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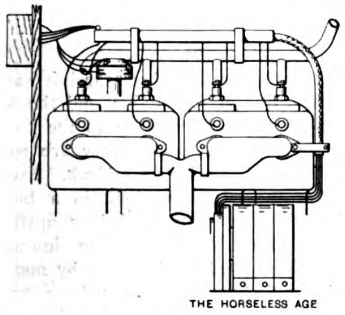
Wiring Arrangements for Double Ignition Systems, as Seen at the Licensed Show.

By E. W. Winans.

Thirty-one per cent. of the cars at the recent Garden Show were equipped with double ignition systems. The jump spark was used in all cases with a high or low tension magneto as the primary source, and accumulators for starting and reserve. Practice was divided between the use of two independent systems with two sets of plugs (this being the older scheme),



Ignition Connections on Pierce Motor.

and the use of two sources of current with one set of plugs (this system, although comparatively new, being found on a large number of cars). In nearly all cases the plugs, whether in double or single sets, were located near the inlet valves, and much attention was paid to providing water jackets about the plugs, thus practically eliminating the failure of the porcelains.

The makers using but one set of plugs claim that with efficient carburation and the use of a good lubricating oil the short circuiting of plugs, through becoming fouled, is an unheard of occurrence, and that an additional set means simply so much added complication. The claim is also advanced that the idle plugs tend to become fouled more readily than those in use.

The advantage claimed by those using two independent systems is that of increased reliability. One manufacturer stated that when running throttle down at intermittent speeds, as in crowded traffic, he uses both systems, thereby greatly decreasing the chance of stalling the engine. It seems probable that this advantage depends upon cutting in the battery, which should be better than the magneto at very low speeds. In one instance (on an air cooled car) it was found that the plugs in use tended to foul much more readily than the idle ones. Upon changing to the other system, the first used plugs would become clean, and so the two were used alternately.

It is quite possible that both schemes will continue to have their advocates, the choice being determined by the performance and needs of the individual cars.

The tops of some motors were covered with a very network of wires, and as the most advantageous distribution of the connections is a problem not so easily solved, it will be of interest to note several instances in which they were well arranged.

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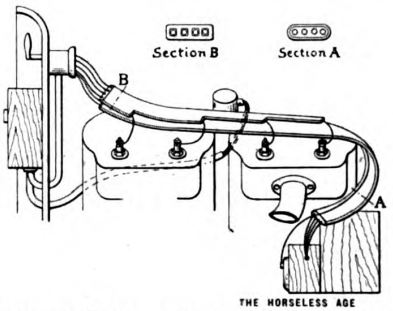
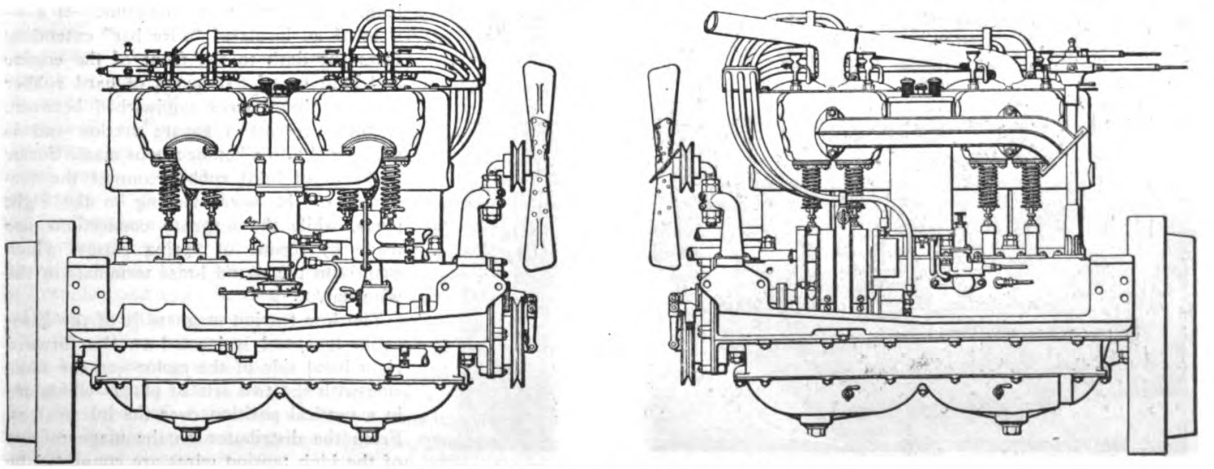
A rather typical example of the arrangement of wires for two independent ignition systems is found on the Pierce Great Arrow. The Bosch high tension magneto, driven at engine speed, is located near the front on the right hand side of the engine. The storage battery, which is the current source for the second system, connects with four "autocoils" on the dash, the timer being located above and between the rear



Ignition Connections on Royal Tourist Motor.

cylinders. Two parallel brass tubes, running the length of the engine, are above and attached to the return water pipe. The secondary wires from the magneto run forward under the intake pipe, through a supporting bracket and into the right hand tube, from which they are distributed to the plugs located horizontally just above the inlet valves. The secondary wires from the coils run into the left hand tube and are led, through holes in the bottom,



Ignition Connections on Packard Motor.

under the water pipe to the vertical plugs over the inlet valves. These wires, with the insulation, are not more than five-sixteenths inch in diameter, and their supports furnish no additional insulation from the engine. A rather excessive length of wire is required, but the removal of any one for inspection or renewal is easily accomplished.

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Two sources of current with one set of plugs are used on the Royal Tourist, the choice between the high tension Bosch magneto and the battery, with four Pittsfield coils, being determined by means of a high tension switch. A distinctive device for conveying the high tension wires is found in the flat, flexible rubber casing, which is interwoven with fine wire to prevent distortion by heat and to lend added strength. The secondary wires from the magneto are carried in a flat tube around the intake pipe toward the front, up and over the engine to the high tension switch located on the front of the dash with a handle extending through to the rear side of the dash. The secondary wires from the coil are led through the dash and up to the switch, from where four high tension wires, contained in a flat rubber casing with a separate hole for each wire, connect with the plugs. The primary wires from the timer to the coils were protected by a round rubber tube.

The use of this system avoids complications of the wiring, excellent auxiliary insulation is provided, and there is good protection against dirt and oil. While the length of wire is rather great, the system allows of the easy removal of any unit.

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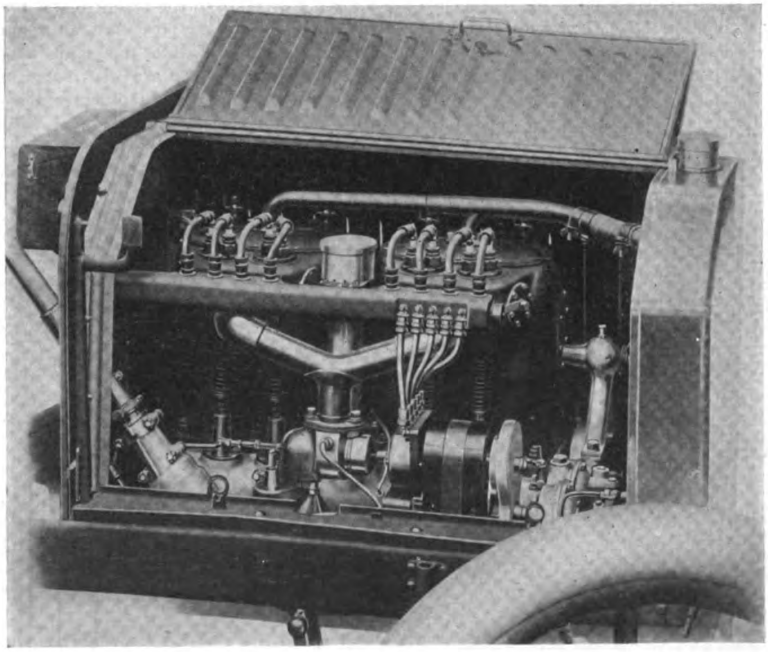
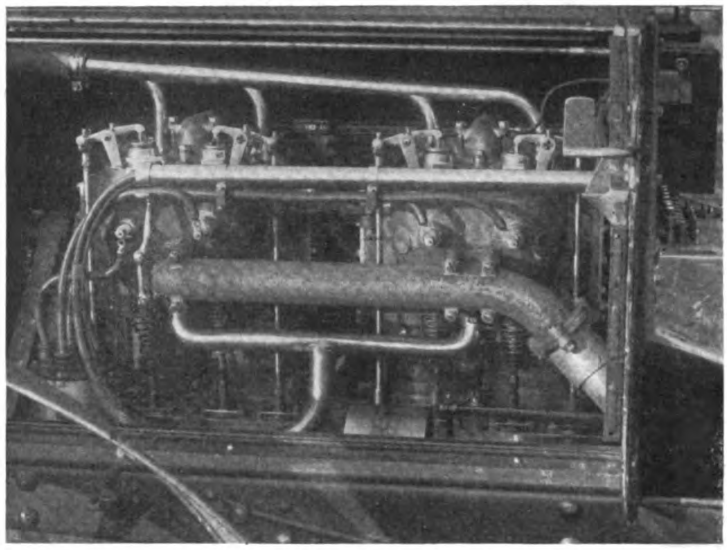
A simple and accessible wiring scheme, presenting a rather obtrusive but well arranged appearance, is found on the Packard "Thirty," the main feature of the system being the insulated supports which carry the wires in a vertical plane. A single set of plugs is used, with two sources of current, the primary being an Eisemann low tension magneto, with a transformer coil mounted on the dash and a Fulmen storage battery for reserve and starting, with a single vibrator coil which is mounted as a unit with the transformer coil. A single switch and the distributor on the magneto are used for both systems.



Ignition Connections on Peerless Motor.



Ignition Connections on Columbia Motor.

The magneto is located on the left hand or exhaust side of the engine, and the six wires extend forward and up to the front of the first cylinder, where they are supported by a rectangular fibre block. From this point the wires are held in a horizontal position by means of four upright perforated fibre supports. The ignition wires are connected to the plugs by means of knife switches, which afford an easy means of cutting out the cylinders for testing.

This system provides a very effective insulation from the engine and at the same time keeps the wires separated and admits of the easy removal of any wire. The length of wire required is not great.

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Although two independent systems of ignition usually entail a seemingly complicated wiring layout, the Peerless has originated a simple device which reduces the lengths of wires to a minimum. It consists of an insulated "wire bar" extending from the dash to the front of the engine and built up of flat layers of hard rubber with the bare wires sandwiched between. It then presents a square section and is vulcanized into a homogeneous mass. Screw bushings of hard rubber connect the terminals of the wires leading to the eight plugs, while the magneto connections are made by means of spring clasps, which snap onto the round brass terminals in the wire bar.

The low tension magneto is of the Eisemann type and is located on the forward right hand side of the motor—on the same side with the two sets of plugs—which are in a vertical position over the inlet valves. From the distributor on the magneto two of the high tension wires are connected by spring clasps to the outside of the wire bar

and three to the engine side, instead of all five on the outside, as shown in the cut. A transformer coil for the magneto and four vibrator coils for the accumulator system are located on the dash, with their high tension terminals connected to the wire bar.

Each wire is easily detached at either end, is short and bent at an easy curve, and is insulated both from the engine and from the other wires. The only objection which might be brought to the bar is that in the case of a short circuit the trouble would be very hard to locate, but there seems to be no probability of such failure in service.

The large Columbia, with electric transmission, has the dual source of ignition with one set of plugs, and in it the distribution of the current has been solved in a way worthy of notice. The distributor, which has been described in THE HORSELESS AGE, combines the two functions of timer for the battery system and distributor for both systems, and effects the timing of the spark without moving the wires. It is located on the forward left hand engine leg with the Gianola high tension magneto on the same side and toward the rear of the engine. The accumulators are provided with a single vibrator coil which is connected with a high tension switch of hard rubber, both being located on the dash.

Just above the spark plugs, on the left hand side, runs a fibre tube incased in a brass protecting tube, which carries the two high tension and two low tension wires to the magneto and the distributor. The ignition wires run from the distributor directly to the plugs and are attached to the under side of the tube by means of fibre blocks.

This system presents a simple wiring scheme, with short lengths and a small number of wires insulated from the engine, and any wire may be easily followed throughout or removed for inspection.

French Roadway System.*

It is generally recognized, I think, that the best and most complete road system in the world is to be found in this country (France), where it stands as an enduring monument to the administrative greatness of Napoleon. French roads are good, not because of any superiority of raw materials, as the same materials exist everywhere; they are not good because of any special talent for road building, as the formula was furnished by an Englishman, and some roads just as fine may be seen in parts of the United States. The real superiority of the French highway system is attributable to the fact that it is under the constant intelligent supervision of an army of trained men, who discover within the organization opportunities for advancement and professional distinction which no mere county administration can offer.

THE FRENCH ADMINISTRATIVE SYSTEM.

The proof of this assertion may be found in France itself. If this country has a wonderful network of great arteries of general communication called "national routes," there is also in every department or county a system of local roads connecting the small towns and villages, built and maintained by the local governments, and very inferior to the national roads. The construction and maintenance of the local roads are affected by the same unfortunate influences which ordinarily attach to county effort in America, but in less noticeable degree. The French road type is therefore the broad and smooth national route, upon which in rolling country one good draught horse is expected to be able to travel 30 kilometres (18.64 miles) per day, hauling a load of 1,500 kilos. (3,306 pounds). Public opinion requires that the local highways be kept in sufficiently good condition not to interfere with the horse power efficiency here indicated.

The basis of the French highway administrative system is the Ecole des Ponts et Chaussées (School of Bridges and Roads), one of the finest technical schools in the world, and, like all other French educational systems of importance, a state affair. It is intended to form the engineers, who afterward take positions in the highway administrative system. Ordinary students also are accepted, and are graduated with the diploma of a civil engineer. The course of study lasts three years and instruction is gratuitous. The highway hierarchy in France is thus organized:

(1) Inspector general of bridges and highways.

(2) Chief engineers charged with the work of the single departments or communes.

(3) Ordinary engineers charged with the work of single arrondissements.

(4) Under engineers, who may be compared to non-commissioned officers in the army, the grade being open to "principal conductors," and those who have reached this grade are charged with the work of single arrondissements.

(5) Principal conductors, charged with the service of the sub-division.

(6) Ordinary conductors (this category comprises several grades), charged with the service of the sub-division.

(7) Piqueurs, who are foremen of construction gangs.

(8) Clerks, employed at headquarters.

(9) Cantonniers, each having from 4 to 7 kilometres of highway under his immediate supervision.

This vast and apparently complicated machine directs the building and maintenance of both national and local roads. The national Government, co-operating with the local governments under certain circumstances, has charge of the hydraulic works of France—that is to say, the supervision and erection of sea and river walls, ports, etc., and exercises surveillance over rivers and railroads.

SECTIONAL DIVISION OF WORK.

The point of departure in this system begins with the modest cantonnier, who lives on the line of his jurisdiction, and is responsible for the maintenance of his section of road at all times. He keeps the ditches open, carefully fills holes and ruts with broken stone when such are discovered, removes dust and deposits of sand and earth after heavy rains, trims the trees and bushes, and when citizens furnish labor in payment of their road tax, directs their work. When ordinary work is impossible the cantonnier breaks stone and transports it to points where it is likely to be needed. He is expected to bring to the attention of his chief any condition requiring special attention, and is the man on the spot in every emergency. Each cantonnier has a book, and in this book the chief cantonnier, who passes over the road at least once a week, notes his instructions and checks up the work accomplished during the preceding interval. Nothing is left to chance. The conductors go over the line at regular intervals also and direct the chief cantonniers, and all reports are transmitted to the central authorities, who thus follow the prevailing conditions on every foot of national highway in France. Each year the conductors prepare estimates of necessary expenses for the following year, itemizing them under the heads of maintenance, heavy repairs and new work, and the parliamentary appropriations are based upon these careful local calculations.

BUILDING A FRENCH ROAD.

A national route in France, like a railroad, must first be declared necessary by a special law. At the present time comparatively few new national routes are being added to a system that is already old and complete. Estimates are prepared when new work is contemplated and the execution is let by contract. A standard roadway in this country is much simpler than is commonly supposed. Experience has demonstrated that deep foundations and other expensive construction are far less important than a careful drainage system, and in providing this French methods particularly excel. A standard roadway in France consists of what the engineers call a box, of earth, into which is deposited the hard material of the road surface proper. This "encaissement," as it is called, is carefully shaped and rammed, the sides or driftways being wide enough to hold the hard material in place, and incidentally to serve as footpaths. On each side of the driftway runs a ditch, unless the special conformation of the land renders a ditch unnecessary. In all cases the drainage scheme must be such that the road surface receives

* By R. P. Skinner, United States Consul at Marseilles.

only its own rainfall. The ordinary proportions of these standard roads are as follows:

Total Roadway. Feet.	Two Driftways.[1] Feet.	Road Proper.[2] Feet.
45.93	22.96-26.24	19.68-22.96
39.37	19.68	19.68
32.80	13.12	19.68
26.24	9.84	16.40
22.96	6.56	16.40

[1] Inclination, 1 centimeter (0.3937 inch) per meter (3.28 feet).

[2] Curvature, one-fiftieth to one-fortieth of width.

The national routes are divided into three classes, having 45.93, 39.37, and 32.80 feet width, respectively. In exceptional cases they are 65.61 feet in width, but only near large cities. Within the road box, when it has been rammed and convexed, is finally deposited the surfacing material of crushed stone, each stone being small enough to pass through a ring of 6 centimeters (2.36 inches) diameter. The depth of the crushed stone, when rolled, should be 20 centimeters (7.87 inches).

MACADAM SYSTEM MODIFIED.

Years ago the process was more complex. It was then regarded as necessary to have three strata of material, beginning with a sort of pavement of large stones, upon which was superposed a layer of smaller stones, and a top dressing of crushed stones. Such a road becomes very rough ultimately, and at present a modified macadam system is in use. Whereas Macadam declared his formula to be invariable under all conditions, French engineers do not hesitate to employ piles, stones, brush, or anything else requisite to establish a secure foundation, or to slightly increase or decrease the thickness of crushed stone where the soil or conditions present special characteristics.

As every roadway established directly upon a rock foundation is hard, likely to become rough and to wear out rapidly, when such a foundation is necessarily employed a considerable layer of earth is interposed between foundation and surface. The road materials being in place, consolidation of the surface is obtained by rolling with a cylinder of about 6 tons weight. The roadway is sprinkled continuously during this operation and a mixture equal to 10 per cent. of the volume of broken stone, consisting of sandy and clayey material, is thrown under the cylinder. The surfacing operation is limited usually to lengths of 200 to 400 meters (656.16 to 1,312.33 feet) at one time. The steam roller first travels over the moistened loose stones three or four times, after which the fine binding material is distributed in very small quantities, and the rolling then proceeds until a loaded cart leaves no trace upon the new surface. When the rolling is completely finished the highway is closed for about fifteen days in order to dry before being opened to traffic.

