to 30 cents an acre. In that heavy ground we break 15 to 20 acres a day with the motor, using eight mold-board plows and one man on the engine and one man to handle the plows, doing as much as fifteen to twenty men and fifty to sixty horses by the team method."

Commercial Notes.

The Board of Public Safety of Springfield, Ohio, is considering the plan of purchasing automobiles for the police and fire department chiefs.

Five members of the fire department committee of the New Bedford, Mass., city council, last week made a trip to Bridgeport, Cann., to make delivery of and drive home the new motor chemical fire engine built there for the New Bedford department.

J. C. Curtis, general manager of the C., B. and Q. Railroad office in Huntington, Ind., has petitioned the council of that city for a franchise to operate a motor transit service in the city streets. Four large cars will be operated over regular routes, and the promotors offered to make any necessary improvements in the streets.



Motor Agricultural Tractor in Use in Western Kansas.

LEGISLATIVE and LEGAL

Official Inspection of Taximeters.

By Xenophon P. Huddy, LL. B.

For some time there have been in operation public vehicles with instruments called "taximeters" attached, that compute the fare to be paid by those carried, according to the distance traveled and the time for which the vehicle is engaged. Presumably these instruments are fairly accurate, although there is no safeguard against "short measure" other than that which may be found in the criminal statutes. A taximeter may be too fast or too slow. If the instrument is too fast then the customer pays too much money for the service according to the contract existing between the carrier and the passenger. If the taximeter is too slow, then the advantage is on the side of the passenger. Who is to determine and who is to know whether these public carriers who are using instruments to measure the fare are making correct charges for transportation?

The taximeter is a new instrument and may be said to be used for the purpose of measuring distance. It may rightfully be called a measure, since its purpose is to measure the distance traveled by a taxicab, upon which measured distance the compensation is to be computed according to the scheduled rates of the operating company. I believe that no one will dispute that the taximeter is in the common and ordinary acceptance of the term a measure of distance, if you please, of linear feet, yards or miles. It is a yardstick in a certain sense. The idea that the taximeter constitutes a measure may strike some as novel, but upon reflection the character of this instrument as a measure will readily be appreciated.

The United States Government has established certain units of measurement. The States of the United States have by legislation also fixed certain units of measure. There are a standard yard, a standard pound for weight, and so on. Realizing that the public is more or less dependent upon the accuracy of the instruments used by various dealers, statutory regulations have been enacted requiring scales and various measures to be inspected annually, or otherwise to be compared with the standard, accurate units, and to be sealed with the seal of the Government by an official sealer, whose duty it is to see that measures are accurate. In New York, for example, there are State, country, city and town sealers. Sometimes the duty to test scales and measures is imposed upon municipal corporations. The various inspectors and sealers are compelled to give bonds for the faithful discharge of their duties and to perform their work in accordance with the legal requirements of the statutes. The public have a right to the protection which these laws afford.

When one hails a taxicab with the object of engaging it he offers to purchase a ride according to the established tariff as indicated by a *correct* taximeter. He does not agree to pay for a ride according to the reading of an incorrect instrument, no matter whether the inaccuracy is due to mere mistake or actual fraud. The taxicab company sells and the passenger buys a ride. The situation is similar in the case of a person going into a store and buying a pound of butter or so many tons of coal, in which latter cases the scales by which the commodities are weighed must be inspected and sealed every so often by the public sealer. Taximeters are not now inspected, nor are they sealed. There is no supervision over them whatsoever. But should there not be? The Public Service Commission of New York has recently taken jurisdiction over gas meters, and has caused several thousands of these instruments to be inspected.

It is the duty of inspectors and sealers to inspect and seal all measures, to have a correct standard unit, and to test the various measuring machines or appliances used in dealing with the public. Thus far the public officials charged with this work have failed to perform the duties of their offices with respect to taximeters. It may require some mechanical knowledge to properly inspect a taximeter, and the official may be compelled to have on hand in his office a correct instrument for purposes of testing and comparison. Of course, taximeter manufacturers and taxicab concerns may make some opposition to placing their instruments under the jurisdiction of the authorities having control over weights and measures. Nevertheless, it is a right belonging to the public which should be enforced. In New York undoubtedly the Public Service Commision has jurisdiction over this matter.

In case it can be shown that a taximeter is out of order no charge can be made for the service, since the measure is false. If a taximeter is intentionally used which is known to be incorrect, then under the old common law the user may be indicted for using a false measure. Under the statutes of the various States this is also made a crime. To neglect or to refuse to have a measure sealed ordinarily entails a statutory penalty, and to use a measuring instrument which has not been sealed in many jurisdictions constitutes a misdemeanor. It is more than probable that the taximeters used on taxicabs in the cities come within at least the spirit of the provisions of the weights and measures laws.

There may be some question as to whether a taximeter is included within the present New York ordinance, which provides for measures of *things* sold. A ride is not looked upon as a chattel, consequently it may not, ordinarily, be called "a thing"; however, by a broader construction the term may include "anything tangible or *intangible*," in which latter case a ride which is purchased is included.

I have written this article merely as a discussion of the question and as suggestive rather than from a partisan standpoint.

What the New Jersey Test Case Is to Establish.

We recently referred to the case to test the constitutionality of the Frelinghuysen automobile law brought by the Associated Automobile Clubs of New Jersey, and which will be conducted by ex-Governor Griggs. The associated counsel, a New York lawyer, has given out the following statement of the objects aimed at in the case:

The intent is first to establish the principle that every citizen of the United States has a right to travel through a State in any kind of a vehicle, subject only to reasonable police regulation and not subject to a specific burden or tax, as is now exacted by the State of New Jersey.

Second, it is intended to settle the question whether the present mode of licensing resident autoombilists is in accordance with the constitution of the State of New Jersey, when it states that all taxation shall be based on the standard of "true value."

These two great fundamental principles are the proposed points or differences to be established, and in fighting for these principles we are assured that there is every prospect of success.

Parts Maker Sues Automobile Manufacturer.

Harvey L. Hooke, receiver for the Muncie Auto Parts Company, Muncie, Ind., on October 10 filed a declaration in the Federal court at Peoria, Ill., against the Bartholomew Company, of the latter place. The Parts Company claim that the Bartholomew Company gave them three promissory notes on the 17th of October, 1907, for $2,000 each, the first one for sixty days from date, the second to be paid January 1, 1908, and the third for ninety days from date, all to draw interest at 6 per cent., and also that the Bartholomew Company owed them $8,548.50 on account for merchandise, etc.

Charlotte, N. C., to Legislate Against Garages.

When some time ago the Southern Automobile Company, of Charlotte, N. C., rented rooms under the Auditorium for a garage and salesroom complaint was made to the board of aldermen that such an establishment was to be allowed under a public building. The matter has been considerably agitated locally, and the following ordinance is to be voted on by the city council this week:

Be it Ordered by the Board of Aldermen of the City of Charlotte:

Sec. 1. That no garage, or place where automobiles are kept, repaired or replenished with gasoline or other inflammable oils or liquids shall be established, conducted or maintained within the fire limits of the city of Charlotte; provided this section shall not apply to persons keeping not more than two automobiles for their own individual use.

Sec. 2. Any person, firm or corporation proven guilty of violating any provision of this ordinance,

shall, upon conviction, be subject to a penalty of $50 for each day of such violation.

Sec. 3. This ordinance shall go into effect the 15th day of November, A. D. 1908.

Legal Notes.

Alderman Otis, of St. Paul, Minn., plans to have introduced at the next session of the legislature a bill requiring all automobiles operated in the State to carry uniform number plates.

Judge Babst, of Bucyrus, Ohio, has handed down a decision in the Drolesbaugh test case, pronouncing the Ohio licensing law constitutional. The case will be carried to a higher court.

Mayor D. S. Rose, of Milwaukee, has recommended to the chief of police that a motorcycle squad be added to the police service. Two plain clothes men have been supplied with motorcycles.

Oliver A. Quaile, president of the New York State A. A., who was arrested at Glens Falls, N. Y., in June last for speeding, and was convicted and fined, succeeded in getting the conviction set aside, and was exonerated on appeal on October 9.

The Cincinnati Professional Chauffeurs' Association in a petition to Mayor Markbreit has declared itself in favor of a traffic ordinance similar to that in force in New York City, which compels heavily laden vehicles to keep near the sidewalks, leaving the centre of the street free to lighter vehicles.

The little town of Hazelton, Ind., incensed over the speed of automobiles going through the place, has passed an ordinance limiting the speed to 8 miles an hour. In addition it is made compulsory on the part of drivers to sound their horns at least twenty times a minute while passing through the town. No automobiles are owned in Hazelton.

Without any special effort to pass the bill, the special session of the Indiana Legislature adjourned without repealing the 3 mile gravel road law. Under the law about $8,000,000 worth of road work has been done during the last two years, and although farmers complained of it, the Legislature thought best not to do anything to injure the good roads movement.

The test case of the New Jersey Automobile and Motor Club to test the constitutionality of the Frelinghuysen automobile law was commenced on October 6, when Frederick J. Kane, of Woodhaven, L. I., was arrested by prearrangement at Paterson, N. J., for operating an automobile without a New Jersey license. The case will be conducted for the club by former Attorney General John W. Griggs.

The common council of Fond du Lac, Wis., has passed an ordinance requiring all garages to be made fireproof, present buildings rebuilt, and new ones according to the new code. It was at first decided to condemn all garages in the business district, but protests were made. The ordinance is the result of the recent $250,000 conflagration, the origin of which is said to have been in the Crescent Auto & Garage Company's building.

The Corporation Counsel of the District of Columbia has been asked by the District Commissioners for an opinion as to whether the permit clerk of the engineer department is authorized under the law to issue more than one license plate and to register the same if the ownership of the motor vehicle has not changed, but when the original plate has been lost; also, if after the original plate has been recovered by the owner after the issuance of the second tag, the fee for the latter should be refunded.

M. R. Nyman, vice president of the Thomas automobile service in Chicago, was arrested recently on a charge of grand larceny made by the Coey Automobile Livery, of which Nyman was formerly manager. It is alleged in the complaint that Nyman appropriated to his own use $443 collected for the Coey concern. Nyman had previously caused the arrest of William E. Walsh, cashier for the Coey Livery, on the same charge, but when Walsh was placed on trial the charge was dismissed at the instance of the Coey Company and a warrant for Nyman's arrest issued.

The Massachusetts Highway Commission has revoked the license of Frank B. Comins, of Sharon, Mass. Comins recently endeavored to pass J. P. Allen on a curve in Newbury, when the two cars suddenly came upon J. L. Hale, of Newburyport, in another automobile coming in the opposite direction. A collision occurred, and the case was brought before the highway commission, who revoked Mr. Comins' license. Mr. Comins claimed that Mr. Allen was monopolizing the road. The latter's side of the case was not heard, as he is not a resident of Massachusetts and refused to appear before the commission.

Motorcycle Firms Trade Combine.

The bicycle and motorcycle department of the Light Manufacturing and Foundry Company, Pottstown, Pa., has been consolidated with the Merkel Motor Company, of Milwaukee. The new firm will be known as the Merkel Light Motor Company. It will occupy four floors of the brick building at the corner of Fourth and Hanover streets, Pottstown. Besides manufacturing bicycles and motorcycles, motors for railroad inspection cars, such as are used by section foremen and employees of railroads, will be made. Some of the employees of the Merkle plant have removed to Pottstown and some machinery has also been shipped there.