SURFACING THE HIGHWAY.

The most favorable moment for constructing a highway is at the beginning of spring. The materials most difficult to handle are pebbles and hard, unbroken gravel. When such material is employed there should be no hesitancy in using as much as 12 per cent. of aggregating earth and sand—the maximum prescribed. Broken limestone is most highly regarded for surfacing purposes, after which in the order given comes silicious material, such as quartz, when it is not friable; silex and granite when the cost of crushing is not excessive; basaltic material is mixed with limestone, pebbles and gravel from mines or river beds. Limestone works up most readily, but harder materials, such as silex or granite, last longer and give less dust and mud. The best stone for road making contains vein stone of calcareous nature, which becomes manifest under compression and provides much of the hardness and cohesion of the French roads. Applications of hot tar, well worked in with brushes, will aid in prolonging the life of any good road, and to that extent prevent the dust nuisance, often intolerable in these days of automobiles. It should be understood that coal tar baths will avail very little on old worn out roads, and that dust itself is detritus arising from the disintegration of the road itself. Consequently the only real remedy for the dust affliction is to build roads that are virtually indestructible.

GENERAL CONSIDERATIONS AND NEW PROBLEMS.

The chief concern in France is that all preliminary and necessary operations shall be thoroughly performed. When embankments are made the earthwork is built up 5.90 to 7.87 inches at a time, and the successive strata are leveled, and in the neighborhood of masonry rammed. Time and rain are given as little to do in the matter of procuring solid construction as possible. Similarly every ditch is very carefully cut at a proper angle, rammed, and if necessary paved with stones. Every dangerous turn is protected by a stone parapet, and stone posts are planted 1 kilometer apart, with ten smaller stone markers at equal distances between the kilometer stones. At each crossroad there are signposts, always in order, and nowadays (this thanks to the Touring Club de France) there are indicators to remind the traveler of dangerous curves, rapid descents, paved drains, and the like. Every grade railroad crossing is protected by a gate with a watchman in charge night and day.

There are in France 23,656 miles of national roads, which cost $303,975,000 to build. There are also 316,898 miles of local highways, built at a total cost of $308,800,000, of which the state furnished $81,060,000 and the interested localities $227,740,000. These various kinds of roads are classed as follows:

(1) National routes, traversing several departments and connecting the important centres. (2) Department routes, connecting the important centres of a single department and crossing the national routes. (3) Highways of grand communication, scarcely less important than the previous class. (4) Highways of public interest, traversing a single canton and connecting with other cantonal roads. (5) Ordinary neighborhood highways, being narrow and unimportant roads connecting remote villages and groups of houses with the more important means of communication.

DESTRUCTIVE EFFECT OF AUTOMOBILES.

The advent of the automobile, with its destructive tires, has placed increased tasks upon the French roadmakers. No method has yet been discovered of preventing the file-like action of the rubber tires, often steel shod, upon the road surface. Coal tar baths do some good, especially in keeping down dust, or rather in preventing its formation, but are by no means generally applied, and only in or near centres of population. On the other hand, the permanency of automobile traffic is recognized, and wherever dangers present themselves to this method of circulation, efforts are made to mitigate them, either by directing public attention to their existence, or in mountainous regions by widening the zigzag turns. The destructiveness of the automobile increases in proportion to its speed, but practically no effort is made to limit speed beyond the confines of towns and cottages. The speed evil is correcting itself to some extent, owing to the perils it presents to the occupants of these vehicles.

By virtue of the law of May 30, 1851, vehicles of all sorts may circulate in France without restriction as to weight of load or width of tires. However, for police purposes prefects may establish certain rules. Thus, for example, a factory utilizing a public road for testing or traffic purposes between given points, and subjecting it to an intense strain, might be required to take out some kind of a license or otherwise make up its excessive utilization of public property. It is a recognized principle, however, that in no case shall agriculture be hampered by any prescriptions in regard to highway transportation tending to interfere with the harvesting, storing or marketing of crops. Without any regulation by law, tire widths in this country are greater than in the United States, and under ordinary circumstances have the effect of ironing out the public roads rather than of deteriorating them.

Some hard-up motorists have discovered the fact that the cheapest way to garage a car is to find out some tiny defect in the body work, and take it into the coach builder's about 6 p. m., saying they "will call for it in the morning." If it does not suit their purpose to call the next morning they conveniently forget it till they really want to use the car again, and perhaps get a couple of days' garaging, and sometimes a wash-down thrown in, for a small repair job for which they are charged 5 shillings. On the other hand, had the car been run into a garage there would have been very small change out of a sovereign.—*Exchange.*

The Private Garage.

This term includes almost every form of building from a simple portable affair, about 10x8 feet, to the very elaborate special buildings erected on the estates of those owning a number of cars. In Great Britain distinction is made between a "motor

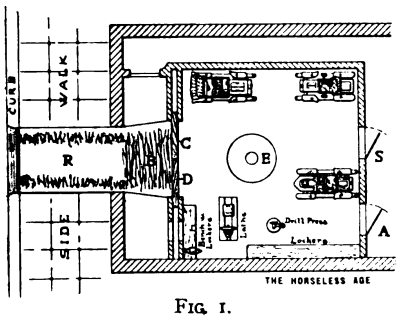

FIG. 1.

house" and a private garage, in that the latter contains at least some elements of a machine shop, and is capable of accommodating three or more cars, while the former may be anything from a glorified dog kennel to a converted horse stable. Such, however, is not the case here; everything is

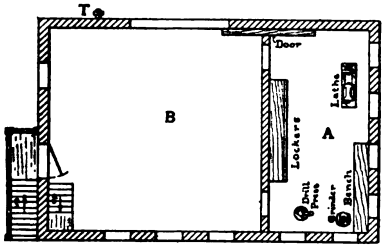

FIG. 2.

a private garage that can contain an automobile.

To accomplish the minor repairs on a car certain tools are needed besides the bare hands and the collection of wrenches, etc., found in the car tool box. The garage should have a bench, with vise attached; a grinder (even if only a treadle operated one) and a lathe, with slide rest and automatic feed. Some of the larger garages have a bench, drill and drill press, and a washing pit (or its equivalent) in addition. It is needless to say that files, chisels and spare parts should be kept in sufficient quantity.

To the gentleman in the suburbs or country the problem of the private garage is simple. There is plenty of ground and portable houses are offered in considerable variety, or, if his means be greater, he may build specially or convert his horse stable. Not so the city motorist, generally possessing only the ground his house stands on. One of the methods of the city man is described below.

A BASEMENT GARAGE.

The basement front room is converted into a garage, usually by concreting and cutting a doorway out into the area and building an incline to the sidewalk. Fig. 1 shows a typical garage of this sort.

Here R is the concrete runway crossing the sidewalk and roughened to give adhesion; B is the incline, also roughened, leading down to the doors C D, which slide between partitions, as shown; S is a stairway to the first floor, with a door at the foot; A leads to the kitchen. The lockers in the garage are arranged in alternate sections of large pigeonholes and closets. The lathe is an 18 inch Seneca Falls, with motor drive. The bench is provided with a vise and foot power grinder, with drawers underneath and pigeonholes above. Each machine has electric lights, and a cluster is suspended in the centre of the room. The doors have each one 30x36 pane of wired glass. Thus ample light is provided at all times. E is a drain, with the concrete sloping toward it, the entire floor and walls being also of concrete. Washing is performed by an ordinary hose attached to a tap in one of the walls. The garage ordinarily contains three cars, but can accommodate two additionally. It will be noticed that the garage has no doors in the passage, and can be entered only through doors A and S from the inside of the house. This is to prevent outsiders "monkeying" with the cars, etc. The owner of this garage does the

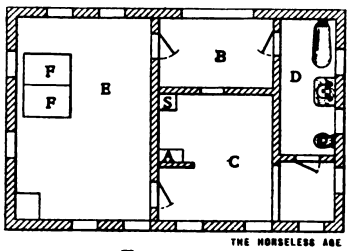

FIG. 3.

greater part of his work himself, and has been able to make the boast that he has "only once seen the inside of a public garage in the last two years, except in getting gasoline."

A CONVERTED HORSE STABLE.

An example of a converted horse stable is shown in Figs. 2 and 3. This belongs to a resident on the main line of the Pennsylvania, who has been an auto enthusiast for a number of years. The first floor plan is shown in Fig. 2. A was the stallroom and B the carriage space. The stalls were removed, as were likewise all other stable fittings, and the room was fitted up as a shop, with lathe, drill press, grinder and bench. Lockers were conveninently placed against the partition wall. The stallroom was unusually well lighted, as may be seen by the figure. The carriage space B was divested of all fittings, and rows of hooks were placed on the walls. The sliding door was, of course, retained.

This stable is peculiarly situated, in that it is nearly 50 feet above the level of the ground floor of the residence, and opens on a back road. Consequently, the vehicles are washed on the turf in front of the stable by a hose connection at T. The residence is perhaps 600 feet from the stable, so telephone connection is resorted to. The vehicles have to be taken down the road, down the street beside the residence, and then driven up the driveway to the porch.

The second floor, the "hay loft," was converted to a chauffeur's apartment, as in Fig. 3. The great hay-door was made into a swinging window, a bathroom was constructed at D, and E was left as originally, with the folding doors F F retained. The living room was arranged at C, with the large bedroom B. A sort of kitchenette is seen at the left side of C, consisting of an oil stove S and a sink A. The building is in Queen Anne style, with brick foundation and first floor, and frame above, with a pointed roof. The arrangement is most satisfactory, steam heat being fitted as well as electric lighting.

The above two garages, both being near sources of gasoline supply, have no storage outfit, and their owners purchase by the gallon can. There are many applications of the storage system, but the owner of Figs. 2 and 3 decided that rather than pump gasoline over 30 feet, which is the distance be-

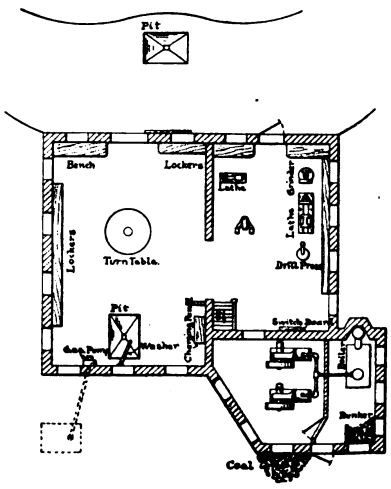

FIG. 4.

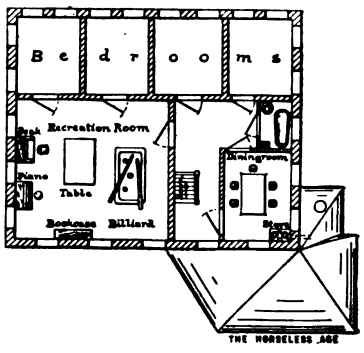

FIG. 5.

low the stable floor the tank would have to be if buried on the property, he would get it by the gallon or 5 gallons.

In the southeast of Pennsylvania a number of first class private garages are found, one of which is represented by Fig. 4. The building is constructed of red brick and generally follows the Colonial type, corresponding to that of the residence. It has accommodation for ten cars, and has an elaborately equipped machine shop annexed. The garage force consists of a steward-chauffeur, two drivers and a hostler, the latter wiping down the cars and taking care of the implements and machinery on the estate generally. The garage is fully equipped with turntable, washing pits (indoors and out), charging panel, switchboard and fuel pumping outfit. The machine shop has one 20 inch engine lathe, an 8 inch Precision bench lathe, hand planer, grinder, bench with vises, drill press, friction bench drill and ample locker capacity. A Franklin hoist is used in ether shop or car room through a communicating door. Fig. 4 shows the general arrangement of the garage. The machines may be seen on the west side, with benches and lockers, the main switchboard on the north wall and the door at the south. Tools and accessories are in lockers on the east wall, and an engine room is located in a wing as shown. In the carroom the turntable occupies the centre, a washing pit being located opposite the door, with overhead washer. The charging panel is on the partition wall as shown, while the other walls have benches, etc. The storage tank is located outside, buried about 10 feet, and the pump connected thereto stands at the doorway, with suitable drainage. The engine room contains steam heating plant, engine and dynamo (for lighting, power, etc.) and boilers, with a personnel of one engineer and two firemen. A washing pit is located opposite the door just off the drive, used in pleasant weather only. Fig. 5 shows the upper floor, showing the living rooms, etc., of the hostler and fireroom force, and also the hall and billiard room for the use of the employees, etc.

A few words may be added concerning what tools are desirable to have. Files, there should be at least six, varying from a heavy bastard down to a heavy smoothing, 16 inch to, say, 4 inches long, and including round, half round and rattail files; wrenches should include a monkey wrench, large enough to take the biggest nut on the car (usually the hub cap); at least two other monkey wrenches, 5 or 6 inches; a Bemis movable jaw wrench, and a set of "S" wrenches for the various sizes on the car; two good screwdrivers, one 6 inches, one 12 inches; a one pound machinist's ball-pein hammer, a copper hammer, a breast drill, with points from one-thirty-second to one-quarter, and also a screwdriver bit, a hacksaw and a pair of gas pliers, about 8 or 10 inches long. A blow torch is always handy, along with a soldering iron and solder. A voltammeter is also useful, except when a charging board is used. Tire outfits are usually comprehensive enough as furnished with the car, but it is convenient to have a locker for tires in which they can be protected and not folded. A vulcanizer is most useful for a permanent repair job. However, each owner should look out for himself as to the equipment of his particular toolroom.

Some Experiences With a Runabout.

The proud owner mounted the seat of his newly acquired crimson runabout and waved adieu to the man who had been touching up the paintwork at the very last minute. Letting in the clutch he started off from the factory, intending to make N———, his native city, just 80 miles away. After going about 25 or 30 miles he found that he could hardly turn the steering wheel, except by the use of much strength, and when he did turn it there came forth a gritting sound. The brakes were set and the investigation was started. Upon opening the steering gear case a small sliver of metal was found wedged between the bevel and sector, which was fitted. Likewise one or two teeth were "chewed," being badly tempered, and the casing was innocent of lubricant of any description. Above on the steering pillar a nickel plated minute oil cup was placed. This was likewise empty. Grease was packed in the steering gear case after the metal was removed with a pair of pincers. A handkerchief filled with non-fluid oil replaced the minute cup, after a liberal use of the oil can.

The trip was then resumed, and all went well until, while running rapidly, a succession of shakings and squeakings again necessitated a pull up. After a rigid examination it was found that owing to lack of lubrication the slip universal joint just aft of the gear box started to score and bind, causing the shaking referred to. A bucket of water cooled the parts, and after an hour the trip was resumed.

At last N——— was reached without further mishap. After several days' wait new gears for the steering case were shipped, and an expert from the factory fitted them and "dressed" the slip joint. To all intents and purposes everything was all right. The dwarf oil cup was replaced by a good sized brass one, which held non-fluid oil. The runabout now ran sweetly for a while and the weather looked cheerful again, but alas! the joy was shortlived! The motor refused to take a long hill, the pistons sticking. Investigation showed that owing to the position of the rubber tube return from the tank to the radiator, the valve dome (it was a horizontal opposed motor) so constricted it that the water would not circulate. Consequently the water remained in the tank and was constantly fed from the jackets by thermo-siphon, the radiator being quite empty. Upon attempting to relieve the constriction the tubing burst, scalding the owner's hands and emptying the tank completely. A piece of hose was bent over the inlet dome and connected, and the tank and cooling system refilled, after the engine had cooled down. On reaching home a gouge was used to hollow out the wood sill and enable the placing of the rubber tube in its former position without squeezing it. Owing to the condition of the owner's hands no driving was done for ten days.

Barring occasional perished inner tubes all has gone smoothly since. The motor is powerful enough—since the circulation was fixed—to carry two almost anywhere at a smart speed. After six months' service the car was overhauled and no appreciable wear was found. The car is running in fine condition at the present writing, unless the tires have laid down again.

Statistics of Olympia Show.

The Autocar prints the following statistics of the recent Olympia Show:

Representations of Nations.	1906.	1907.
Great Britain	285	313
France	177	145
Italy	35	28
America	28	24
Belgium	26	20
Germany	18	21
Holland	5	4
Switzerland	2	3
Spain	..	2
Grand totals	576	560

Methods of Driving.		
Chains, double	186	99
Chains, single	6	19
Propeller (Cardan shaft)	380	435
Electric, direct	4	6
Belt	..	1
Grand totals	576	560

The most striking feature is certainly the decline in the proportion of double chain driven cars.

Utility Vehicles in Italy.

The touring and automobile clubs of Italy are now working together in the organization of trials for commercial motor vehicles to be held at Plaisance in September next. The trials will have the patronage of the Italian War Office. At the same time and place a contest for agricultural motors, in which the Minister of Agriculture is interesting himself, will be held.

It is very likely that in conjunction with these events motor bus and delivery van tests will also be held. The question of the utility of such vehicles is to be studied by a technical committee appointed last week by the Postmaster General of Italy, the members of this body including, it is interesting to note, Prince Borghese, who was first home in the Pekin-Paris motor run. The Italian Parliament is so much interested in the future of the motor bus and motor van as to have placed 30,000 lire at the disposition of the Government for the organization of the suggested trials.—*Commercial Motor.*

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The Lines of Least Resistance for the Automobile Trade.

The present situation in the automobile trade is certainly a delicate one, and the proper policy to pursue under the circumstances is a question that demands the careful consideration of every factory manager. It is not sufficient to simply maintain a pleasant mien and hope for the best, as manufacturers have been advised by various editors, but the trend of the market must be carefully studied, and then the nature and volume of next year's production be determined in accordance with the conclusions arrived at. One thing that admits of no doubt is that there will be a strong decline in the demand for large, luxurious cars, and it will therefore be the part of wisdom to curtail production in this line as much as possible. It will be far better in the end to have lost a few sales owing to an underestimate of the demand than to be left at the end of the season with a large stock of vehicles on hand that cannot be moved by any other means except disastrous price cutting. The experience of last season, toward the close of which quite a few reputable makes of cars were advertised by metropolitan dealers at cut prices, should prove a lesson.

Reports to the effect that the demand for high priced cars is as active as ever are being issued continuously from irresponsible sources; no such reports should be given credence, but the situation should be investigated at first hand, as the very existence of many manufacturers will depend upon a proper estimation of the coming season's market. Nothing could prove more harmful to the industry now than another blind rush ahead under the supposition that conditions have not materially changed, resulting in further overproduction, reckless price cutting and ruin. It is better for all concerned that the situation should be squarely faced.