C. Herbert Moore, mayor of Spokane, wants a pair of automobiles to facilitate the work of the fire chief and board of public works and city engineer. In a letter to the council he requests that body to appropriate funds for the purpose of purchasing machines for the use of these officials.

Electric Vehicle Company Business to Be Continued Four Months.

Halsey M. Barrett and Henry W. Nuckols, receivers of the Electrical Vehicle Company, of Hartford, Conn., have been authorized by an order of Judge Shumway to continue the business of the company for another period of four months. The court also approves the semi-annual report submitted by the receivers.

The Cleveland Endurance Contests.

At Cleveland, Ohio, a three days' endurance contest was held last week, under the auspices of the local automobile club. It was run under substantially the same rules as the recent Chicago endurance contest, an examination of the cars following the runs. Following is the final score:

Car.	Driver.	Score.
Maxwell,	C. G. Bleasdale	1000
Thomas,	George Sperry	1000
Franklin,	C. S. Carris	1000
Garford,	E. E. Ernest	1000
Garford,	C. R. Wedler	946
Stoddard-Dayton,	H. S. Moore	922
Chalmers "30,"	J. H. Stickney	791
Chalmers "40,"	Sam Emerson	791
Jackson,	Grant Johnson	791

New International Race Rules.

The committee of the recognized national automobile clubs, in convention at Paris on October 19, adopted new racing rules, according to which the weight of the racing cars must hereafter not be less than 900 kilograms (1,980 pounds), and the cylinder bore of a four cylinder motor not more than 130 millimetres (5⅛ inches appr.). Under the Ostend rules now in force the limits are 1,100 kilograms (2,420 pounds) and 155 millimetres (6⅛ inches), respectively.

St. Louis Show Date.

The St. Louis Automobile Manufacturers' and Dealers' Association held a meeting at the Washington Hotel on October 7 and decided on February 15-20 as the date for next winter's show. Two propositions were considered, viz., a five and a six day show, and a majority of the votes was cast for the six day show. At the same meeting the following officers were elected: President, O. L. Halsey; vice president, E. J. Moon; treasurer, Samuel Primm; secretary, Robert E. Lee.

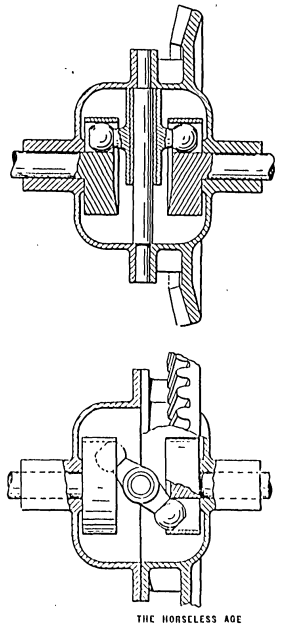
Alcohol Fuel Tests.

A representative of THE HORSELESS AGE recently had a ride in a special taxicab built by the H. H. Franklin Manufacturing Company. Alcohol was used as fuel in a regular Franklin motor suitably altered as to compression and carburetion. It appeared from the performance of this car that alcohol is an excellent fuel for motor car purposes. The motor is powerful, flexible and "sweet." Some difficulty in starting is the objection which remains to be overcome.

OUR FOREIGN EXCHANGES

A New Gearless Differential.

A novel and ingenious differential device, entirely dispensing with toothed gears, is illustrated in a recent issue of the *Automotor Journal*. It is the invention of Reginald Donkin, whose address is not given. As will be seen from the two views herewith, the side gears of the ordinary differential are replaced by circular discs, and diametrically through the centre of the housing extends a stud or shaft, on which a hub is arranged to slide, this hub carrying two laterally extending arms with ball ends. The balls are located in cylindrical holes in the discs at a certain distance from the centre. By looking at the drawings it will easily be seen that when the casing is held stationary and one of the differential shafts is turned in one direction, the connecting member between the two discs will have a combined sliding and rocking motion, and the second differential shaft will be rotated in the opposite direction to the first. The differential is here shown more or less in diagrammatic form, and if made as shown the balls would only have a line contact with the disc. In order to insure long life it would be necessary to provide sockets for the balls, of cylindrical form on the outside, and this arrangement has been adopted in a gear on this principle actually constructed. A number of variations in form embodying the same principle are possible, and in one form constructed the discs at the ends of the differential shaft are in the form of eccentrics with their outer surfaces rounded, and the connecting member is in the form of a cylindrical shell, into the ends of which the two eccentrics fit.

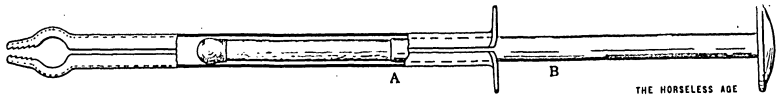


DONKIN GEARLESS DIFFERENTIAL.

It is stated that a device based on this general principle has been used for the office of a reversing gear in the United States, and it can be easily seen that if the power is applied to one of the side shafts the other side shaft will be turned in the same direction if the two are locked together, and in the opposite direction if they are freed and the casing is held stationary. Mr. Donkin believes, however, that he is the first to apply this mechanism to the purpose of a differential on a motor car.

Lamp Lighter.

A novelty of distinct utility has made its appearance in France in the form of a match lighter and holder with which the match can be ignited and held within the lamp out of reach of the wind, thus preventing the annoying and exasperating failures to light the lamp on a windy night. The sketch of the device is practically self explanatory, and is very simple. The body A is a light metal stamping, one end of which is corrugated to provide a frictional surface to ignite the match, and also to hold it, and the other end is flared to provide a grip for the fingers. A plunger B fits into the tube, and is provided with a button head. In operation the match is slipped into the tube, and the plunger inserted. The instrument is then grasped in the hand, and the end inserted inside the lamp. The lamp can be fitted with a small aperture covered by a slide, or else the door can be opened a quarter of an inch. The thumb then depresses the plunger, which pushes the head of the match through the corrugated ends, thus igniting it.



MATCH IGNITER.

Statistics of the German Automobile Industry.

The German Department of the Interior some time ago took up the collection of data regarding the growth and present status of the German automobile industry, in which it was assisted by the several trade organizations. Question blanks were sent out to the various manufacturers, and by them filled in and returned to the department. The work of compiling these statistics has now come to an end. The statistics cover only the period up to 1906. They show a rapid growth both of the number of workmen employed in the industry and of the value of the products. Owing to the fact that many of the largest automobile manufacturers in Germany are also engaged in other lines, such as the manufacture of bicycles, typewriters, sewing machines and machine tools, the task of obtaining separate figures for automobile production, etc., involved some difficulty. The following figures, which are provisional, show the rapid growth of the industry since the begining of the century:

	1901.	1903.	1906.
Number of workmen employed	1,589	3,289	10,347
Wages paid in millions of marks	1.81	3.82	13.32
Value of products in millions of marks	5.66	14.11	51.04

Long Stroke Motors.

The manner in which freaks are developed by races and racing formulæ is well shown by the abnormal cylinder proportions of the cars which competed in the recent voiturette race in France. The bore for a single cylinder car was limited to 100 mm. (substantially 4 inches). The two Sizaire-Naudin cars, which secured first and second places respectively, had single cylinder motors of 4 inch bore and 10 inch stroke. They are claimed to develop 24 horse power at 1,800 r. p. m. At this speed they show the enormous piston speed of 3,000 feet per minute, and the mean pressure, figuring on a mechanical efficiency of 80 per cent., works out to 82 pounds per square inch. The vibration of such an engine must be very strong, as the reciprocating parts weigh considerably more than in a short stroke 4 inch engine, and as the linear speed is three times as great the inertia effects must be at least ten times as great. The De Dion motors used in this race had a 4 inch bore and a 6.4 inch stroke and are said to develop 17 piston speed at 1,900 r. p. m. The piston speed of this motor is therefore about 2,000 feet per minute, and the mean effective pressure, on the basis of 80 per cent. mechanical efficiency, figures out to 86 pounds per square inch. The car which secured third place, a Lion, had a stroke of 8 inches for a bore of 4 inches, but no data as to its output have come to our notice. The first five cars classed themselves in the order of length of stroke, which indicates that the power does increase the length of stroke.

There are now five motor cabs in service in Christiania, Norway, and as the demand for them is so brisk that they can very rarely be found at the cab stands, it is the intention to shortly put on a number of additional vehicles.

The Club of Vienna Motorists has been formed in Vienna, and its statutes have been approved by the Government. The club is founded on a "civilian" basis and intends to promote the motor movement by the organization of excursions, tours, contests, etc., as well as through lectures. The headquarters of the new club are Hotel Meissl & Schadn, Wien I, Neuer Markt.

MINOR MENTION

The Overland Automobile Company, of Indianapolis, have recently purchased the Marion factory of that city.

The Triumph Automobile Tire Company, of Homestead, Pa., has been incorporated in West Virginia with a capital stock of $1,000,000.

The W. D. Spring Cushion Tire Company, recently organized with its principal office at New York, has decided to locate in Hartford, Conn.

The Auto Import Company, 1786 Broadway, New York, who imported Rochet-Schneider cars, have dissolved. Benjamin Eisberg was president.

The Oakland Motor Car Company, of Pontiac, Mich., have recently brought out a new four cylinder model of 40 horse power, which is to sell at $1,600.

The Cuyahoga Motor Car Company, of Cleveland, Ohio, will shortly engage in the manufacture of automobiles. A model car is now being constructed.

The Boston Automobile Dealers' Association will hold its annual outing and dinner on October 21 at the Ashland Country Club in South Framingham.

The Brighton Beach track, near New York city, where quite a number of automobile races have been held in the past, is now being laid out in building lots.

The Auto Parts Equipment Company, of Cleveland, Ohio, have discontinued their salesroom on Euclid avenue. Their city trade will be handled from the downtown office.

The Moshammey Company, of Cleveland, Ohio, will shortly begin the manufacture of a new style of "water trap." In this device, after sufficient water is separated from the gasoline to fill the receptacle, the drain is automatically opened, and remains open until the chamber is emptied.

A company for the manufacture of automobile motors is being organized at Detroit, and will occupy the factory formerly occupied by the E. R. Thomas Detroit Company at Harper avenue and Dequindre street. Louis Mendelsohn and Mr. Herreshoff of yacht fame are said to be interested.

The plant of the Verstraete-Fyfe Company, manufacturers of parts and accessories, Burlington, Wis., was damaged $20,000 by fire last week. Special arrangements have been made, however, for immediate resumption in temporary quarters and the business will be little inconvenienced.

The Interstate Automobile Company, of Muncie, Ind., composed of Thomas Hart, George and William Ball, T. F. Rose, J. M. Maring, and others, recently purchased a plot of 40 acres, and have now begun the construction of a brick, steel and glass factory building, 140x440 feet. They expect to start operations in this building by the first of next year.

It is reported that the John A. Roebling Company, of Trenton, N. J., have made a contract with W. H. Sharp to manufacture the car which Sharp constructed and drove in the recent Long Island sweepstakes races.

The Board of Freeholders of Atlantic County, N. J., met at Hammonton on October 14 and inspected and accepted the new road from that point, which will open a new automobile thoroughfare to New York city.

The registrations in Iowa reached 7,524 on October 9, which is double the number registered at the beginning of the year. This indicates that in Iowa at least the automobile business has been prosperous during the past season.

The Kirkham Motor Company, of Bath, N. Y., has secured the contract for supplying engines for the Pullman automobiles for 1909. The Kirkham Company has furnished the motors for the Pullman cars for the last two years.