While restricting the production of cars of luxury, automobile manufacturers should be on the lookout for new outlets for their production. The basis of their industry is practically the light, portable gasoline motor, and this motor is constantly finding new applications. For instance, it has proven quite successful for propelling railroad inspection cars, and in large units has been applied to railroad haulage. Motor tractors for farm work are employed to quite an extent in England, and interest in this new development appears to be spreading in France, where a competition of such tractors is being organized for next spring. Then there are the multitudinous odd applications of commercial vehicles—sometimes where the vehicle is only required at long and irregular intervals; again where the distance is greater than can be covered by horses or where loading and unloading are preferably accomplished by mechanical power. All of these individual applications may not furnish a very great volume of business, but they promise certain success when cultivated in the right way.

The final mission of the motor vehicle is, of course, to replace the horse on the highway, but this transformation of motive power for road vehicles can only be accomplished by long continued, painstaking perfection of the mechanical vehicle, and the cases where mechanical power is of special advantage must necessarily be picked out first. The scene of activity is therefore gradually shifting from the publicity departments to the engineering departments, where all these special lines of introduction must receive the most careful consideration on their merits alone. To those who take up the work in a thorough manner success will come, helping the industry to tide over the period of depression which will follow the recent period of boom and inflation, as surely as night follows day.

The Master Vibrator System.

The advantage of perfectly synchronized sparks in all cylinders of a multiple engine is now pretty well established. Rather extensive use has already been made of the single vibrator coil and distributor system, which effects the desired end in a manner highly satisfactory in most respects, and now considerable attention is being paid to the use of the master vibrator in connection with the regular form of primary timer and multiple coils, unequipped with vibrators. Both systems attain the same end, since in both the first spark in each cylinder is always produced by the action of the same vibrator mechanism, and therefore ignition should take place in each cylinder at a uniform length of time after the commencement of the primary contact; but it is necessary to assume in the case of the master vibrator system that all the coils are electrically and magnetically identical, as otherwise the first spark might be very slightly earlier in one cylinder than in another, even though controlled by the same vibrator.

The objection commonly made to the distributor system is that the high tension current is handled by a moving mechanism which is to some extent exposed to the short circuiting action of dirty water and oil and of metallic particles worn from the electrical contacts themselves. Some manufacturers have hesitated to adopt the method on this account, fearing unreliability in service. For use in connection with motors of more than two cylinders the cost of installation of the distributor system is likely to be less than that of the multiple coil arrangement—the extra cost of the combined distributor and timer over that of a simple timer not usually being as great as that of the two, three or five vibrator coils which its use renders unnecessary. If a spare coil unit be carried on cars equipped with the distributor system, its advantage in point of first cost becomes somewhat less.

The saving in installation cost of the master vibrator system over the multiple coil arrangement cannot be of much moment, if indeed there is any, except perhaps with six cylinder equipments. The cost of the master vibrator may be expected

to nearly offset the saving due to the use of plain coils instead of vibrator coils and whatever reduction in the condenser equipment the method may be found to warrant. Exact comparison of the two systems as regards cost will, of course, be possible only when the master vibrator and coils appropriate for use therewith become common commercially.

There must, it would seem, be a slightly greater consumption of energy occasioned by the use of the single vibrator, for the reason that it is operated by its own magnet, separately energized instead of by the magnetism of the core of the spark coil itself. This, however, can hardly prove a serious consideration if the master vibrator magnet is well designed. With this system no extra chances of high tension leakage are taken over those met with in ordinary multiple vibrator coil practice, and it would seem that the master vibrator system, while probably offering no special advantage in the matter of first cost, and requiring a little additional expenditure of energy over the multiple vibrator method, might thus appeal to some manufacturers who desire a synchronized system and are a little incredulous as to the reliability of the high tension distributor.

Three Speeds versus Four.

In using a touring car of up to 24 horse power carrying five persons grades are frequently encountered which cannot be readily taken on the high gear. If the car is provided with a change gear having three forward speeds, the only recourse is to drop back to the second speed, taking the grade at an indifferent pace, running the motor much faster than desirable, and raising the temperature of the circulating water, in some cases to boiling point. On the other hand, with four forward speeds, a drop back to the third gear is made, the climb is made at good speed, the temperature of the water remains practically the same, and the motor is not run very much faster than before. It is to be understood that the high speed in both cases is a direct drive, and not an over drive. This last is suitable only for speed work on "billiard table" roads and is absolutely useless for ordinary work, imposing as it does too great a strain upon the engine.

With the higher powered cars only three or even two speeds are needed, the power and flexibility of the engine dispensing with the need of intermediate speeds. Grades that the lighter engine must change down to "negotiate" properly can be "eaten up" by the more powerful engine. On a car above 30 horse power, properly constructed, four speeds are absolutely unnecessary and quite in the nature of a "fad." And yet by some irony of fate cars of 30 horse power and above are furnished with four speed gears, while the 15 horse power car staggers along with only two or occasionally three speeds.

Another reason for the use of the four speed gear is that the majority of cars are not intended to run on the second speed. This is due to the craze for "high gear" drives, demonstrations being given as a rule on the high gear only. Consequently the second speed is useful for short distances only, the radiator not being equal to the work imposed upon it, with the inevitable result of boiling circulating water. An obvious remedy would be to give greater attention to gear ratios and radiator surfaces.

To the owner who runs over fairly level country roads only three speeds are sufficient. But there are others who live in districts where a 3 per cent. grade is considered level, and these above all need the four speed gear. It is a significant fact that all European automobiles which are built in hilly sections have four speeds, no matter what the horse power, while those built in more level sections have only three speeds. Four speed gears should also be used where poor roads predominate, so as to save the motor in heavy going. The low speed of a four speed gear is naturally much lower in ratio than that of a three speed gear, consequently surfaces can be negotiated by the first which could not be attempted by the second at all.

The factors entering into the question of three speeds versus four are the nature of the roads and grades over which the car is to be used, the horse power and the carrying capacity. To the owner of a moderate powered car in a district of poor, hilly roads a fourth gear is of considerable advantage.

The Decline of the Planetary Gear.

Perhaps the most noteworthy fact brought out by our statistics of mechanical features at the two recent shows in New York city is that only a relatively small number of manufacturers retain the planetary change speed gear, the majority having changed over to one or the other form of the sliding gear. At the Grand Central Palace Show only 4 per cent. of all the chassis types exhibited were equipped with this form of gear, and at the Madison Square Garden Show about 8 per cent., making the average for the whole industry about 6 per cent. Two years ago, among 156 different models of American manufacture exhibited at the two shows, thirty-two, or about 20 per cent., were equipped with the planetary gear, and if we go back two years more we find that about 50 per cent. of all the models on the American market had this type of gear.

The planetary gear has from the first been used more particularly for light and cheap cars, and the tendency toward powerful and high priced models therefore partly explains its decline in numbers. All attempts to construct satisfactory planetary gears with more than two forward speeds have failed, and with cars geared to 40 and 50 miles per hour on the direct drive there is considered need for at least one intermediate gear. That the planetary is not used for big touring cars is therefore not surprising, but its abandonment by some of the manufacturers of relatively light and well powered cars is not so easily explained. One fundamental difference between the planetary and the sliding gear is that the former will give tolerable service when built of the commonest materials, whereas it is absolutely necessary that a sliding gear be built of high grade materials. Cast iron is generally used almost exclusively in the construction of the former, while nothing poorer than high carbon steel will stand up for any length of time in sliding pinions, and alloy steels are used in the majority of instances. Moreover, the modern sliding pinion change gear is generally mounted on either ball or roller bearings and is very effectively protected against dust and moisture—both features not found in planetary gears. The average planetary construction could no doubt be greatly improved, especially by completely encasing it, but these improvements would render it more expensive, and as it seems to be used particularly on the lowest priced cars, it continues to be made in the old imperfect way. What appears to limit the field of application of this gear is that it does not seem applicable where more than two forward speeds are desired. The great advantage of the planetary gear is the ease of control it provides, all changes of speed, starting and stopping requiring only a single motion each.

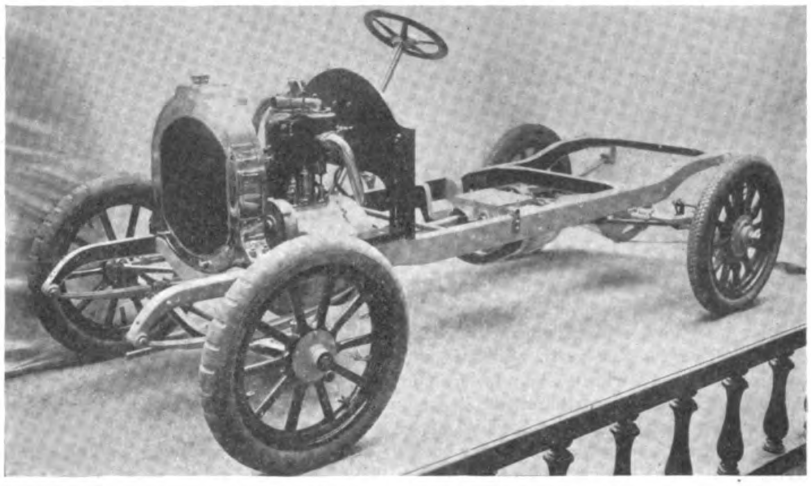
The 1907 Paris Show.

Present Position of the Trade.

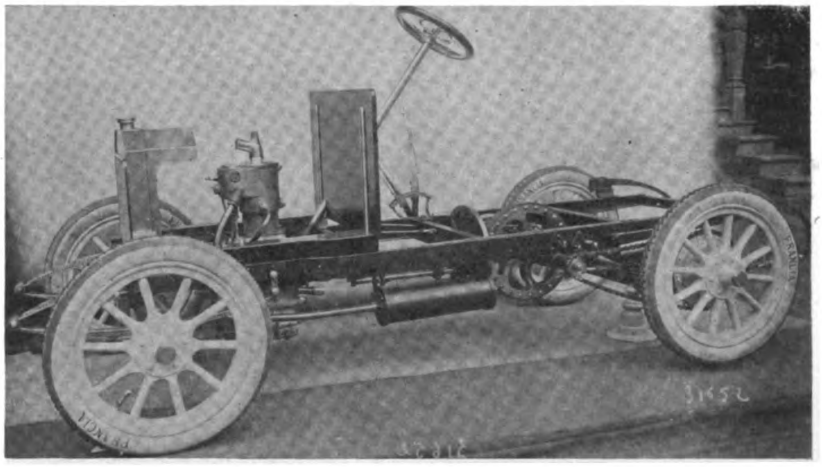
By Nativus.

From time to time during the past twelve months statements respecting movements and happenings of the French trade have appeared in The Horseless Age, and the facts thus published have correctly represented the changes attaching to a constantly developing business which now ranks fifth in importance in France. The occurrence of the annual show in Paris (no provincial automobile exhibitions of any kind are held in France) seems an opportune moment to disabuse the minds of your readers of the many false impressions disseminated throughout America and England by those interested persons who seem to delight in calumniating France's energetic progress in an industry that she has alone created. Sorrowfully we must admit that some few of our clever automobile engineers have been too deeply enshrouded in creating model workshops, and have somewhat neglected the purely commercial side—what your go-ahead countrymen term "getting rich quickly." Disaster has overtaken these men, yet in this they have not forfeited the respect of their creditors or their fellow constructors, and the sympathy extended to them has been so practical that they may hope to shortly again hold their heads proudly before the world. Yet they are but few and insignificant, and in normal times would have been passed over as merely the natural changes of personnel to which all classes of industry are subject. That France is passing through a critical period we on this side do not pretend to ignore, but unknown to ourselves the chiefs of the great manufacturing concerns have been meeting in solemn conclave on numerous occasions this past year, and have kept themselves fully acquainted with the changing condition of all countries where they are at present doing business or expect to do so in the future. It may surprise your readers to learn that the Chambre Syndicale, which entirely controls and represents the industry conjointly with the Automobile Club de France (just as if your A. L. A. M., A. M. C. M. A. and the A. C. A. were all rolled into one society), has confidential agents in London, New York, Chicago, Cape Town, Bombay and Melbourne, who send home regular reports of the minutest character, at very short intervals, dealing with the manner in which French cars are sold by the various agents, prices realized, and the trend of local demand for certain types of construction. So far as concerns the United States market, the patriotic desire of its citizens to give their orders to their own factories has not gone unobserved, and thus we see certain American companies supplied with French designs and working drawings, French manufacturers keeping a hold upon the production by means which may not here be specified. The establishment of a factory to make Michelin tires west of the Atlantic seaboard is evidence of this policy. We admit that American automobile manufacturers have progressed in a manner that secures our admiration, but for our part we have not been standing still. This past year has brought many American tourists to our shores who have made their journeys on the European continent on American high powered automobiles of the latest patterns, and we have been afforded numberless opportunities, of which we have not failed to take advantage, of inspecting the design, construction and workmanship, and of comparing with similar powered chasses from our own factories. It was always foreseen that on account of the high import duties the United States trade could only take the most expensive types of vehicle, and up to the middle of 1906 it was considered probable that, for such a type only, sales would gradually increase for some four or five years, and then would begin to fall off as the native production progressed in design and experience. The change has come much earlier than was expected, yet its effects were foreseen during the last Paris Show in the falling off of orders and disinclination of those few American agents who visited Paris in December, 1906, to fix up contracts beyond the end of 1907.

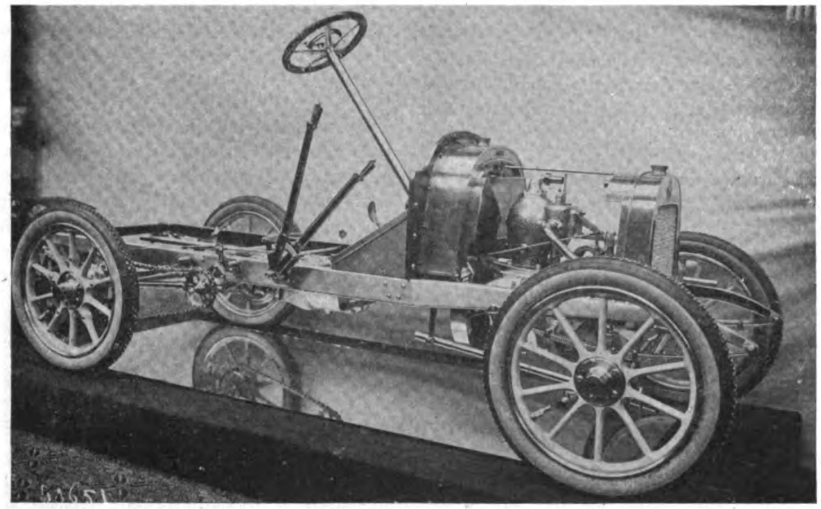
What is our position today? In design we set the fashion to the world; in the employment of special alloys of steel we are years in advance of all other nations; in workmanship we may be equalled by the very best of American factories; but striking an average among the workmen in all classes of factories, large and small, we are still able to declare the French as generally superior. Financially, excluding the few small firms who have retired and about eight or ten others who have just managed to clear expenses this year, the better known houses are perfectly stable, and some few of them have made phenomenal profits. As an instance, the Darracq Company have made a net profit for 1907 of $1,275,000, of which $925,000 will be distributed as dividends to the shareholders and the remainder will be carried to a reserve fund. Moreover, there are rumors of amalgamation between several of the principal makers. M.



Vulpes Voiturette Chassis.



Le Metier Voiturette Chassis.



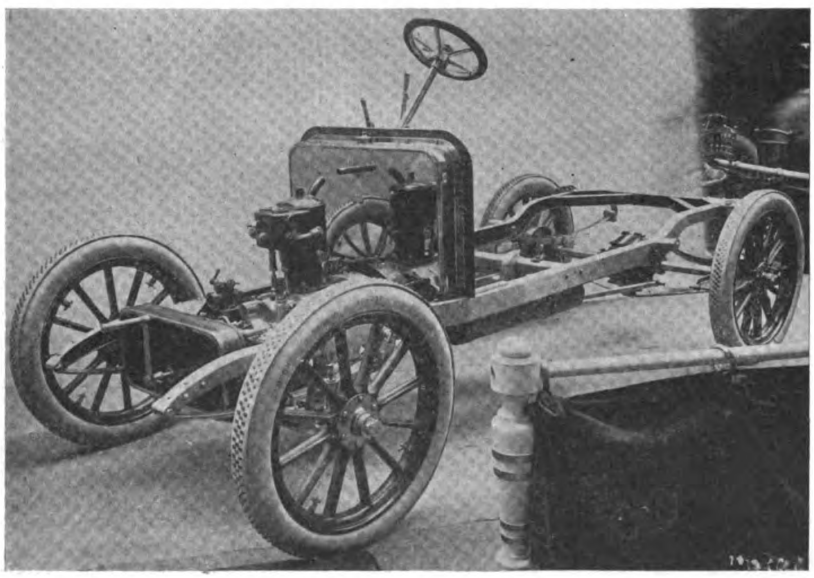
PEUGEOT VOITURETTE CHASSIS.

Clement, who is extremely wealthy and has large sums invested in several directions, is quietly proceeding with a scheme he has been maturing for two years, and it is an open secret that he will be likely to buy up Panhard & Levassor, together with all outside interests in the Clement-Bayard, Clement, Gladiator, and one or two other concerns, and eventually consolidate these, with the assistance of Baron de Zuylen, who holds the controlling financial interest in the De Dion-Bouton factory. Such a huge combine is projected not so much in the nature of a trust to keep prices inflated, but to stop internal competition, centralize manufacture in a few enormous factories, and so reduce constructional costs as to be prepared to meet British and American competition in every one of the world's markets.

General Review of French Design.

BY A SPECIAL CORRESPONDENT.

With over 1,200 exhibitors of pleasure cars, commercial vehicles, accessories and boats, it is impossible to review everything within the limits of a single letter, and, therefore, only purely pleasure cars will be now dealt with, reserving commercial vehicles and really novel accessories to a later contribution. Whether looked at as a whole, taking the individual exhibits of the great firms, or inspecting the innumerable smaller concerns whose names are quite unknown outside France, there is no slackening of progress, and the finish on every machine in the Grand Palais is remarkable. Conceding that all the machines have been specially prepared solely for displaying purposes, one would expect to find numerous exceptions among the small manufacturers whose output is admittedly only on a moderate scale. Many of these people are hidden away in most inaccessible positions under the galleries of the main hall or in the maze of minor halls and basements that lead in every direction; but it is impossible to discover a single machine that is not qualified by reason of design or finish to occupy a position in the main avenue. In previous years the smaller makers have been content with the mere fact of obtaining some sort of publicity by being in the building, and have sent up a good deal of rough work, because they knew they would be dumped down in comparatively dark gangways and nobody would be much the wiser. The change this year is nothing short of revolutionary, the leveling up of finish and workmanship making it invidious to differentiate in these respects between any of the stands, and this effect is further enhanced by the trouble taken to properly illuminate the hitherto dark spaces and to spend considerable sums of money on decorating out of the way corners.



PASSE PARTOUT VOITURETTE CHASSIS.