Plans are on foot with a view to removing the Stanley automobile plant from Mooreland, Ind., to Troy, Ohio, and combining the business with the Troy Buggy Company. James Stanley, of Mooreland, is president of the Stanley Automobile Company.

The House & Rohle Carriage Company, manufacturers of carriages and automobiles, St. Louis, Mo., have secured a permit for the erection of a one story brick and stone factory building at 3958 to 3962 Laclede avenue.

The Shunk Plow Company, Bucyrus, Ohio, are placing on the market a motor buggy equipped with a 12 horse power Roberts two cycle engine and a Ross steering gear. The change speed gear is of the planetary type and is carried, together with the differential gear, at the centre of the rear axle.

The report for September of the Pope Motor Car Company receivers shows sales for the month of $39,611.01, and that the balance in Toledo banks was increased by $19,364.16. The factory pay roll was $3,264.17. The cash balance on September 1 was $214,250.18 and at the close of the month $233,614.34.

According to the report of the Electric Vehicle Company receivers for September, the receipts for the month, including a balance of $218,417 on hand September 1, amounted to $239,116. The cash disbursements amounted to $30,927, including as the largest items $17,262 for the pay roll and $9,371 for purchases. The balance on hand October 1 amounted to $208,188.

While the chauffeur of A. B. Longacre, of Pittsburg, Pa., was working on his employer's car a pool of gasoline formed beneath the car and was accidentally ignited. In order to save the garage from being destroyed by fire the chauffeur started the car and rapidly backed it out of the building, but in his excitement he drove it against a stable at the back of the garage and set fire to this stable. The total damage done amounted to $2,500.

The contract for the new three story building to be erected for the Peerless Motor Car Company has been let to the D. C. Criese & Walker Company.

The plant of the Auto Body Trimming Company, 338 and 340 Ellicott street, Buffalo, N. Y., was damaged to the extent of about $5,000 by a fire of unknown origin on October 6.

Washington A. Roebling, 2d, Trenton, N. J., plans to build ten four cylinder cars, with motors of 7 inch bore and 6 inch stroke, after designs by M. Etienne Planchard, a French engineer. The car is to be known as the Roebling-Planchard and to be rated at 140 horse power.

At the annual meeting of the stockholders of the Matheson Motor Car Company, held at Wilkes-Barre, Pa., last week, John C. Bridgeman, of Wilkes-Barre, and E. S. Fretz, of Pottstown, were elected directors to fill the vacancies caused by the withdrawal of the Palmers of New York.

The Rider-Lewis Motor Car Company have decided to locate in Anderson, Ind., in the northwestern portion of the city near the table factory. It is planned to erect two buildings, a factory building, 60x450 feet, with L extensions 36x80 feet, at each end, and a two story 30x45 feet office building.

R. G. Kelsey, of New York, who was to drive in an automobile race at Cleveland last week, was arrested there on instructions received from the Chicago police, being charged by the Haynes Automobile Company, of Chicago, with converting one of that company's automobiles to his own use. Offers of bail were made, but could not be accepted.

The sale of the Waverley automobile plant at Indianapolis, Ind., by the Pope Motor Car Company to the recently organized Waverley Company, was recorded in Indianapolis on October 10. The Waverley Company paid over to the clerk of the Federal court $200,000. It is stated that the Waverley Company expects to give employment to about 500 men.

John Albin, of Oyster Bay, N. Y., whose son Byron had his skull fractured by a piece of machinery thrown from the Buick car which participated in the sweepstake races on Long Island last week, has brought suit for damages against the Buick Automobile Company, Nassau County and the American Automobile Association. Nassau County is protected against any losses by a bond of $25,000 filed by the Long Island Motor Parkway Association.

M. R. Nyman, vice president of the Thomas Flyer Automobile service in Chicago, whose arrest on a charge of larceny preferred by the Coey Automobile Livery Company we noticed last week, was released by the court because of insufficient evidence to hold him. Nyman was accused of having failed to turn over to the Coey Company a certain sum of money collected for the latter. He admits that he collected the money, but alleges that he turned it

over to William E. Walsh, cashier for the Coey Company.

The Four Traction Automobile Company, Mankato, Minn., have leased the Kleinschmidt Building, on North Fourth street.

The Kensington Y. M. C. A., 1854 Frankford avenue, Philadelphia, will open an automobile school on October 21. Wm. Vees will be chief instructor.

L. E. Younie, formerly with the Pacific Commercial Car Company, Tacoma, Wash. has taken the agency there for the Michelin tires, and is now located at 111 South Tenth street.

The Dayton Airless Automobile Tire Company, of Dayton, Ohio, have opened an office at Baum and Whitfield streets, Pitsburg, Pa., in charge of H. E. Henderson and Wm. McLay.

President S. W. Luitweiler, of the Luitweiler Pumping Engine Company, Los Angeles, Cal., builders of motor propelled fire apparatus, are considering to remove to Rochester, N. Y.

We are informed that the Ajax-Grieb Rubber Company have secured the order for tires for the Maxwell 1909 product. It provides for 29,000 tires, costing over half a million dollars, to be delivered before July 1, 1909.

The Smith Motor Car Company, selling agents for the Smith Automobile Company, both of Topeka, Kan., met on October 7 and re-elected their old directors, as follows: L. Anton Smith, C. H. Alexander, E. B. Kellam, Geo. W. Hackney and W. J. V. Deacon.

Business men of Sandusky, Ohio, have subscribed to the required amount of stock of the Roberts Motor Company, of Clyde, Ohio, and the business of the latter company will probably be moved to Sandusky in the near future, where it will be located in the Vincent Valve Company plant.

The Chalmers-Detroit Company inform us that they had received up to Ocober 5 953 bona fide orders from customers, while the list of inquiries for 1909 cars had run to 10,486. The entire 1909 output of 3,100 cars was sold to dealers before August 1. Over 500 1909 cars have already been delivered.