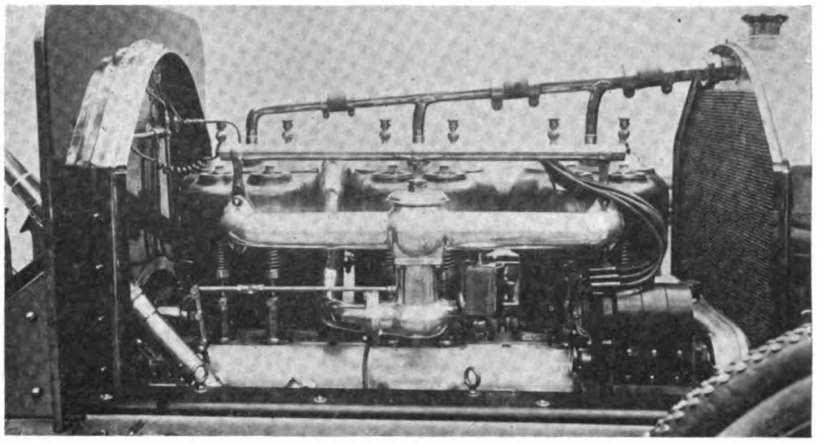
VOITURETTES.

One expects some sort of surprise every year, and the current exhibition is in no way behind the 1906, when six cylinder machines aroused so much interest. This year, strange as it may read in America, is remarkable for the number of single cylinder machines, all developing about 7 horse power and fitted with two seated phaeton bodies. The revival of interest in the low powered vehicle may be traced to the establishment of the race known as the Coupe des Voiturettes in the autumn of 1906, confined to single cylinder engines, having an equal bore and stroke of 110 millimeters. The annual race for this type of machine occupied seven days just prior to the show, and in which some seventy of these little vehicles competed, the winner averaging 42 miles per hour on the road over a course of some 250 miles. How many different patterns of these little machines there are in the building one cannot say offhand, certainly not less than fifty, and a careful count might considerably increase that number. The appearance of so many is the more remarkable inasmuch as only one well known house—De Dion—has given any attention to this class of trade, every one of the fifty or more makers being firms who twelve months ago were quite unknown, and even now have no prominence beyond the circle of the towns where they are located. Although of such small power, they are in no way cheap, as that word is understood in America, none of them being offered for less than $750, chassis and tires; and quite a number sell for as much as $1,000. Four or five years ago this class of machine was very, very cheap, and consequently so very nasty that, more than anything else, they helped to kill the trade in the British colonies that French makers were then striving after. Today these ma-

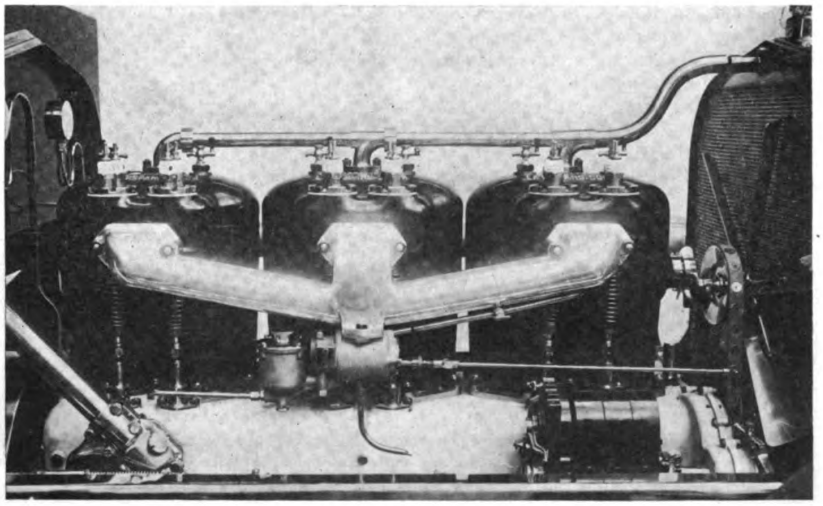
chines are quite on a level with the big four and six cylinder, 40 horse power cars of worldwide reputation. Pressed steel frames, suspended crank shaft, high tension magneto, mechanical pump lubrication, gate change gear box, cellular radiator, ball bearings to gear box, and every moving shaft—these are the items embodied in every machine. But they are not mere copies of larger existing types and the originality of design and the many ingenious devices found on every one are worthy of the highest commendation. New ideas and developments are, of course, introduced by the giants of the industry, like Panhard, Darracq, etc., but for the real departures and features that may very possibly largely influence future design in every class of vehicle one must investigate among these "little fellows," and after examining them closely one cannot but admit that the French automobile engineer can still claim pre-eminence. There is only one machine built in England that can approach this 110 millimeter type for quality, and most certainly nothing of American production that has yet been seen in Europe of the single cylinder class. Where all are so good it is almost impossible to make a choice; the Lion-Peugeot, Alcyon, Vulpes, Chenard-Walcker, Steel and, quite in a class by itself, the Sizaire-Naudin are excellent. On these last machines the rear springing is very much like the single cylinder Cadillac, but the front of the frame rests on a transverse spring carried across the middle of the radiator, the two ends of the spring floating on spirals around the enormously extended vertical steering sockets. One of the exceptions to the nearly universal propeller shaft and live axle drive on these small machines is the Lion-Peugeot, which drives by two side chains; a sub-frame is provided to carry the engine and gear box, the water jacket space around the engine being very large, while the casting departs from the normal in presenting the appearance of a sphere. In point of high class fitting and attention to the most minute detail the vehicle is wonderfully good, and is fully worth the $1,000 asked for it with a two seated body, and only $40 purchases two extra rear seats that can be reached by turning down the front passengers' seat. Another small machine with a four cylinder monobloc (a word which I will coin to express more than two cylinders cast together) engine of but 8 horse power, quite a number of specialties, and with the refinement of a transverse rear spring, sells for $945 complete with body.

MODERATE POWERED CARS.

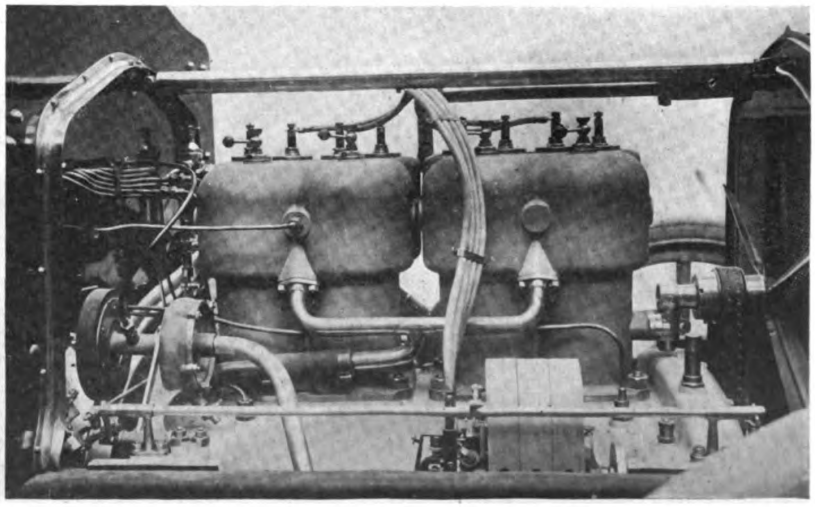
It is among the moderate power cars of from 15 to 24 horse power that the most remarkable developments can be traced. One would have imagined that the 1907 models seem so well to satisfy critical ideals that hereafter manufacturers would be content to refine only the minor details and so standardize the general design that the production of large quantities at greatly reduced prices would be the natural order of events. The few days I have already spent in the Salon have left me with a sense of wonderment at the great advances in this type of car, and a doubt as to whether any of her international competitors will ever be able to catch up to the high level which France's automobile engineers ever



FIAT SIX CYLINDER MOTOR (ITALIAN).

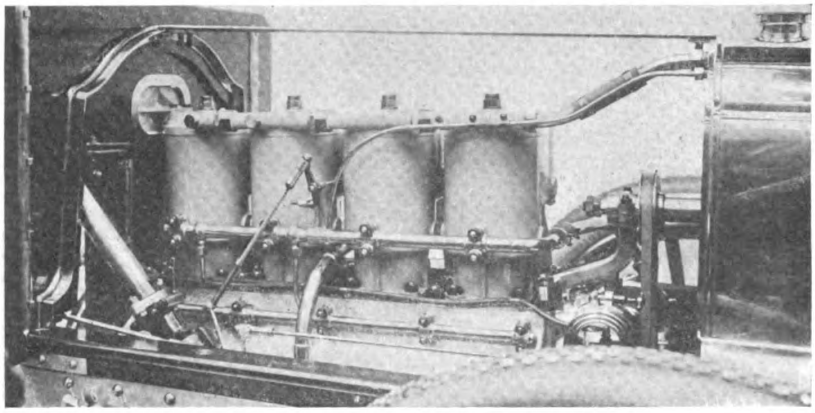


HISPANO-SUIZA MOTOR (SPANISH).

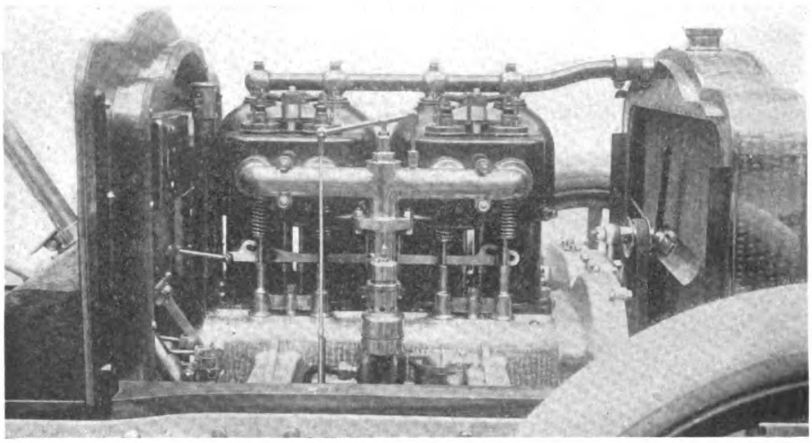


REGINA DIXI MOTOR (GERMAN).

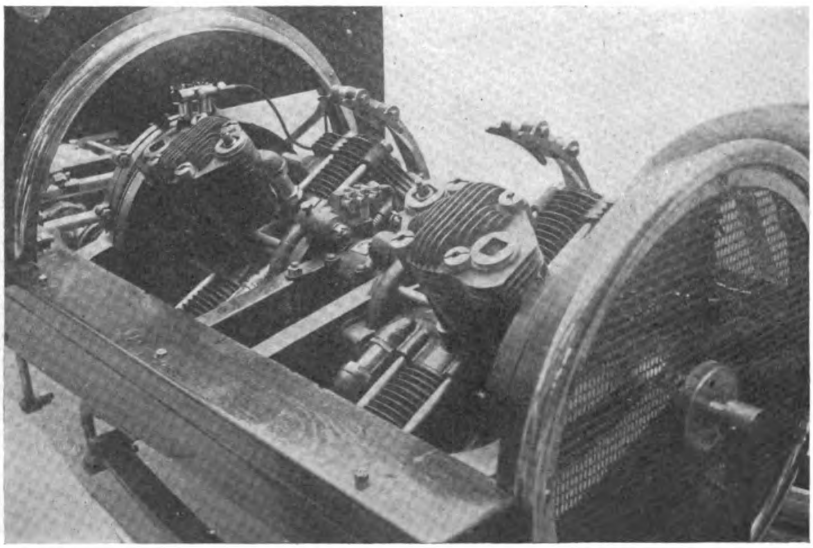
strive to obtain. Suddenly recognizing that extremely big powers will mainly be constructed in but limited quantities in the countries where a special demand for this class can only be created and maintained by those fully conversant with local conditions, the leading French firms appear to have all simultaneously arrived at a decision. This decision would be surprising in its unanimity but for the secret information bureau, and from which the future trade possibilities of the world's markets had been disseminated. Months before America or England had quite realized the slump in very expensive machines, all the factories in France altered their 1908 plans, left the 40, 50 and 60 horse power chasses to sell on the reputation already created, and favorably devoted the whole of their energies to redesigning the type of machine that will find purchasers at about $2,500 to $3,000. Mere description cannot convey the efforts made by every French maker, large and small, to prove to the world that the creators of the motor car industry mean to maintain their position by sheer force of merit, and are not content to rest calmly if others attempt to wrest the leadership from them.



De Dion Four Cylinder Motor.



Brouhot Four Cylinder Motor.



Burlat Eight Cylinder Motor, Air Cooled.

LIVE AXLE PANHARD.

The truth of the existing position, accented in the preceding paragraph, is shown by the fact that the great firm of Panhard & Levassor have marketed a four cylinder, 15 horse power model with live axle drive. This is a change of policy that has created a profound impression since the first day of the Show among the thousands of visitors. Panhards, with their 3,000 workmen, who would never make anything else but chain drive and who were wedded forever to the armored wood frame, have descended from that high and mighty position and are selling a machine with a pressed steel frame. Still the leaders in the French industry, anything coming from the Panhard works must command respect, although it must be admitted many of the details are arranged on too conservative a basis, yet the major portion of the design is typical of the very latest ideas. The pressed steel frame has the side members quite parallel from end to end, and these are nearly twice as deep in section as have been fitted to similar powered machines of other makes. The object of this is to so stiffen the frame as to prevent any side twist. The springing is by half elliptics at front and three-quarter elliptics behind, the fixed ends of the top quarters of the latter being bolted rigidly to extension brackets attached to the extreme ends of the frame. The only feature of design that resembles previous Panhard practice is the separately cast cylinders with valves on opposite sides, the valve pockets being extended considerably beyond the cylinder jackets; in all other details the engine and transmission are new. The enclosed cam shafts are so mounted in the top of the crank case that they can be withdrawn from the rear end by unscrewing a detachable disc. The engine only is supported upon a sub-frame, three cross members between dashboard and rear main member supporting, respectively, the clutch collar and the gear box, the latter having selector rods, four forward speeds and reverse with direct drive on top, controlled from a gate side lever, gear shafts running in ball bearings. A multiple disc clutch is enclosed in a long aluminum casting connected to the gear box, bent right away from the crank case; this casing can be entirely removed without disturb-

ing clutch or anything else. A universal joint, Oldham type, situated to the rear of the gear box, communicates with the propeller shaft, which is entirely enclosed within a huge sleeve bolted directly to the crown bevel housing and having the front of the casing extended into a fork. This fork goes clear of the universal joint and has its two ends swinging from two steel pins suspended from the central cross frame member, ball and socket joints being fitted both at top and bottom of each pin, or four joints in all. This propeller shaft casing is caused to function partially as a torque rod, with the rear springs taking a part of the drive, as the forward ends are without shackles, and thus act as distance rods. The rear axle is highly original in respect to the manner in which the drive from the outward ends of the differential shafts is conveyed to the road wheel hubs. The rear axle casing is literally enormous, and big enough to withstand ten times the weight it will carry. The rear wheel hubs run on ball bearings carried around the axle casing and are canted outward at a slight angle so that the tops of the wheels are nearly as much out of perpendicular as are the front steering wheels, a design initiated by an Italian maker last year. The differential shafts are, of course, out of horizontal, the inner ends being higher than the outer, and it is at the latter points that the great departure from anything previously attempted by any other firm is here revealed. The canting outward of the driving wheels necessitates some form of flexible coupling between shafts and hubs to allow for the difference in angle when, with the fully loaded car, the tops of the wheels assume a perpendicular with the ground, and the plan hitherto adopted has been to put universal joints nearly at the ends of the differential shafts, the actual drive being performed with dog tooth clutches of a normal type. This does not get rid of the enormous side friction between the inner face of the hub and the thrust bearing against which it abuts, the upper part of the thrust block quickly wearing away. On this new Panhard the outer ends of the differential shafts carry toothed wheels with slightly convex faces, while teeth are cut on a ring attached to each side of the hubs, but with concave faces. The end attained is just the same as if each opposite pair of teeth formed a ball and socket joint; we have, therefore, practically a series of ball and socket joints equal to the number of teeth on one ring, without the wearing surfaces that these joints would entail.

Eisemann high tension magneto is the standard ignition, a single non-trembler coil on the dashboard serving for both magneto and accumulators, the distributor at one end of the magneto also acting for both ignition systems by means of a two-way switch. As in last year's Panhards, ignition advance is obtained, not from variation of the armature position relative to the maximum lines of force, but by partial rotation of the field magnets bodily around the armature.

Such a machine is a credit to its producers, and will go far toward once more placing the Panhard firm as the leaders in French design. Two detail faults are that they still persist in employing a belt for the oil pump (that only delivers to sight feeds, leaving the oil to reach the crank case by gravity), and that the pull of the brake rods is taken entirely by extremely fine threads cut on the rods themselves, this latter arrangement being so positively dangerous as to arouse wonder why it has been permitted to spoil a good chassis.

In the other Panhard models, all chain driven, the details are unaltered except that the hydraulic regulator for the auxiliary air valve of the Krebs carburetor is now set vertically instead of horizontally, and they still retain the unsafe wire rope to pull on the rear brakes that everybody else discarded years ago. Just why a rope is beloved by these folks is a standing mystery, for it has probably given more trouble to owners of Panhard cars than everything else combined.

FREAKS.

Of "freak" constructions there are a few this year, one of the weirdest being the Burlat, which has eight cylinders, air cooled, set in two lots of four each around a common crank shaft, and which the inventor explicitly states revolve around the shaft, while the shaft itself also turns round and moves the propeller shaft through the usual gear box; the spark plugs at the top of each cylinder have no attached wires, but rub against a contact suspended from the middle of a curved arm rising up from the side of the frame. It all looks very wonderful, but nobody has seen it running. Another freak dispenses altogether with the radiator, ostensibly to save weight, and obtains currents of air without a fan by forcing water through very fine jets, and thus cool the air before it reaches the cylinders along copper jackets; this is too fearful for words, because the ingenious gentleman adds about double the weight that he attempts to displace by casting the radiator overboard. A chassis that draws crowds of people is the Bart, with a four cylinder engine of 24 horse power, with three points suspension of engine only, the front end carried on a rocker joint; so large is the exterior of this engine, with tremendous water jackets, water pipes nearly as large as a man's arm, and exhaust pipe that a big dog could easily creep through, that if the catalogue stated it to be a 200 horse power engine nobody would be surprised.

DISAPPEARANCE OF STEAMER.

The absolute disappearance of the steamer as a selling article in France (the Darracq-Serpollet is now only being manufactured for thirty-four seated omnibuses) is marked by the fact that Weyher & Richemond, who have spent enormous sums of money in perfecting a really good and high grade steamer, have at last ceased to struggle against fate, and have come forward with a four cylinder, 20 horse power gasoline chassis. Turgan, who lost a big fortune in trying to popularize steam, fell into line last year with a gasoline machine, and thus there is today not a single steamer made in France for pleasure cars.