The Detroit Automobile Dealers' Association will hold its second annual endurance contest on November 5, 6 and 7. The start each day will be at the Hotel Tuller, and the daily routes will be Detroit-Saginaw and back, Detroit-Adrian-Jackson-Detroit and Detroit-Lansing and back. At the conclusion of the runs a technical examination of the cars will be made.

Scranton, Pa., will soon have two independent taxicab services, if the plans announced mature. The Scranton Garage and Motor Car Company will begin to operate two Thomas cabs within a few days and add to their equipment as fast as the patronage warrants. Now the Lackawanna Automobile and Taxicab Company has been formed in that city, which expects to begin operations December 1, and to have the service fully established by January 1.

Club Notes.

The fall series of family evenings at the Chicago A. C. began last Friday with a kinetoscope exhibition of automobile subjects.

A movement is said to be on foot in Indianapolis for the consolidation of the Indiana A. C. and the Indianapolis Automobile Trade Association.

The New Jersey Automobile and Motor Club, on October 15, held a house warming at its new quarters at Park place and East Park street, Newark, N. J.

The North Jersey A. C., Paterson, N. J., have extended an invitation to the Hackensack A. C. to affiliate with them. A joint committee of the two clubs will discuss the matter and arrange the terms.

The Montana A. A. has been organized in Helena, Mont., with the following officers: Creighton Largey, Butte, president; John Berkin, Butte, first vice president; Louis Penwell, Helena, second vice president.

The Cheyenne (Wyo.) Industrial Club has appointed a committee to arrange for the organization of the first automobile club in Wyoming. The club will have an initial membership of about ninety Cheyenne motorists.

The Louisville (Ky.) A. C. has decided to erect its own club house, and has appointed a committee to investigate various proposed sites. The committee is composed of Robert Morris, Albert Reutlinger, A. R. Howe, Lee Miles and E. H. Neill. A stock company will be formed to finance the undertaking.

At the regular monthly meeting of the New Jersey Automobile and Motor Club, held at Newark on October 12, counsel for E. R. Thomas, whose hearing before the club was set for October 15, pleaded that Mr. Thomas would be unable to personally appear before the club on that date, and asked for a postponement of the hearing. The governors of the club agreed to a postponement until November 2.

The Automobile Club of America has received from the International Motor Boat Association, specifically known as "The International Association of Yachting Automobile," which comprises in its membership the principal national motor boat clubs, yacht clubs and automobile clubs of France, Germany, Great Britain, Italy and Monaco, a dispatch notifying it that it has been selected by the association as its sole representative in America, which selection carries with it the sole governing authority in all international motor boat races or competitions held in the United States.

Business Troubles.

A petition in bankruptcy was filed on October 11 against the R. O. Williams Automobile Company, Columbus, Ohio. Among the creditors are the Electric Storage Battery Company and the Columbus Tool and Supply Company, the latter's claim of $566.46 being the largest of all.

The creditors of Charles A. Duerr & Co., Inc., at a meeting held on October 14 decided that the receiver, Lindsay Russell, should continue the business for sixty days.

Harry E. Price has been appointed receiver for the J. A. Orlando Auto Company, Columbus, Ohio, on a petition filed by Jess M. Morrison, who owns a one-third interest in the partnership, and who accuses his partner, James A. Orlando, of having converted some of the assets of the company to his own use.

Involuntary proceedings in bankruptcy were brought against the General Motor Car Company, of San Francisco, on October 9. The petitioners and their claims are the Union Oil Company, of Oleum, Contra Costa County, $2,159.94; W. M. Klinger, San Francisco, $674.27, and Arthur Joel, of San Francisco, $396.42.

J. T. Morrison, of Carthage, Mo., has started a motor parcel delivery service with a 14 horse power, two cylinder, air cooled, chain driven car, specially built for the service.

Trade Personals.

Arthur H. Denison has opened the Buffalo Automobile School at 59 Franklin street, Buffalo, N. Y. Both day and evening classes will be held.

Harry Cummings has been appointed sales manager of the American Automobile Co., handling Stoddard-Dayton and Reo cars in Tacoma, Wash.

H. C. Merrill, formerly with the Kansas City agent of the Moon, has been engaged by the Moon Motor Car Co. factory as touring salesman.

Harold Stillman, an automobile salesman, who had been connected with several agencies in Philadelphia, died at Hartford, Conn., on October 12 of typhoid fever.

George Von Rottweiler, until recently engineer of the Fort Pitt Manufacturing Co., New Kensington, Pa., is reported to be forming another company in that city, to be known as the Mercedes Motor Manufacturing Co., to turn out a car to be known as the "Vanderbilt."

F. B. Read, who has been connected with the Springfield Metal Body Co., for several years past, has severed that connection, and has accepted a position as assistant manager of the wholesale end of the H. J. Koehler Co., 1649 Broadway, New York, who handle the E. M. F. 30.

Trade Literature Received.

J. H. Sager Co., Rochester, N. Y.—Circular of the Sager "Easy" springs.

The Cameron Car Co., Beverly, Mass.—Catalouge of 1909 Cameron cars.

The Winton Motor Carriage Co., Cleveland, Ohio.—Catalogue of the Winton Six.

The Autocar Co., Ardmore, Pa.—Catalogue of the new Autocar utility car chassis.

Maxwell-Briscoe Motor Co., Tarrytown, N. Y.—Circular of the Maxwell Junior runabout.

Resilient Wheel Co., 96 Fulton street, New York.—Circular of the Overman resilient wheel.

Saks & Co., Broadway and Thirty-third to Thirty-fourth street.—Catalogue of motorists' apparel.

E. R. Thomas Motor Co., Buffalo, N. Y.—Folder containing specifications and cuts of the Thomas 1909 line.

The Cutler-Hammer Manufacturing Co., Milwaukee, Wis.—Circular of the company's battery charging panel Type E.