A SIGN OF THE TIMES.

A sign of the times can be observed on the stand of the Compagnie Electromobile Française, who hitherto confined themselves to making town carriages driven by electric motors taking current from a battery of accumulators; they have produced a four cylinder, 16 horse power gasoline car with live axle drive on the most up to date lines, and that has embodied one of the very many novelties to be found scattered throughout the building. The tail end of the leather faced clutch shaft is suspended by means of a ball bearing from one of the cross frame members, and has behind it a universal joint with the pins moving in ball bearings, a similar pattern of joint extending from the rear of the gear box. The gear box itself is not bolted rigidly to the chassis framing, but "floats" from a three point suspension, the front and rear corners of one side of the box being suspended from one side of the main frame, and the centre point of the other side of the box being dependent from the opposite frame member. The three large arms, cast integral in the box, have their extreme ends formed into balls which are held between pairs of very stout helical springs set horizontally, almost exactly the same design as is universally employed for connecting the steering arm below the steering column to the forward extending rod attached to the knuckle joint. Undoubtedly such construction, that entirely insulates the change speed gear from all vibration and also makes it quite independent of any twists in the frame, is a big step forward and presages the likelihood of it being adapted to the engine also; in fact, provided the spring suspension is sufficiently strong and that each unit in the transmission is quite separated from its neighbor, there seems to be no reason for objection to this or some other development of the same idea pointing to improvements not hitherto thought possible. The old adage about nothing new under the sun is recalled by the Wilson-Pilcher four cylinder, horizontally opposed engine, built and exhibited in London in 1901, which was suspended from the frame by overhead helical springs, a system that was quite successful, and was only dropped when the horizontal engine went out of fashion in England.

(To be continued.)

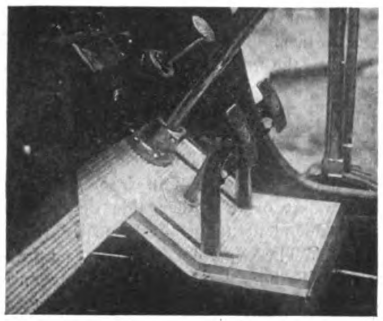
At a recent conference of automobile engineering interests in London the work carried out by the engineering standards committee was approved by automobile engineers and the British standard fine threads were pronounced suitable for automobile construction. It was stated to be an advantage to lighten the existing Whitworth standard nuts by reducing their width across the flats, and it was claimed to be desirable to add certain special standard threads to those already standardized by the committee.

The London 1907 Show at Olympia.

(Concluded.)

By Roy Lindsay.

Among the few entirely new cars seen for the first time is the Hillman Coatalen, whose manufacturers have come forward with a four cylinder, 25 horse power, and a six cylinder, 40 horse power. In the smaller model the crank case, unlike in most other machines, is split vertically, the base being covered by a detachable plate, allowing adjustments to be made to the connecting rod bearings only. This crank case construction is a reversion to the methods employed some years ago, and has been adopted with the specific object of strengthening the carriers of the three bearing crank shaft, the designer's argument being that the usual practice of suspending the shaft from the upper half of the case is incorrect, both in theory and practice; unless the crank case is made abnormally heavy the shaft will "spring" and cause the bearings to be forced out of alignment. On the face of it the reasoning appears to be sound enough, and as the designer was also responsible for another English car that sells in large numbers, his factory experience may have been found helpful. The change speed gear wheels and the wheels for the bevel drive from propeller shaft to the differential cage, as well as those in the differential, are cut from self hardening chrome-nickel steel.



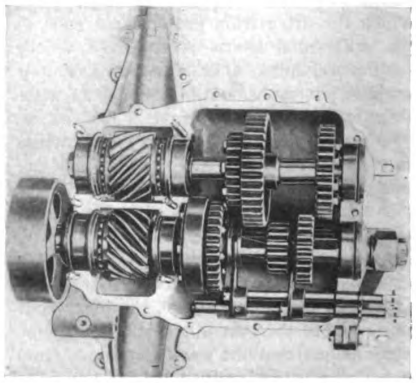
Humber Aluminum Slot Plate and Foot Actuated Oil Pump.

TWO HIGH TENSION MAGNETOS.

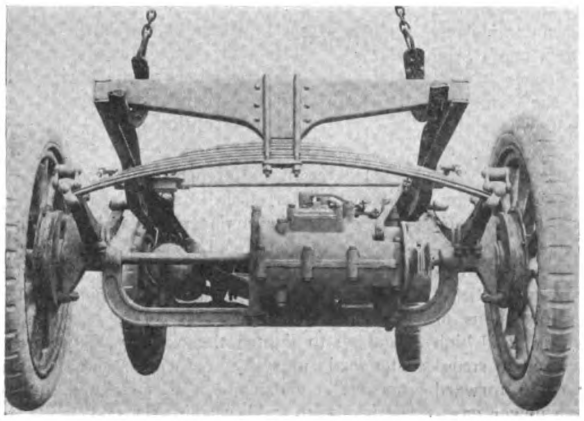
On the six cylinder, 60 horse power Austin car two novel features are seen. The first is really startling, two separate high tension magnetos supplying the ignition current to the single set of spark plugs; the two machines are set end to end, with their spur driving wheels adjacent, the shaft communicating motion from the timing gear case being carried below them and having mounted on its end two spur wheels meshing with those on the armature shafts. Up to an engine speed of about 1,800 revolutions per minute the first machine is in action, but when this speed is exceeded a controller switch cuts one out by short circuiting the field magnets and simultaneously opens the circuit of the other machine, which is said to be quite satisfactory to give a spark of sufficient duration to properly ignite the charge regularly in all the six cylinders at the tremendous engine speed of 3,000 revolutions per minute. The other novel feature on the Austin is the casting of an oil well at each end of the long crank chamber, with a separate mechanically driven pump for each well to force lubricant through the hollow crank shaft to the journals and connecting rod bearings; this is refinement with a vengeance, but seems to be a necessity on six cylinder machines, owing to the great variation in the oil level when ascending or descending hills. A talking point and nothing else best describes the entire enclosure of the lower portion of the change speed lever to prevent ingress of dust to the cross rocker shaft, but the fact that, as the casing must always be open at the top to permit of the lever moving in the gate slots, the casing will form a perfect receptacle for water, with a consequent rusting up of the joints, is hardly what the Austin drawing office could have been aiming for.

DAIMLER LIVE AXLE MODEL.

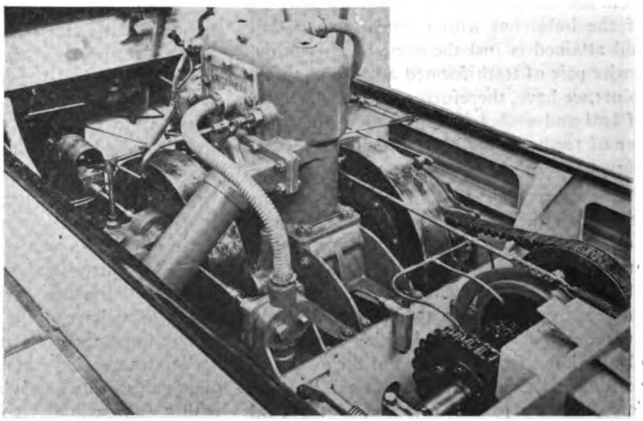
A mild sensation was created on the opening day by the appearance of a new 36 horse power live axle model on the Daimler Company's stand. (This manufacturer must not be confounded with the German Daimler Company, whose cars are known as the Mercedes.) Like Panhards in France, the English Daimler Company have never made anything else, for sale, than chain driven cars, although they turned out half a dozen experimental live axle models in the autumn of 1906, but the fact that they had done so has only been known to very few persons outside the factory. Constructional differences between the new model and the old ones concern only the portions to rear of the gear box, all other features being alike. The main features of interest lie in the flattening of the centre part of the live axle casing into the semblance of a drum, the two side plates being held on by bolts, and by taking away the rear half of the drum and withdrawing the differential shafts through the outer ends of the hubs the complete differential can be lifted away bodily. The two half elliptic springs at the rear are new with respect to the method for supporting the shackle pins, for instead of being attached to short brackets bolted to the side members of the frame at the front ends and to dumb iron frame extensions at the rear, the pins are driven into large weldless steel tubes that extend from side to side right across the frame, the rear tube also acting as the cross frame member. The resistance to twisting effort at the ends of the pins must be appreciably increased by this good arrange-



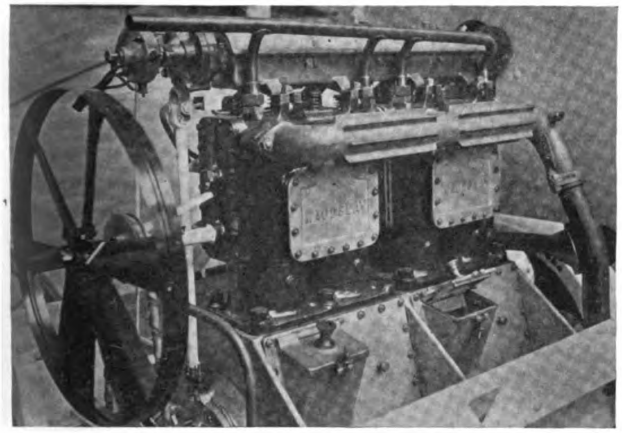
Gear Box of Daimler Car.



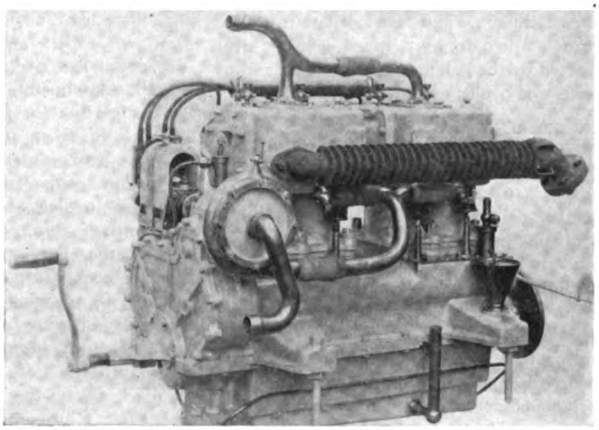
Darracq Rear Axle With Gear Box.



Lucas Valveless Engine.



EXHAUST SIDE OF MAUDSLAY ENGINE.



THORNYCROFT ENGINE.

ment, and it is also possible to provide very much larger pins.

A NEW GEAR BOX.

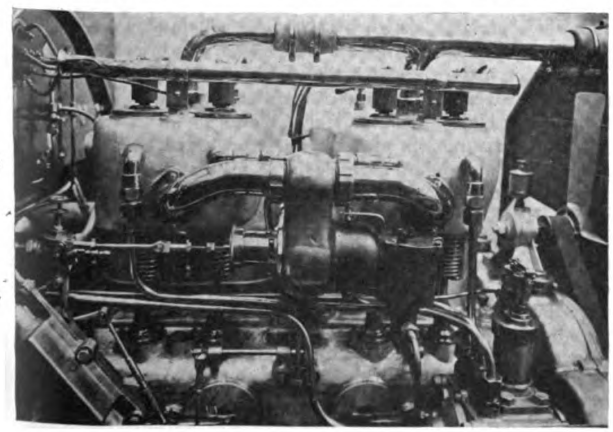
For the side chain driven Daimlers, 42 horse power and 58 horse power, respectively, an entirely new gear box has been devised, in which both the direct drive on top speed from the primary gear shaft and the indirect drive on first, second and third speeds through the secondary gear shaft are both delivered to the cross differential shaft by worm wheels, the object being to secure a more silent drive than is possible with bevels. Further efforts toward quietness of running are made by entirely enclosing the side chains in dustproof and oil tight chain cases; built up from pressed steel; those cases have stout internal stiffeners to enable them to act also as distance rods, eccentrics drawn up by rods taking a pull from the front ends of the cases, giving the necessary adjustments to the chains. A particularly noticeable alteration in detail from last year's models is the provision of a separate outlet from the water circulating pump to each pair of cylinders, the two pipes being also nearly double the internal diameter of the single one previously employed. The idea of a hinged body is not in itself new, but the application to a body fitted to a 58 horse power car is a very daring innovation, and the cream colored phaeton body with Cape cart hood on the Daimler stand was creditably carried out; the whole body, including hood and rear mud guards, was hinged around the large tubular cross frame member at the rear, the bottoms of the mud guards only being held to the running boards by wing nuts.

GEAR BOX ON REAR AXLES.

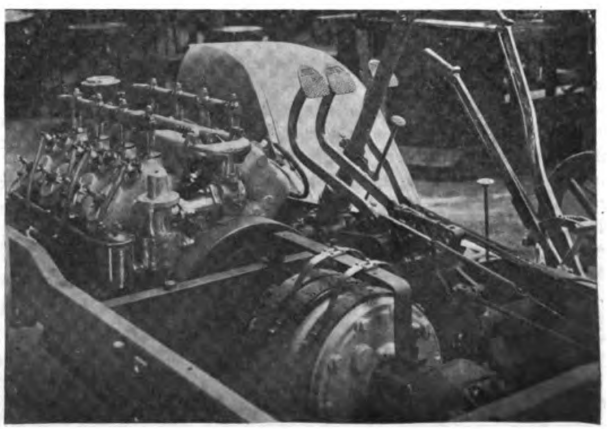
The Darracq people in advertisements issued prior to the Show made the extraordinary announcement that they would have on view a car without a gear box. Most all of the daily newspaper men who write so called "reports" from material supplied by the manufacturers swallowed the bait with as much gusto as greedy fish, publishing foolish and inaccurate paragraphs to the effect that the gear box was doomed to early extinction, and that Messrs. Darracq were the clever pioneers of such a departure as would immediately revolutionize the whole industry. When the technical press were permitted to see this epoch making wonder it turned out to be nothing more or less than the placing of the gear box right on top of a dropped solid rear axle, and driving the rear wheels by two differential shafts passing through the ends of the axle. Only one model is as yet so made, viz., the four cylinder, 18 horse power, and it is extremely doubtful whether it will be a successful introduction, despite the Darracqs' emphatic assertion that they have been testing it for two years, because the solid axle is far too close to the ground, and the gear box not being on the spring supported frame will be subjected to the fiercest vibration and to all the shocks set up by the contact of the road wheels with the ground. Perhaps its sole object has been to create an advertising boom, but this has been altogether discounted by a somewhat cold reception from the technical press, the members of which always resent any attempt to wilfully lead them astray, as was done in the present case.

AN EIGHT CYLINDER CAR.

The eight cylinder, 50 horse power Adams car was the only vehicle having more than six cylinders in the Show, and was further interesting because it is probably the biggest horse power that has so far been equipped with an epicyclic change speed gear in England. The cylinders are arranged in the shape of a "V," with the heads pointing outward, four on each side, each opposite pair working on the same crank pin. The exhaust and inlet valves are all within the angle of the "V," and are driven from two cam shafts, and there are separate water outlet pipes from each set of four cylinder jackets to the cellular radiator. Inlet and exhaust pipes are cast together for each



MERCEDES ENGINE WITH BOSCH MAGNETIC SPARK PLUGS.



EIGHT CYLINDER ADAMS ENGINE WITH INTERLOCKED PEDAL CONTROL.

four cylinders, and the drive is taken through a two forward speed epicyclic gear actuated by the Adams system of interlocked pedals and propeller shaft to live axle.

A LOW POWERED HUMBER.

Among the few surprises from the leading manufacturers was the staging of a four cylinder, 10-12 horse power model by the Humber Company, selling complete with a beautifully finished five seated side entrance body for $1,150. A similar powered model was offered by this company in 1905, but was dropped when larger powered machines were undertaken. Its revival, so transformed that it is practically a new model throughout, is a sign of the times that the buying public want something smaller than they have hitherto been able to purchase in the four cylinder class, while the reduction in price of $325 from that of the earlier type accentuates the position. In every detail this car might be termed a replica of the 30 horse power Humber, although the general features of the design are quite different. Without wishing to deprecate the merits of other machines approximating to the same cost, there was a consensus of opinion, even among their competitors in the trade, that it was extraordinarily good and would be likely to secure the bulk of orders in its class in 1908. The new 20 horse power Humber has an aluminum floor plate below the pedals, cast to imitate rubber matting, and removes the objection to the usual slitting of such rubber mats to enable them to be passed around the pedal arms. The Humber Company, just as they did at the 1906 Show, took more orders than anyone else, reliable information supplied by one of their leading officials, and backed up by ocular proof, showing sales in the first six days totaling $1,350,000. The output for 1908 will reach 140 cars per week for the whole season.

ATTENDANCE.

The number of persons who passed the turnstiles during the first half of the Show was 103,000, and comparing the first Friday and Saturday with the corresponding days of 1906, there was an increase alone for these two days of over 16,000 visitors. The young King of Spain was an interested visitor during the first Thursday morning, he paying his 25 cents at the door with one of his equerries, and roaming round the stands for quite a long time before he was recognized. No attempt was made to crowd round him, although when the exhibition authorities learned he was in the building they sent a couple of policemen to follow him up and restrain any too enthusiastic persons who might make themselves a nuisance.

The project of an Italian automobile trust will not be realized, it is reported. The Fiat firm has reached an agreement with its creditors, and will enjoy their further assistance. The proposed consolidation with the French Darracq and De Dietrich firms will therefore not take place.

The Chicago Show.

It has come to be a matter of comment among automobile men that a snowstorm is always due for the opening day of the automobile show in Chicago. This year did not prove an exception to the general rule, but early in the day the storm changed to sleet, and later it became an intermittent rain. Despite this unfavorable weather the exhibitors gathered early, and by noon most of the exhibits were in place. By evening everything was shipshape and ready to receive the opening crowd, which began to pour in about 8 p. m. In the Coliseum every exhibit was in place, but in the Coliseum basement and the First Regiment Armory a number of spaces were still vacant at the closing hours of Saturday night.

As in previous years, the Coliseum and First Regiment Armory are connected by a passageway; but this year the passage is formed by a canvas canopy over the brick paved alley. Special tickets are given to whoever leaves one building, and are taken when they enter the other. This year's Show is distinguished as the first in which a comprehensive exhibition of commercial vehicles is attempted. The commercial exhibits are housed at the Seventh Regiment Armory, better known as "Tattersall's." Visitors to the pleasure exhibit are given free rides to the same in motor buses.

In the Coliseum the decorations are exceptionally fine. Although the general arrangement is similar to that which proved so effective last year, the details are carried out better, and the effect is more artistic and harmonious. The floor is covered with red and green denim, and the exhibits are effectively separated by red curtains, about 3 feet high.

The staff work represented motoring scenes in high relief, and the large oval panels contain color paintings of American cars in various parts of the world. These paintings, as well as the larger ones hung from the gallery rail, were taken from photographic scenes. The ceiling is hung with bunting and flags. Similar but less elaborate decorations are used in the other buildings.