Stewart & Clark Manufacturing Co., 502-520 Diversey Boulevard, Chicago, Ill.—Catalogue of the 1909 line of Stewart speedometers.

Sterling Alternating Ignition Co., Binghamton, N. Y.—Catalogue of the Sterling alternating master vibrator and the Sterling double contact timer.

Garage Notes.

J. G. Rankin will open a garage and repair shop at Hibbing, Minn.

A garage is being built by Mooreland & Duholm on Main street, Austin, Minn.

Work has been begun on a new garage at Oneida Castle, Oneida, N. Y. It will be owned and operated by the Schubert interests of Oneida.

J. N. Boyce, New Haven, Conn., has filed plans for a one story, 37x80 feet, brick garage, to be erected at 911-913 State street, at a cost of about $5,000.

Charles Miller is negotiating for the purchase of the garage of the Hazleton Garage Co., at the corner of Wyoming and Green streets, Washington, D. C.

The White Garage, of Los Angeles, Cal., will move about December 1 to a new building, 120x168 feet, and two stories high, on Olive street, between Eighth and Ninth.

Plans have been drawn for a $25,000 garage for the Jones Automobile Exchange, Wichita, Kans. The building will be of brick, 50x140 feet and two stories high.

J. O. Caldwell, Jr., formerly of Boston, has opened a garage and automobile supply store at 145 Third avenue, North, Nashville, Tenn. He will also handle the Regal cars.

E. P Moriarty & Co., Kansas City, Mo., will shortly begin the erection of a three story garage at 1510 Grand avenue, in that city. An old two story brick building on the site was torn down last week.

C. F. Roemer and T. C. Miller will establish an automobile garage and supply store in Marshalltown, Ia. The former will continue to devote most of his time to the agricultural implement business.

The petition of the property owners of Fond du Lac, Wis., that the garage on Fourth street be condemned, owing to the fire risk, has been referred to the police and fire commission of the city council.

The old power house of the Chattanooga Railways Co., West Seventh street, will be remodeled to serve as a garage for the Joyce Automobile Co., Chattanooga, Tenn. A sum of $1,500 will be spent for improvements.

C. W. Lindsay and H. A. Wetmore, Sioux City, Ia., have formed a partnership and will open a garage before January 1. They will handle the Thomas car in western Iowa, eastern Nebraska, South Dakota and Minnesota.

The Matheson car will be handled in the District of Columbia and the States of Maryland and Virginia by the Matheson Company, of Maryland, J. J. Mason, president. A salesroom and garage at 1002 Morton street, Baltimore, Md., has been secured.

Plans have been completed for a new garage on Broadway, between Twelfth and Thirteenth avenues, Nashville, Tenn. The building will have 75 feet front on Broadway and be 175 feet deep. It will be completed in about forty-five days, at a cost of about $7,500.

A co-operative company has been formed between motorists of Rockford, Ill., who expect to erect a garage on Seventh street in that city. The following officers have been elected: Dr. E. Lofgren, president; Dr. E. W. Parks, secretary, and Swan O. Widell, treasurer.

The Somerset Automobile Co. has been organized at Somerset, Pa., to handle several lines of automobiles. The officers of the company are: J. Watson Frease, president; J. B. Holderbaum, vice president; J. Picking, secretary and treasurer; William Hoffman, manager, and John Arisman, mechanic.

The Mutual Motor Car Co., consisting of a number of motorists of Pittsburg, Pa., have bought for $50,000 the property of the Colonial Auto Co., consisting of a two story brick, stone and iron fireproof building at 5518-5520 Walnut street, East End. The intention is to restrict the use of the garage to stockholders in the company.

Wm. J. Doughty and Oscar Eckberg, Grand Rapids, Mich., have gone into partnership and bought the Deane Brothers & Shedd garage at 160-162 North Iona street, of that city, which they will conduct under the style of the Central Auto Garage. They have the agency for the Franklin car.

V. E. Roscher, Riverside, Cal., has purchased the interest of his partner, B. H. Ormand, in their garage on Tenth street.

A garage for the Meteor Automobile Co., is to be built by Mrs. M. B. Petersen at Third and Harrison streets, Davenport, Ia.

State Senator H. C. Lintott, Nashua, N. H., has taken a five years' lease of a garage in the Commercial Inn property of the Greeley estate, and expects to occupy it about January 1.

The Schwartzburg-Bond Co. has opened a garage at 176-178 Thirteenth street, Milwaukee. The company will do a general livery business, handle second hand cars, storage and general repair work.

The William R. Ruess Automobile Co. will open a garage and salesroom at 1028-1032 South Main street, Los Angeles, Cal., on November 1, and will handle Pope-Hartford and Tribune cars in southern California.

The Olds Motor Works, of Lansing, Mich., have leased a portion of the building at 5922-5924 Baum street, Pittsburg, for a local branch, which will be placed in charge of J. Vandergrift Hall. Another story will be added to this building.

The H. L. Keats Automobile Co., of Portland, one of the largest concerns in the automobile business on the coast, contemplates erecting an up to date brick and cement garage on Broadway and Pike streets, Seattle, in the near future.

The Western Carolina Automobile Co. has opened a garage at 61 South Main street, Asheville, N. C., and will handle the Cadillac car. The officers of the company are J. H. Lange, president; A. H. McCormick, secretary, and Waxler Smathers, treasurer.

The Levy & Hipple Motor Co., now located at 390 Wabash avenue, Chicago, has leased the property at 1467-1469 Wabash avenue, a plot 42x161 feet, on which it will erect a three story garage building. The building will have a front of white tile and glass and cost in the neighborhood of $25,000.

The Crescent Automobile Co. has been organized at Chattanooga, Tenn., with J. A. Wardlaw, as president; C. N. Woodworth, vice president; L. M. Strong, treasurer, and Jos. J. O'Rourke, secretary and general manager. The company handles the White steamer, and has opened a garage at 18-22 William street.