In size the exhibition is the largest ever held in this country, being about one-third larger than last year's record breaker. There are about 300 exhibitors of autos, accessories and parts, and it is estimated that 600 vehicles are shown. This is more than were exhibited at both New York shows combined.

Still it is far from being a national exhibition. The country is too large ever to hold a truly national show. About thirty car manufacturers who exhibited at New York do not show here, and a considerable number of Western makers who did not exhibit at New York display their products, many of them for the first time.

The exhibits are as a whole devoid of startling novelties. It would seem that most makers had been discouraged from new designs by the unfavorable year just passed. Nevertheless the general opinion among sales managers was optimistic. Chicago is the centre for the Western trade, which promises to be fairly good the coming season. There is considerable talk of curtailing production among the makers of the larger cars, and it is evident that many of them are buying equipment only as fast as it is needed.

VIEW OF THE CHICAGO SHOW SHOWING DECORATIONS.

There was a decided tendency to talk of the "factory behind the car" among those who had factories worth talking of, and one company had a miniature reproduction of its plant and surroundings on exhibition. It is evident that the public will have an opportunity to learn something of the way the different cars are made, and the idea is commendable, as it will inspire confidence.

Gasoline cars are largely in evidence, and show better finish, easier adjustment, better protection from dirt and more reliable ignition than those shown a year ago. Steam cars are represented by the exhibit of a single large maker. The number of electrics has only slightly increased, though the universal opinion among salesmen is that the demand for this class of vehicle is growing rapidly.

The crowd on the opening night was large and of a mixed nature; although the majority belonged to the idle curious class, there were many "good prospects" and a number of sales were reported. If the opening is any criterion, the attendance through the week will be fully up to the standard of previous years.

THE COMMERCIAL EXHIBITS.

As one approached Tattersall's, on the opening day, he was struck by the utterly unshowlike appearance of the place. There were no "demonstrators" with purring engines and whirring gears, no hurrying crowds. Not even a sign of any kind to announce that an exhibition was being held inside. Across the street from the entrance horse drawn trucks were being loaded as serenely as though no possible rival existed.

On opening the door the visitor was confronted with an impressive exhibition. The large hall was comfortably filled with the product of some thirty makers. Not all of these exhibits were "commercial," in the usual sense of the term, however. There were two makes of runabouts, a touring car and a flying machine. But there were more commercial cars than most people realize are on the market. Indeed some of the exhibitors expressed surprise at the excellent showing.

Most of the cars exhibited showed careful thought and good workmanship, but it was evident that some designers had been unable to forget their pleasure car ideals. It is evident that commercial design is not standardized, for there is little uniformity in the vehicles shown. The side chain drive is in the majority, though single chains and bevel and worm gears are used. One truck uses the front wheels for both driving and braking. Such simplifications as air cooling, friction driving and two cycle motors are freely employed.

A considerable number of accessories manufacturers have thought it advisable to exhibit in this building.

Take it all in all, the commercial exhibit is the most impressive feature of the Show, and will be the most valuable as serving to show the public the quiet growth of this branch of the industry, whose extent no one as yet fully realizes. A surprising feature, however, is that only one vehicle suitable for use as a taximeter cab is shown. This may be accounted for by the fact that American manufacturers use such an extensive equipment of jigs and tools that they are slower than foreign makers to take up radically new designs.

In conclusion, it may be said that as at New York the manufacturers of accessories and parts seem to take less interest in this exhibition than in those of previous years; and it is likely that if a show is held in Chicago next year there will be few exhibits of parts.

We will not take the space to describe the exhibits of manufacturers who were at the recent New York shows, but will give short descriptions of the new exhibits in this and the following issue.

The following meetings are to be held in Chicago this week: N. A. A. M., Wednesday, at New Southern Hotel; A. L. A. M. Mechanical Branch, Thursday, at Chicago Athletic Club; Illinois State A. A., Thursday, at Chicago A. C.

Car Exhibits.

BUGMOBILE COMPANY OF AMERICA,

208 Wabash avenue, Chicago, shows a new buggy type automobile known as the "bugmobile," with a double cylinder air cooled engine of 4 inches bore and stroke, respectively, rated at 12 horse power. The change speed gear is of the bike gear order, by chain and sprocket, and transmission by specially lubricated chain cables. Two speeds forward and one reverse are provided. Ignition is by coil and dry cells. The wheel base is 72 inches, the tread standard, and the wheels are 44 inches rear and 40 inches front. The car is provided with one brake. The body is of the electric runabout type and finished in coach black.

SAYERS & SCOVILL,

2247-2261 Colerain avenue, Cincinnati, Ohio, are showing one of their air cooled four cylinder, 25 horse power trucks. The motor is of a well known make that has been extensively used also for touring cars, and has a bore and stroke of 4 inches each. It is located in front under the footboard and driver's seat. The clutch is of the internal expansion type, 15 inches diameter, faced with leather reinforced with 200 hickory pegs, and revolves on a roller bearing. The change gear consists of sliding gears of standard design, giving three speeds forward and one reverse, with direct drive on high gear to differential. Timken roller bearings are used throughout the transmission. The final drive is by side chains. The frame is constructed of 2x5 inch sound ash, armored by ¼x5 inch steel. The wheels are of second growth hickory, and the driving sprockets on the end rear wheels serve as the inner hub flange. Two independent sets of brakes are used. They are of the contracting band type. The regular light running brakes act on the side shaft, and their adjustment cannot be affected by the radius rod. The emergency brakes (2½ inch face and 16 inches in diameter) are on the hubs of the rear sprockets. The model A chassis has 3,000 pounds carrying capacity, a wheel base of 96 inches, a 60 inch tread, 3½ inch solid rubber tires on 32 inch front and 34 inch rear wheels. It is fitted with a body 6 feet wide and 13 feet long back of the seat, has a gasoline capacity of 10 gallons, and is said to weigh (without body) 2,600 pounds.

THE AMERICAN MOTOR TRUCK COMPANY,

Lockport, N. Y., exhibited one of their standard 3 ton stake trucks. This is equipped with a 40 horse power four cylinder motor, controlled by a governer acting on a carburetor throttle valve. Ignition is by jump spark from storage batteries and dry cells, and the motor is lubricated by force feed to cylinders and splash in crank case. The radiator is of the built up type, without soldered joints, of seamless copper tubes each separately packed. A two speed forward and reverse planetary gear is used, with a disc clutch running in oil. The drive is by side chains. The frame is built up of channel steel, hot riveted, and is supported on semi-elliptic front and platform rear springs. The front axle is of I section and the rear of solid square section, both being equipped with Timken roller bearings. The wheels are 36 inches in diameter, fitted with solid rubber tires, twin in the rear. The brake equipment comprises a countershaft brake, double rear hub brakes and drag bars. The gasoline capacity is 18 gallons, and the car has a maximum speed of 12 miles per hour.

THE COMMERCIAL MOTOR TRUCK COMPANY,

of Plymouth, Ohio, shows one of their 2 ton truck chasses. This is fitted with a 4 cylinder Continental engine of 4¾ inches bore by 5 inches stroke, rated at 40 horse power. A feature of the engine is the self-contained oiling system. The power is transmitted by means of the Commercial Company's double variable speed friction drive and by independent side chains to the rear wheels. The frame is constructed of channel steel and heavily braced. Timken roller bearing axles are used, 2 inch I section in front and 2 inches square in the rear. The wheel base is 103 inches. Solid rubber tires are fitted, 34x3½ inches in front and double 36x2½ inches in the rear. The truck is equipped with double internal expanding brakes, 16x2½ inches, on the rear hubs, operated through an equalizer.

PITTSBURG MOTOR VEHICLE COMPANY,

of Pittsburg, Pa., exhibit three commercial electric vehicles as follows: One 750 pound carrying capacity delivery wagon, with roller chain drive; one delivery wagon of the same capacity, but with Morse silent chain drive, and one 1,500 pound load capacity wagon, with double motor drive. The features claimed for these vehicles are lightness and simplicity of construction, combined with strength and graceful lines. The manufacturers claim to use smaller batteries than are used on other similar electric vehicles.

THE STREATOR MOTOR CAR COMPANY

of Streator, Ill., exhibit the Halladay 35-40 horse power, 4 cylinder touring car, which is an "assembled" machine. It is fitted with a Rutenber 4 cylinder motor, and has jump spark ignition, fed by a 6 volt storage battery, supplemented by a battery of dry cells. A three speed sliding gear is used, and the final drive is by a short shaft and bevel gears. The wheel base of the car is 108 inches, and the wheels, which are 34 inches diameter, are mounted on ball bearings and shod with 4 inch pneumatic tires. The front axle is of I-beam section and the rear axle of the floating type. Lubrication is by Hill precision sight feed oiler and cooling by the Briscoe radiator. There are two pairs of brakes, all acting on the rear wheel hubs. The weight of the car is given as 2,600 pounds.

THE COMMERCIAL MOTOR CAR COMPANY,

Times Building, New York, exhibit the "Safir" motor truck, which is manufactured

by the Safir Automobile Works, Zurich, Switzerland. This truck is equipped with a four cylinder motor, of 4⅛ inch bore by 6½ inch stroke, which develops 30 horse power at 1,000 r. p. m. Ignition is by high tension magneto. A cellular radiator is placed in front of the engine space, with a fan behind it, and the water is circulated by a centrifugal pump. A double nozzle "Saurer" carburetor is employed, and possible speed variation of 200-12 r. p. m. is claimed. A special feature of the engine is that by shifting the cam shaft and bringing a new set of cams into action, the motor may be used as a brake. The oiling system is entirely automatic. The motor is self starting by means of a small compressed air engine. The clutch is of the multiple disc type, and the change gear a sliding pinion selective device, giving four forward speeds and one reverse. To the rear wheels the power is transmitted by side chains. The frame is made of channel section, nickel steel pressed members, and is supported by semi-elliptic springs throughout. A steel pan extends beneath the frame the whole length of the power plant. The steering gear is of the irreversible type. In addition to the motor brake, two sets of mechanical brakes are provided, one operating on the countershaft, and one on the rear wheel hubs, the latter set being the hand brakes. Sprags are also provided. The truck has a wheel base of 12 feet 9 inches, and weighs complete 5,500 pounds. The standard body has a loading space 11 feet by 6 feet, and the platform is 13 feet 6 inches above the ground.

OAKLAND MOTOR CAR COMPANY,

Pontiac, Mich., exhibit one touring car, Model B, which is equipped with a water cooled engine, planetary change gear and shaft drive. It has a trussed wood frame. Lubrication of the engine is effected by splash. The throttle lever is arranged on the steering wheel. The car weighs approximately 1,650 pounds, and is fitted with 3½ inch clincher tires on 32 inch wheels. The wheel base is 96 inches, while the tread is standard. All four springs are 38 inches long. The gasoline capacity is 10 gallons.

A. D. MEISELBACH MOTOR WAGON COMPANY,

North Milwaukee, Wis., exhibit a 1 ton chassis and a 2 ton brewery wagon with sliding doors, as well as a sightseeing car capable of carrying fourteen passengers. All of these wagons are equipped with a double opposed cylinder motor, rated at 28 horse power, the bore being 6 inches and the stroke 4½ inches. The motor is located transversely of the frame under the seat and drives through a conical friction gearing and double side chains to the rear wheels. The wheel base is 96 inches. The speed can be varied by means of the friction mechanism, from 1 to 10 miles per hour or over.

THE PUNGS-FINCH AUTO COMPANY,

Detroit, Mich., exhibit a Model 35 runabout and a Model H touring car. The touring car is equipped with a 28-32 horse power, 4½x5 inch four cylinder engine, the cylinders being water cooled and cast in pairs. A multiple disc lubricated clutch is used, and a selective sliding gear transmission, which gives three forward speeds and a reverse. The drive to the rear axle is by shaft and bevel gear. The rear axle is of the floating type, while the front axle is of I beam construction. The car is said to weigh 2,400 pounds, has a wheel base of 106 inches, a gasoline capacity of 19 gallons, and is fitted with 32x4 inch tires. The Model 35 runabout is equipped with a 4 cylinder, 4¾x5 inch engine, rated at 40 horse power, and is otherwise identical with the touring car except as to weight and other details.

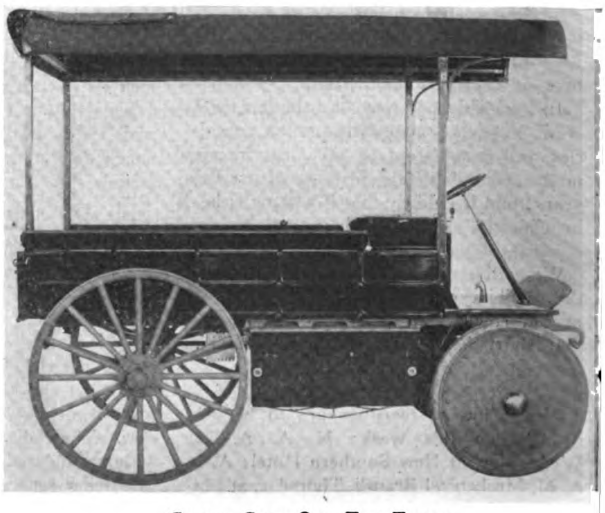
AUBURN AUTOMOBILE COMPANY,

Auburn, Ind., exhibit one of their Model G five passenger touring cars, which has a body of straight line design, with a tonneau roomier than the one on the 1907 model, and a divided front seat. The motor is a double cylinder opposed one, of 5¼ inches bore by 5 inches stroke, and is called 24 horse power. The change speed gear is of the planetary type. The rear axle is fitted with roller bearings, and the front axle with ball bearings. A centre chain drive is employed. The wheels are 32 inches in diameter, and fitted with 3½ inch tires. The car has a wheel base of 100 inches. The rear springs are full elliptic and the front semi-elliptic. The steering gear is irreversible, Raymond brakes are fitted to the hubs, and a belt driven Hill precision oiler effects the lubrication. They also show a Model K runabout, which has the same mechanical features as Model G, but is fitted with a rakish body with rumble seat.

STAVER CARRIAGE COMPANY,

Seventy-sixth and Wallace streets, Auburn Park, Ill., are exhibiting their Model D buggy type runabout, which has a seat 40 inches wide on top of the cushion in front, 19 inches deep, and with a back 24 inches high. The motor is a double cylinder opposed, water cooled, of 5 inches bore and stroke respectively, and rated at 18-20 horse power, at 950 r. p. m. Ignition is by jump spark, through a ball contact timer. There are two forward speeds and one reverse, by means of a planetary gear, the high forward speed being controlled by a lever on the steering column and the low speed and reverse by pedals. The high speed is obtained by means of a multiple disc clutch. The car has a wheel base of 78 inches and a road clearance of 18½ inches. The frame is of heavy angle steel and is carried on full elliptic springs in the rear and semi-elliptic springs in front. The wheels are of large diameter, fitted with 1¼ inch solid rubber tires in front and 1½ inch in the rear. A honeycomb radiator is used, and the engine is lubricated by a six feed mechanical oiler. The body is of the stanhope pattern and seats two passengers. The weight of the car is given as 1,700 pounds.

STAVER MODEL D.



COUPLE GEAR ONE TON TRUCK.

THE COUPLE-GEAR FREIGHT WHEEL COMPANY,

of Grand Rapids, Mich., are exhibiting their four wheel drive electric trucks, and also a new 1 ton truck with front wheel drive. The latter has the ordinary iron tired rear wheels, of large diameter, and two solid rubber tires, pressed steel front wheels, which act both as driving and steering wheels, and contain each an electric motor of 3 horse power. These motors are arranged with their shafts almost at right angles to the axle stub, and carrying at each end of the shaft a bevel pinion, which meshes with a large bevel gear crown secured to the inside of the wheel disc. The battery consists of forty cells of any of the several well known makes. The car is said to have a speed of 9 miles an hour with load and 11 miles per hour empty. The inside dimensions of the body are 7 feet 2 inches in length by 44 inches in width. The front wheels are 36 inches in diameter and shod with 3 inch solid rubber tires, and the rear wheels are 48 inches in diameter and shod with 2¼ inch steel tires.

THE C. V. I. MOTOR CAR COMPANY,

of Jackson, Mich., exhibit their Model A, six cylinder, 40 horse power touring car. This is fitted with a straight-line body, with individual front seats and a roomy tonneau, seating three passengers. The motor is of 4 inch bore and 5 inch stroke, and is claimed to give its rated horse power at 1,200 r. p. m. The cylinders are cast in pairs, with integral water jackets and valve chambers on opposite sides. The crank shaft is a chrome-nickel steel forging, heat treated and ground to size. It is mounted in five bearings, the three inner ones being lined with Parsons white metal, and the two outer ones being F. & S. ball bearings. The change gear is of the selective, sliding pinion type, three speeds forward and reverse, mounted on ball bearings. All gears are chrome-nickel steel. The final drive is by a shaft with two universal joints. The cooling is effected by a Mercedes type radiator and a gear driven gear pump. Two systems of high tension ignition are fitted, one by Simms-Bosch magneto and the other by Witherbee battery. The frame is of chrome-nickel steel and dropped. It is supported on semi-elliptic vanadium steel front springs, and full elliptic rear springs. The rear axle is of Garford construction, and the front axle an I beam section nickel steel forging, ball bearings being used on both axles. The wheels are 36 inches in diameter, with 3½ inch front tires and 4 inch rear. The car has a wheel base of 117 inches, and is fitted with external and internal hub brakes. The clutch is of the conical type with cork inserts. They also show the same chassis with a roadster body, and an engine on separate stand.

THE LAUTH-JUERGENS MOTOR CAR COMPANY,

94-98 Rawson street, Chicago, Ill., exhibit the Lauth-Juergens tourist. This is equipped with a four cylinder motor, of 5 inch bore and 5½ inch stroke, rated at 45-50 horse power. The motor is of the "T" type, with oil chambers on opposite sides of the cylinders, but the company also builds another model with straight cylinders, having the valves in the cylinder heads. Lubrication is by splash in the crank case, in which an oil supply is maintained by a sight feed oiler, operated by exhaust pressure, which is located on the dash. The clutch consists of two metal discs, with a fibre disc between, and is claimed to take up the load very gradually and to show very small wear. A pair of universal joints is interposed between the clutch and the change gear. The latter is of the positive clutch type, operated selectively, and gives two forward speeds and one reverse. The low speed and reverse are obtained by means of a sliding gear. The frame is of pressed steel, and a sub-frame is provided for carrying the motor and change gear. The drive is by shaft and bevel gear. A floating type rear axle is used, and a 2½ inch I beam drop forged front axle. The springs are semi-elliptic, the front ones being 40 inches and the rear ones 50 inches long. Steering is by worm and sector, and both internal expanding and external contracting brakes act upon rear hub drums. The car has a wheel base of 118 inches and 36 inch wheels, fitted with 4½ inch tires. Ignition is by jump spark, and the cooling system comprises a tubular radiator, with belt driven fan and a gear driven centrifugal pump. The gasoline capacity is 20 gallons.

THE PULLMAN MOTOR CAR COMPANY,

of Chicago, exhibit the chassis of the "Pullman Flyer." This is a large touring car of standard four cylinder construction. The motor is a 5½x5½ inch, rated at 50-60 horse power, and drives a four speed selective change gear through a band clutch. Finial drive is by bevel gears to a floating type rear axle. Annular ball bearings and special alloy steels are used throughout. The wheel base is 120 inches, and 36 inch wheels are employed. Semi-elliptic front springs are used, 40x2¼ inches. Platform springs are used at the rear.

THE AURORA MOTOR WORKS,

Aurora, Ill., show a chassis and a runabout of their moderate priced model. The car is shaft driven by a 20 horse power opposed motor set crosswise under the hood. Speed changes are obtained by a planetary gear. Semi-elliptic springs are used in front and a platform suspension is used at the rear. The wheel base is 80 inches and the tread 56 inches. The wheels are 32 inches in diameter and are equipped with either pneumatic or solid tires. The body is roomy and comfortable, and has a large compartment at the rear for carrying spare tires, etc. This compartment may be removed, leaving a flat deck for carrying trunks, etc.

THE WOODS MOTOR VEHICLE COMPANY,

of Chicago, exhibit six models of their electric cars, as follows: One Queen Victoria with leather top, one Queen Victoria with detachable child's seat, one Queen Victoria with brougham top, one Queen Victoria with pneumatic tires, and electric chassis. They are also exhibiting the first automobile ever exhibited publicly in the city of Chicago, viz., a Woods brake, shown at the Tattersall bicycle meet in 1898. This vehicle was built in the year 1897 and sold to Montgomery Ward & Co., who since 1900 have been using same for the purpose of conveying their out of town customers to and from depots. The Woods Company recently purchased this machine from Mr. Ward to keep it as a relic of early automobile days.

THE LANGE-SMITH MOTOR COMPANY

exhibit the Teg two cycle motor in operation. This motor is a two cylinder, air cooled, of very simple construction. A full description will be given at an early date.

THE BLOCK MANUFACTURING COMPANY,

exhibit a new motor buggy, also the frame and power plant for the same. The motor is an air cooled opposed, and drives to the rear axle through a planetary gear and side chains. The gear is made with reaches and the two full elliptic springs are set above the axles, the piano box body being hung between them. The wheel base is 65 inches and the wheels are 38 inches, with 1⅛ inch steel tires.

W. C. PRICE

shows the Price belt driven runabout. This car has an opposed motor under the hood, which is connected to the propeller shaft by a belt about 6 inches wide. There are two sets of pulleys, one for ordinary running, the other for hill climbing, and when using either pair the speed may be varied by allowing the belt to slip. The reverse is secured by grooved friction wheels. Drive to the rear axle is by bevel gear.

THE TINCHER MOTOR CAR COMPANY

show two runabouts and a touring car, all fully equipped. These cars are built along the lines of the best foreign practice. They are large, high powered machines, and use side chain drive. A full description of these cars appeared in a recent issue.

THE CHICAGO COACH AND CARRIAGE COMPANY

exhibit the Duer car. This is a large machine of the buggy type. It has a 12 horse power, air cooled, opposed engine in front under the hood, which transmits to a two speed selective gear. The final drive is by cables to each rear wheel. Wheels are 44 inches in diameter front, 48 inches rear, with 1¼ inch solid rubber tires. Timken roller bearing axles are employed. A speed of 30 miles per hour is claimed.

Parts Exhibits.

THE DUPLEX COIL COMPANY,

Fond du Lac, Wis., show a full line of their coils, and exhibit them connected to an apparatus which runs at a wide variation of speed. As their name implies, these coils are made with two primary and two secondary windings, and two cores acting

on each vibrator. They are claimed to be more rapid, more responsive and to consume less current than any other coil.

EUGENE ARNSTEIN

shows a large variety of automobile supplies. The Arnstein aluminum enamel and Arnstein automobile puncture cement are given prominent place among them.

THE EXCELSIOR SUPPLY COMPANY,

Chicago, show a line of supplies, including the inner tube repair patches, the Webster gasoline gauge and the "Ready Flated" Continental tire.

MORRISON, M'INTOSH & CO.

show a very complete line of automobile gloves in many different kinds of leather. They make a specialty of their "Rist Fit" ventilated gloves.

THE M'CANNA MANUFACTURING COMPANY

exhibit a line of their well known lubricators. In this year's model the pumps are in a case which extends through the dash; this case has a large glass panel, so the entire working of the pump and flow of oil is in full view of the driver.

THE FRANCO-AMERICAN AUTO AND SUPPLY COMPANY,

Chicago, Ill., exhibit a complete line of American and imported accessories and supplies. Their exhibit of lamps is especially good.

THE NEVER-MISS SPARK PLUG COMPANY,

Lansing, Mich., show their Never-Miss spark plugs, battery testers and a chain repair device. The voltmeter, ammeter and voltammeter are the latest addition to their line. The coils are wound on brass spools carefully inducted, and the pivot carrying the inducting needle is made from stub steel, hardened and finished by a special process. The cases are of 18 gauge brass and are made dust proof. With the chain repairing device it is claimed to be possible to draw together the largest and heaviest chains in a very short period of time.

THE PFANSTIEHL ELECTRICAL LABORATORY,

North Chicago, Ill., makes a conventional exhibit of spark coils, and besides displays what they call the largest automobile unit ever constructed. The discharge is called the "caterpillar flame," and since the large coil is built along identically the same lines as the automobile units, it shows the same quality of discharge. The 110 volts direct current is used in operating this coil.

THE STANDARD VARNISH WORKS,

2620-2640 Armour avenue, Chicago, exhibit bottles of varnishes used in finishing automobiles and samples of the various gums employed in the manufacture of their stocks.

THE LONGDIN BRUGGER COMPANY,

Fond du Lac, Wis., show three tops, viz., a touring car top, full pantasote, black silk lining, complete with side curtains and three piece storm front; one unlined touring car top showing the back quarters and rear side curtains in one piece, and one runabout top with blue silk lining complete.

THE STANDARD LAMP AND MANUFACTURING COMPANY,

Chicago, show new designs of electric lamps for all automobile users; also new round acetylene generators and headlights, and sets of two headlights and a generator of runabout size. Some new models of oil lamps and a new oil pot locking device are also exhibited.

THE VIVAX STORAGE BATTERY COMPANY,

Chicago, show a full line of their batteries, and also exhibit the batteries in action, operating incandescent lights and spark plugs. Either rubber or glass jars will be furnished with these batteries, which have the well known wire type grids and separators.

THE CHICAGO WIND SHIELD COMPANY,

Chicago, Ill., have a large display of their shields in different styles and finishes. They pay particular attention to metal binding and reinforcement of corners, thus producing a substantial article.

THE CHICAGO SCHOOL OF MOTORING

are distributing a pamphlet describing their courses of instruction. These remain practically the same as last year. They also give out an appropriate souvenir post card.

THE CENTRAL RUBBER COMPANY,

82-84 Lake street, Chicago, exhibit G. & J. and Morgan & Wright auto tires, auto coats, dusters and all kinds of auto clothing, boots, aprons and gloves for washing purposes, rubber auto accessories of all kinds, including blanket robes, auto buckets, tire tape, etc., and auto mats and matting.

CARTIER, CHAPMAN & CO.,

Ludington, Mich., exhibit the Breeze wind shield, both in the wood frame, half folding and in the brass frame style. In the former the frame is made of one continuous piece of wood. The glass is a 3-16 French plate. The attachments are of polished brass. Their specially constructed hinge permits instantaneous removal. The brace rods are tubular brass rods of the telescoping pattern, allowing the shield to be placed in any desired position from perpendicular to horizontal.

List of Exhibitors.

COLISEUM—MAIN FLOOR.

Packard Motor Car Company, Detroit, Mich.
Locomobile Company of America, Bridgeport, Conn.
Wayne Automobile Company, Detroit, Mich.
Electric Vehicle Company, Hartford, Conn.
Knox Automobile Company, Springfield, Mass.
Woods Motor Vehicle Company, Chicago, Ill.
Reo Motor Company, Lansing, Mich.
Studebaker Automobile Company, South Bend, Ind.
E. R. Thomas Motor Co., Buffalo, N. Y.
F. B. Stearns Company, Cleveland, Ohio.
Apperson Brothers Auto Company, Kokomo, Ind.
Northern Motor Car Company, Detroit, Mich.
Elmore Manufacturing Company, Clyde, Ohio.
Olds Motor Works, Lansing, Mich.
Lozier Motor Company, New York.
Dayton Motor Car Company, Dayton, Ohio.
Pope Motor Car Company, Toledo, Ohio.
Pope Manufacturing Company, Hartford, Conn.
H. H. Franklin Manufacturing Company, Syracuse, N. Y.
Bartholomew Company, Peoria, Ill.
Waltham Manufacturing Company, Waltham, Mass.
Premier Motor Manufacturing Company, Indianapolis, Ind.
Matheson Motor Car Company, Wilkes-Barre, Pa.
Maxwell-Briscoe Motor Company, Tarrytown, N. Y.
Geo. N. Pierce Company, Buffalo, N. Y.
White Company, Cleveland, Ohio.
Stevens-Duryea Company, Chicopee Falls, Mass.
Haynes Automobile Company, Kokomo, Ind.
Winton Motor Carriage Co., Cleveland, Ohio.
Royal Motor Car Company, Cleveland, Ohio.
Thomas B. Jeffery & Co., Kenosha, Wis.
National Motor Vehicle Company, Indianapolis, Ind.
Babcock Electric Carriage Company, Buffalo, N. Y.
Mitchell Motor Car Company, Racine, Wis.
Pungs-Finch Auto and Gas Engine Company, Detroit, Mich.

COLISEUM ANNEX—FIRST FLOOR.

Autocar Company, Ardmore, Pa.
Dragon Automobile Company, Philadelphia, Pa.
Baker Motor Vehicle Company, Cleveland, Ohio.
Cadillac Motor Car Co., Detroit, Mich.
Peerless Motor Car Co., Cleveland, Ohio.
Imperial Motor Car Company, Williamsport, Pa.
Welch Motor Car Company, Pontiac, Mich.
Peerless Motor Car Company, Cleveland, Ohio.
Corbin Motor Vehicle Corporation, New Britain, Conn.

FIRST REGIMENT ARMORY—MAIN FLOOR.

Buckeye Manufacturing Company, Anderson, Ind.
Columbus Buggy Company, Columbus, Ohio.
Nordyke & Marmon Company, Indianapolis, Ind.
American Locomotive Auto Company, New York.
Rauch & Lang Carriage Company, Cleveland, Ohio.
Western Tool Works, Galesburg, Ill.
Aerocar Motor Company, Detroit, Mich.
Gearless Transmission Company, Rochester, N. Y.
Moon Motor Car Company, St. Louis, Mo.
Pierce Engine Company, Racine, Wis.—Pierce.
Tincher Motor Car Company, South Bend, Ind.
Austin Automobile Company, Grand Rapids, Mich.
De Luxe Motor Car Company, Detroit, Mich.
Jackson Automobile Company, Jackson, Mich.
American Motor Car Company, Indianapolis, Ind.
Chicago Coach and Carriage Company, Chicago, Ill.
Staver Carriage Company, Chicago.
Oscar Lear Automobile Company, Springfield, Ohio.
Dolson Automobile Company, Charlotte, Mich.
Acme Motor Car Company, Reading, Pa.
Monarch Motor Car Company, Chicago Heights, Ill.
Moline Automobile Company, East Moline, Ill.
Auburn Automobile Company, Auburn, Ind.
Diamond T. Auto Company, Chicago.
Holsman Automobile Company, Chicago.
Wayne Works, Richmond, Ind.
Rainier Company, New York.
Kissell Motor Car Company, Hartford, Wis.
Smith Automobile Company, Topeka, Kan.

COLISEUM BASEMENT.

Bugmobile Company of America, Chicago.
Chicago School of Motoring, Chicago.
Lauth Juergens Motor Car Company, Chicago.
Shoemaker Automobile Company, Freeport, Ill.
Schacht Manufacturing Company, Cincinnati, Ohio.
Reliable Dayton Motor Car Company, Chicago.
Aurora Motor Works, Aurora, Ill.
Lorraine Automobile Manufacturing Company, Chicago.
Pullman Motor Car Company, Chicago.
Gaeth Automobile Works, Cleveland, Ohio.
Hatfield Motor Vehicle Company, Miamisburg, Ohio.

Atlas Motor Car Company, Springfield, Mass.
Cornish-Friedberg Motor Car Company, Chicago.
C. V. I. Motor Car Company, Jackson, Mich.
Oakland Motor Car Company, Pontiac, Mich.
C. H. Stratton Carriage Company, Pontiac, Mich.
K. W. Ignition Company, Cleveland, Ohio.
C. A. Shaler Company, Waupun, Wis.
Norton Company, Worcester, Mass.
Randall-Faichney Company, Boston, Mass.
Auto Goods Company, Boston, Mass.
T. Alton Bemus, Boston, Mass.
American Aluminum Coating Company, Pittsburg, Pa.
Vehicle Top and Supply Company, St. Louis, Mo.
Roger B. McMullen, Chicago.
Ovington Motor Company, New York.
Automobile Topics, New York City.
Jeffery-Dewitt Company, Newark, N. J.
Warner Clutch Company, Chicago.
Triple Action Spring Company, Chicago.
Duplex Coil Company, Fond du Lac, Wis.
Longdin-Brugger Company, Fond du Lac, Wis.
Pfanstiehl Electrical Laboratory, No. Chicago, Ill.
Chicago Wind Shield Company, Chicago.
Vivax Storage Battery Company, Chicago.

COLISEUM GALLERY.

Kinsey Manufacturing Company, Dayton, Ohio.
Sprague Umbrella Company, Norwalk, Ohio.
Never-Miss Spark Plug Company, Lansing, Mich.
Adam Cook's Sons, New York.
Indestructible Steel Wheel Co., Chicago.
Imperial Brass Manufacturing Company, Chicago.
Republic Rubber Company, Youngstown, Ohio.
Prest-O-Lite Company, Indianapolis, Ind.
Valentine & Co., Chicago.
Electric Storage Battery Company, Philadelphia, Pa.
McCord & Co., Chicago.
Auto Improvement Company, New York.
Wray Pump and Register Company, Rochester, N. Y.
Aurora Automatic Machinery Company, Aurora, Ill.
Pennsylvania Rubber Company, Jeannette, Pa.
Hartford Suspension Company, New York.
Wm. Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa.
R. H. Smith Manufacturing Company, Springfield, Mass.
Chicago Battery Company, Chicago.
Whitney Manufacturing Company, Hartford, Conn.
Motsinger Device Manufacturing Company, Pendleton, Ind.
Wheeler & Schebler, Indianapolis, Ind.
Morgan & Wright, Detroit, Mich.
R. E. Dietz Company, New York.
Dayton Electrical Manufacturing Company, Dayton, Ohio.
Hartford Rubber Works Company, Hartford, Conn.
Timken Roller Bearing Axle Company, Canton, Ohio.
Diamond Rubber Company, Akron, Ohio.
Brown-Lipe Gear Company, Syracuse, N. Y.
Spicer Universal Joint Manufacturing Company, Plainfield, N. J.
G & J Tire Company, Indianapolis, Ind.
Badger Brass Manufacturing Company, Kenosha, Wis.
Veeder Manufacturing Company, Hartford, Conn.
Gray & Davis, Amesbury, Mass.
A. W. Harris Oil Company, Providence, R. I.
National Carbon Company, Cleveland, Ohio.
Ross Manufacturing Company, Philadelphia, Pa.
B. F. Godrich Company, Akron, Ohio.
C. F. Splitdorf, New York.
Hyatt Roller Bearing Company, Harrison, N. J.
Shelby Steel Tube Company, Pittsburg, Pa.
Long Manufacturing Company, Chicago.
Fisk Rubber Company, Chicopee Falls, Mass.
Diamond Chain and Manufacturing Company, Indianapolis, Ind.
Jos. W. Jones, New York.
Warner Gear Company, Muncie, Ind.
Ajax-Grieb Rubber Company, New York.
Goodyear Tire and Rubber Company, Akron, Ohio.
Baldwin Chain and Manufacturing Company, Worcester, Mass.
Pantasote Company, New York.
Warner Instrument Company, Beloit, Wis.
Swinehart Clincher Tire and Rubber Company, Akron, Ohio.
N. Y. & N. J. Lubricant Company, New York.
Remy Electric Company, Anderson, Ind.
Firestone Tire and Rubber Company, Akron, Ohio.
Motor and Accessories Manufacturers, Inc.
Cook's Standard Tool Company, Kalmazoo, Mich.
Oliver Manufacturing Company, Chicago.
S. F. Bowser & Co., Inc., Fort Wayne, Ind.
Edmunds & Jones Manufacturing Company, Detroit, Mich.
Byrne, Kingston & Co., Kokomo, Ind.
Kokomo Electric Company, Kokomo, Ind.
Weed Chain Tire Grip Company, New York.
Hancock Manufacturing Company, Charlotte, Mich.
Leather Tire Goods Company, Newton Upper Falls, Mass.

COLISEUM ANNEX—SECOND FLOOR.

Hotchkin Manufacturing Company, Chicago.
Auto Accessories Manufacturing Company, Detroit, Mich.
Duff Manufacturing Company, Allegheny, Pa.
Western Malleable Steel Company, Detroit, Mich.
Midgley Manufacturing Company, Columbus, Ohio.
R. E. Hardy Company, New York.
Jos. Dixon Crucible Company, Chicago.
Stewart & Clark Manufacturing Company, Chicago.
Atwater Kent Manufacturing Works, Philadelphia, Pa.
Elite Manufacturing Company, Ashland, Ohio.
Empire Auto Tire Company, Trenton, N. J.
Ross Gear and Tool Company, Lafayette, Ind.
J. H. Sager Company, Rochester, N. Y.
Hoffecker Company, Boston, Mass.
C. Cowles & Co., New Haven, Conn.
Breeze Carburetter Company.
Auto Pump Company, Springville, N. Y.
Gray-Hawley Manufacturing Company, Detroit, Mich.
Lipman Manufacturing Company, Beloit, Wis.
National Battery Company, Buffalo, N. Y.
Michelin Tire Company, Milltown, N. J.
Gemmer Manufacturing Company, Detroit, Mich.
Briscoe Manufacturing Company, Detroit, Mich.
Heinze Electric Company, Lowell, Mass.
Wm. C. Robinson & Son Company, Baltimore, Md.
Oliver Instrument Company, Minneapolis, Minn.
Whiteley Steel Company, Muncie, Ind.
Atwood Manufacturing Company, Amesbury, Mass.
Standard Roller Bearing Company, Philadelphia, Pa.
Motor Car Specialty Company, Philadelphia, Pa.
Connecticut Telephone and Electric Company, Meriden, Conn.
Diezemann Shock Absorber Company, Hoboken, N. J.
Avery Portable Lighting Company, Milwaukee, Wis.
Precision Appliance Company, Chicago.
Kilgore Manufacturing Company, Old Town, Me.
Uncas Specialty Company, Norwich, Conn.
Witherbee Igniter Company, New York.
Muncie Auto Parts Company, Muncie, Ind.