The Barclay Auto Co., Minneapolis, Minn., at a recent meeting, decided to reorganize by taking George S. Burch into the company, and to increase the capital stock from $25,000 to $50,000. Officers were elected as follows: J. J. Barclay, president and general manager; George S. Burch, vice president, and Harry A. Peterson, secretary and treasurer.

H. A. Paxton, Sandusky avenue, Bucyrus, Ohio, is building a 68x40 feet addition to his garage, which will give him when completed a single story cement block building 150x40, entirely fireproof. The addition will be completed by November 15. Mr. Paxton makes a specialty of tire repairs and battery charging, and handles the Cadillac and Winton cars.

The State Automobile Co. has been organized at Indianapolis, Ind., with Jake Herft as president; John R. Schmidt as vice president, and Sol. Allman as secretary and treasurer. The company has leased the building at 415-419 Massachusetts avenue, and will conduct a general garage, repair and supply business. The full line of cars to be handled has not yet been decided upon.

New Incorporations.

Mitchell Automobile Co., Chicago, Ill.—Capital stock increased from $1,000 to $20,000.

Gove Automobile Co., Milwaukee, Wis.—Capital, $5,000. Incorporators, Richard Gove, E. G. Gove and G. J. Carroll.

White Tire Co., New York, N. Y.—Capital, $250,000. Directors, Leonard L. Stein, Leo L. Doblin and Nathan Coleman.

Automobile Livery Co., Birmingham, Ala.—Capital, $5,000. The officers are H. T. Shoup, president; N. O. Tyler, vice president; H. Lee Brown, treasurer, and A. J. Morgan, secretary.

State Automobile Co., Indianapolis, Ind.—Capital, $25,000. Directors, Jacob Herff, Sol Allman and J. R. Schmidt.

Non-Fluid Oil Co., New York, N. Y.—Capital, $50,000. Directors, Thomas A. Matthews, Walter F. Kimball and Frederick J. Barnes.

Triumph Automobile Tire Co., Homestead, Pa.—Capital, $1,000,000. Incorporators, H. E. Keyes, C. O. Derr and W. O. Johnson.

Best Automobile Co., Indianapolis, Ind.—Capital, $20,000. Directors, Edgar Updyke, William N. Gates and Edward E. Gates.

Southern Tier Motor Co., Elmira, N. Y.—Capital, $25,000. Directors, Guy W. Shoemaker, Charles S. Latten, Harry H. Crandall.

Bingham-Jordan Automobile Co., Minneapolis, Minn.—Capital, $50,000. Incorporators, George Bingham, Eva Bingham and T. C. Jordan.

Auto Livery Co., New Orleans, La.—Capital, $7,500. Incorporators, Ginder Abbott, Palmer Abbott, E. J. Hewling and Joseph Woodward.

Standard Auto and Transit Co., Mansfield, Ohio.—Capital, $10,000. Incorporators, Bert Lane, J. C. McNutt, F. C. Poling, E. K. Lane and E. B. Polin.

Preston Fabric Co., Buffalo, N. Y.—Capital, $100,000. Directors, Christian Wesp, Morris R. Evans, James F. Preston, Philip Wesp, Jr., and Alonzo S. Collins.

Derain Motor Co., Cleveland, Ohio.—Capital, $30,000. Incorporators, J. T. Murphy, D. F. Sherbondy, W. S. Mitchell, M. A. Copeland and Charles F. Lang.

Los Angeles Automobile Livery and Sightseeing Co., Los Angeles, Cal.—Capital, $75,000. Incorporators, Frank C. Woodward, O. E. Freeman, G. W. DeLape and E. S. Williams.

Champion Tire Co., Syracuse, N. Y.—Capital, $100,000. Incorporators, I. C. Reed, E. Olin Kinne, John R. Clancy, George B. Becker and S. D. Schlacter. To manufacture the Champion auto tire cover.

New Agencies.

Newark, N. J.—J. H. Kochler, E-M-F.
Detroit, Mich.—C. B. Fear, Gyroscope.
La Crosse, Wis.—Alfred James, Franklin.
Kansas City, Mo.—W. S. Helm, Gyroscope.
Hutchinson, Minn.—W. W. Sivright, Ford.
Reading, Pa.—Graham Automobile Co., Acme.
Brooklyn, N. Y.—W. S. Williamson, Gyroscope.
Youngstown, Ohio.—Standard Auto Garage Co., Franklin.
Charlotte, N. C.—Southern Automobile Co., Maxwell.
Salina, Kan.—Ollinger-Center Motor Car Co., Oldsmobile.
Tacoma, Wash.—Pacific Commercial Car Co., Chalmers-Detroit.
Tacoma, Wash.—E. S. Dimmock, Seventh and Pacific avenues, Studebaker.
Reading, Pa.—Reading Automobile Co., 26-28 South Fifth street, Franklin.
Baltimore, Md.—Mar-Del Mobile Co., Charles street and Mount Royal avenue, Franklin.

Coming Events.

October 17—Hill Climb, Avon Mountain, A. C. of Hartford (Conn.).

October 24—Vanderbilt Cup Race, Long Island.

November 26—Grand Prize Race, Savannah, Ga., Automobile Club of America, New York City.

December 31 to January 7—New York City, Grand Central Palace, Ninth Annual Show American Motor Car Manufacturers' Association.

January 16 to 23—New York City, Madison Square Garden, Ninth Annual Show Association of Licensed Automobile Manufacturers.

January 23 to 30—Philadelphia, Pa., Automobile Trade Association's Annual Show.

February 6 to 13—Chicago, Ill., Coliseum, Annual Show, National Association of Automobile Manufacturers.

February 27 to March 3—Hartford, Conn., Annual Show, Automobile Dealers' Association.