COLISEUM ANNEX—SECOND FLOOR. MOTORCYCLES.

Hendee Manufacturing Company, Springfield, Mass.
Harley-Davidson Motor Company, Chicago.
Armac Motor Company, Chicago.
G. H. Curtiss Manufacturing Company, Hammondsport, N. Y.
Fowler-Manson-Sherman Cycle Manufacturing Company, Chicago.
Light Manufacturing and Foundry Company, Pottstown, Pa.
Excelsior Motor and Manufacturing Company, Chicago.
Consolidated Manufacturing Company, Toledo, Ohio.
Merkel Motor Company, Milwaukee, Wis.
Hornecker Motor Manufacturing Company, Whiting, Ind.
L. C. Chase & Co., Boston, Mass.
Stackpole Battery Company, St. Mary's, Pa.
American Electrical Novelty and Manufacturing Company, New York.
Vesta Accumulator Company, Chicago.
Igniter Appliance Company, Cleveland, Ohio.
Rands Manufacturing Company, Detroit, Mich.
Gabriel Horn Manufacturing Company, Cleveland, Ohio.
C. T. Ham Manufacturing Company, Rochester, N. Y.
Pittsfield Spark Coil Company, Dalton, Mass.
National Oil Pump and Tank Company, Dayton, Ohio.
Limousine Carriage Manufacturing Company, Chicago.
A. R. Mosler & Co., New York.
Sherwin-Williams Company, Cleveland, Ohio.

FIRST REGIMENT ARMORY—GALLERY.

Standard Lamp and Manufacturing Company, Chicago.
Motor Way, Chicago.
Continental Caoutchouc Company, New York.
Eugene Arnstein, Chicago.
Motor, New York.
Acetylene Company, New York.
Thos. Prosser & Son, New York.
Ventilated Cushion and Spring Company, Jackson, Mich.
Edward Neely & Co., Chicago.—Specialties.
Newmastic Tire Company, New York.
Franco-American Auto and Supply Company, Chicago.
Cycle and Automobile Trade Journal, Philadelphia, Pa.
McCanna Manufacturing Company, Chicago.
Standard Varnish Works, Chicago.
Motz Clincher Tire and Rubber Company, Akron, Ohio.
Morrison, McIntosh & Co., Grinnell, Ia.
HORSELESS AGE, New York.
Manhattan Screw and Stamping Company, New York.
Motor Age, Chicago.
Excelsior Supply Company, Chicago.
Class Journal Company, New York.
Heitger Carburetter Company, Indianapolis, Ind.
Healy Leather Tire Company, Chicago.
Auto Parts Company, Chicago.
Edmund E. Haus Company, Minneapolis, Minn.
F. A. Brownell Motor Company, Rochester, N. Y.
Electrical and Mechanical Development Company, Asbury Park, N. J.
Norris Auto Company, Saginaw, Mich.
Central Rubber Company, Chicago.
Robert Bosch, New York, Inc., New York City.
Troy Carriage Sun Shade Company, Troy, Ohio.

SEVENTH REGIMENT ARMORY. COMMERCIAL VEHICLES.

H. H. Franklin Manufacturing Company, Syracuse, N. Y.
American Motor Truck Company, Lockport, N. Y.
Safir Automobile Company, Zurich, Switzerland.
Buckeye Manufacturing Company, Anderson, Ind.
Rapid Motor Vehicle Company, Pontiac, Mich.
White Company, Cleveland, Ohio.
Commercial Motor Truck Company, Plymouth, Ohio.
Sayers & Scovill, Cincinnati, Ohio.
Continental Motor Car Company, Chicago.
Coppock Motor Car Company, Marion, Ind.
General Vehicle Company, New York.
Logan Construction Company, Chillicothe, Ohio.
Reliance Motor Car Company, Detroit, Mich.
Gifford-Pettit Manufacturing Company, Chicago.
Alden Sampson Manufacturing Company, Pittsfield, Mass.
Oscar Lear Automobile Company, Springfield, Ohio.
Studebaker Automobile Company, South Bend, Ind.
Pope Motor Car Company, Indianapolis, Ind.
Streator Motor Car Company, Streator, Ill.
Pittsburg Motor Vehicle Company, New York.
Mitchell Motor Car Company, Racine, Wis.
Couple Gear Freight Wheel Company, Grand Rapids, Mich.
Knox Automobile Company, Springfield, Mass.
Worth Motor Car Manufacturing Company, Evansville, Ind.
E. R. Thomas Motor Company, Buffalo, N. Y.
Colt Runabout Company, New York.
Brush Runabout Company, Detroit, Mich.
A. D. Meiselbach Motor Wagon Company, North Milwaukee, Wis.

COMMUNICATIONS

Six Years' Continuous Service—Solid Tires.

Editor HORSELESS AGE:

The fact that so many motorists have during past years bought a new car almost every season leads many to inquire as to the life of the average automobile. The idea seems rather widespread that, after one season's use, the car is in condition to be consigned to the scrap heap. Undoubtedly, most of the cars that were seen four, five and six years ago on the streets are never seen now. It would be interesting to know where these old cars are now. That these cars have disappeared because they are worn out the writer can scarcely believe. Many of them have most likely gone out of use because they were very imperfect in construction and too difficult to keep in running order. Others have probably been discarded because the style has so radically changed.

That a car will not be worn out by one or two seasons' work is demonstrated by my own experience. Six years ago I purchased a single cylinder runabout, rated at 8 horse power. This car I have employed daily in my work, the practice of medicine, using it winter and summer alike, and the car is doing as good work today as it did the first year I had it, and from all appearances it is good for another six years. I do not know of another car in Cincinnati that has been continuously in use for as long a time. My car does not often go to the shop. Last year I drove it from October to March without having to take it to the shop a single time. I care for the car myself and do all my own driving. I do not believe that I give it an unusual amount of attention. I doubt if I give it fifteen minutes' attention each day.

Two years ago, in order to obviate the danger of being held up by punctures or other tire troubles, I equipped it with solid tires. I was assured by knowing ones that if I had not had troubles before they were certainly in store for me then, as the solid tires would shake my machine to pieces in a short time. They have not done so. The rather peculiar appearance of the rear wheel tire in the illustration needs a word of explanation. I had in my automobile shed a number of old outer casings that had been damaged beyond repair, and the solid tires on the rear wheels being somewhat worn down I thought I would try the experiment of placing one of these old outer casings over them. On the left rear wheel the casing used for this purpose had been flattened out by lying a long time on the floor of the shed with a heavy weight upon it. After putting it over the solid tire I attempted to bring it back into shape by fastening it down to the rim of the wheel by straps, as the illustration shows, but only with partial success. On the one over the right rear wheel no straps were used, and, although it has been on this wheel about eight months, it has never come off; in fact, I attempted one day recently to pull it off, but found it such a difficult task that I left it on. I thought when I put them on that they would fly off the first time that I turned a corner right fast. It must be borne in mind that the clinchers of these tires are not fastened under the clincher of the rim, as the solid rubber tire fills up this space. These old outer casings, used as described, reduce the jolting as compared with solid tires alone.

I have often been asked by fellow motorists if I would recommend solid tires.

DR. COLTER'S CAR.

My reply has always been that it will depend altogether upon what kind of roads they have to run over. I use my car strictly as a business proposition, and my visits take me over roads which are almost entirely of macadam construction, with here and there an asphalt street. On such streets I do not find the additional jolting of any great moment, but on granite block pavements and on cobblestone streets I find them far from being satisfactory. I would never recommend them to one who has much driving over the latter kind of streets. On such streets as I mostly use the additional feeling of security from tire troubles and their resultant delays makes them satisfactory to me. On an automobile used for pleasure purposes I would not think of using them.

It would be interesting to me to know whether or not there are many cars in daily use today that have been used continuously as long as has mine. This particular make of car was abandoned by the builders several years ago, not because it was not a good, practical car, and a car that would stand hard knocks, but because the type of cars had so changed that, as the president of the company building it told me, it was impossible to sell them at any price.

L. S. COLTER.

Wood Frames.

Editor HORSELESS AGE:

In the issue of THE HORSELESS AGE for November 20, 1907, we noticed on page 761 an article by you on the relative strength of wood sills as compared with those of pressed steel. As we are quite interested in this question, and always on the lookout for information, would you kindly advise us as to where you obtained this data on the strength of sills? If you have the results of any actual tests or could give us the names of the parties who have, we would appreciate such a favor very much.

H. H. FRANKLIN MFG. COMPANY,
Engineering Department,
R. G. S.

[Our answer to this inquiry was based on data found in standard engineering hand books, such as Kent's Mechanical Engineers' Pocket Book, which contains a great deal of data on tests of different woods and steels. In applying this experimental data to our problem we have to bear in mind that a frame side member works essentially like a beam supported at two points near its ends, and has the load distributed more or less evenly over its whole length. The greatest stress occurs undoubtedly approximately midway between springs, and is a downward bending stress. We must, therefore, take wood and pressed steel frame sections of the same resistance to downward bending stresses and compare their weights.

An average section for the pressed steel frame side members for a medium weight touring car is $\frac{3}{16}$ inch thick, 4 inches high and 1½ inches wide. The average tensile or compression strength of the high carbon steel used for pressed steel frames is in the neighborhood of 75,000 pounds per square inch. Some manufacturers use nickel steel and nickel-chrome steel frames, which steels have a higher tensile strength than carbon steel, but as their use is not common this need not be considered here.

The above section has a moment of inertia

$$I = \frac{\left(1\frac{1}{2} \times 4^3\right) - \left(1\frac{5}{16} \times 3\frac{5}{8}^3\right)}{12} = 3$$

(approx.)

The distance from the centre of the section to the outermost fibre being 2 inches, the resisting moment is

$$M = \frac{3 \times 75{,}000}{2} = 112{,}500$$

In finding an equivalent section of wood, we must first of all take account of the fact that, while for steel the tensile strength is practically always greater than the compression strength, the opposite holds true for wood. Therefore, in calculating the resisting moment of a wood sill, we must base our calculation on the compression strength of the wood (inasmuch as the top fibres of the sill are subjected to compression and the bottom fibres to tension of the same amount. According to experiments made by the United States Government at Water-

town, the results of which are given in Kent, fifth edition, page 311, hickory has an endwise compression strength of 8,000 pounds per square inch, while white oak has a compression strength of 7,000 pounds. The latter weighs from 45 to 54.5 pounds per cubic foot; on the average, say, 50 pounds. We will carry the calculation through for white oak.

In finding a section of the same resisting moment the first problem that confronts us is what ratio of height to width to use. Of course, the higher the section, in proportion to width, the lighter will be the section, but we believe that a ratio of three will be about as great as is permissible. This is a somewhat greater ratio than obtains in the case of the steel section, hence it seems that if we adopt it the comparison will certainly not be on an unjust basis from the standpoint of the wood frame. Calling the necessary width of the wood sill x, we have for its moment of inertia

$$I = \frac{x \times (3x)^3}{12} = 2.25\, x^4$$

The distance from the neutral to the outermost fibre is 1.5 x, hence the resisting moment for white oak is

$$M = \frac{2.25\, x^4 \times 7000}{1.5\, x} = 10{,}500\, x^3$$

Equating this to the resisting moment of the steel section, we have

$$10{,}500\, x^3 = 112{,}500$$
$$x^3 = 10.71$$
$$x = 2.2 \text{ inches.}$$

Consequently, a white oak sill, to be of equal strength as the above mentioned steel sill, would have to be 2.2 inches wide and $3 \times 2.2 = 6.6$ inches high. Such a sill would weigh per inch in length

$$\frac{2.2 \times 6.6 \times 50}{1728} = .42 \text{ pound.}$$

If instead of oak we use hickory, the equation for the resisting moment becomes

$$M = \frac{2.25\, x^4 \times 8000}{1.5\, x} = 12{,}000\, x^3$$

Equating this to the resisting moment of the steel section, we have

$$12{,}000\, x^3 = 112{,}500$$
$$x^3 = 9.37$$
$$x = 2.11$$

Consequently, a hickory sill to be of equal strength as the above mentioned steel sill would have to be 2.11 inches wide and $3 \times 2.11 = 6.33$ inches high. Hickory has the same specific gravity as white oak (Kent, p. 165), and the hickory sill would therefore weigh per inch in length

$$\frac{2.11 \times 6.33 \times 50}{17.28} = .387 \text{ pound.}$$

The weight per cubic inch of steel being .283 pound, the steel sill will weigh per inch in length

$$[4 + (2 \times 1\tfrac{5}{8})] \times \tfrac{3}{16} \times .283 = .35 \text{ pound.}$$

This line of reasoning, based upon authentic data, therefore shows that the proportionate weights of frame sills are as follows: Pressed steel, 35; white oak, 42; hickory, 38.7. We admit that this is not a conclusive proof that a wood frame is necessarily always heavier than a steel frame of the same strength, or that a wood frame is necessarily always weaker than a steel frame of the same weight. We believe, however, that the above calculations are entirely logical and that the assumptions are in accord with modern practice, and the results of these and similar calculations incline us to the belief that, as stated in our reply to a reader, the wood frame is heavier than the pressed steel frame of the same strength. We do not see how an absolute, general proof of this proposition could be furnished either theoretically or experimentally, as there are countless possible variations in frame design, and such variations must affect the strength of the frame differently according to whether a full section or a channel section is used. If there are any flaws in our above reasoning, or any unwarrantable assumptions, we should be much pleased to have them pointed out. —Ed.]

In the Market for a Doctor's Runabout.

Editor Horseless Age:

I took up the study of the automobile some months ago with a view of determining whether I could supplant horses with it in the practice of medicine. I have come to the conclusion that this can be largely done, and entirely so when the roads are in good shape. We have fairly good roads, but have some heavy hills, some sand and some mud holes. I am 12 miles from the nearest garage, and wish to know if you think I could acquire the skill to manage, and make the necessary adjustments and repairs that are constanly being required. I want a good, durable, substantial car, that I can depend on, to cost not more than or not much more than $1,000. I have only looked into the merits of two or three cars, and have been most impressed with the ——— and the ———. The ——— is a chain and the ——— a shaft drive. Which would you consider would be most suitable for my purpose? Of these two cars which do you think the best? Is either of these suitable for my work? If not, what car would you recommend as being suitable for the work that I would require of it? This is a matter of considerable importance to me, as I know absolutely nothing about autos, and in purchasing would be completely at the mercy of the salesman. I will be thankful for any information that you can give me.

R. G. C.

[We can only say that both of these are low priced, medium powered cars, made by concerns which are among the largest in the industry, and which have been established each for quite a number of years. Both of them have the same kind of motor, but the location of the motors is different, which affects the accessibility of the motor parts. The greatest difference between the two cars is that one is chain driven and the other shaft driven. We might point out that the shaft drive has the advantage that it is better protected against road dust and mud, requires therefore less attention and does not wear out so easily as a chain, as a general rule. An advantage of the chain is that when it breaks you can repair it yourself by means of spare links. We regret that we are unable to give any more than the above general information, as it is against our rules to recommend any particular car.—Ed.]

Explosive Engine Queries.

Editor Horseless Age:

Please answer through the columns of your journal the following queries:

1. What should be the size of the inlet valve, working automatically, and the exhaust valves for a 3½x3½ inch air cooled, four cycle gasoline engine, and how much lift should they have?

2. What per cent. of the cylinder area should be left for compression space?

3. Is five-eighth inch thick enough for the cylinder that will have ribs or fins around it 1¼x3⅛ inch thick, set three-eighth inch apart?

4. What should be the size of inlet and exhaust pipes?

J. H. Thomas.

[Both valves should have a clear diameter of 1¼ inches. The exhaust valve should have a lift of ⅜ inch and the inlet valve ¼ inch. Make the compression volume about one-third the volume swept through by the piston during one stroke. Five-eighth inch is too thick for the wall of the cylinder, three-eighth inch being ample if the work is well done. One inch pipe size inlet and exhaust pipes will do, though a somewhat larger pipe is desirable.—Ed.]

Spring Wheels.

Editor Horseless Age:

I would like some information from you in regard to the spring wheel question. I see that many patents on spring wheels are applied for and granted, but have never seen any placed on the market. What is the cause of this? Have they proved to be successful; if so, in what way?

F. K. P.

[So far spring wheels have not proved successful for motor car work. In France there has been a contest for vehicles fitted with any sort of elastic wheels and without pneumatic tires during each of the past two years, but all spring wheels entered were speedily eliminated, and the prizes went to cars with wheels having rubber cushions between the hub and the felloe. Two different makes of spring wheels were offered on the market in Europe for quite a time, but they seem to have finally disappeared again, as nothing is being heard of them any more. One of these was marketed in France and had flat steel spring spokes curved in opposite directions. This invention was taken up by a man reputed to be wealthy, and he certainly made great efforts to introduce it, but met with little success. Another spring wheel went through an officially observed

long distance endurance run in England, but quite a few replacements became necessary, and the otherwise successful completion of the test does not seem to have convinced the English motoring public of its merits.

Most spring wheels are much too complicated to be practical, and their working parts are not sufficiently protected against water and mud, so that they fail to work properly after the wheel has become muddy, and eventually rusts. Also, as a vibration absorbing device a steel spring can never perfectly replace a rubber or air cushion. A block of rubber or a bag of air when deformed and then released will return to its original form, and will not swing beyond it, as it were, like a steel spring. However, the main reasons for the apparent failure of the spring wheel are its complication and lack of protection of wearing parts.—Ed.]

Heat Resisting Paints.

Editor Horseless Age:

Kindly give through The Horseless Age the receipt for painting exhaust pipes and muffler so they will not burn off. I saw this once, but cannot find the issue.

F. D. Weeks.

[Following are the two formulæ for paints which are claimed to withstand high temperatures. Both of these are of black color. The first requires the following ingredients: Three pounds lampblack, 3 pounds graphite, 1 pound black oxide of manganese, 1 pint japan gold size, half pint turpentine and 1 pint boiled linseed oil. Powder the graphite and mix all the ingredients well together to a uniform consistency. Then apply two coats as with ordinary paints. The ingredients for the other paint are: Two pounds of black oxide of manganese, 3 pounds of graphite and 9 pounds of terra alba. Mix well together and pass through a fine sieve; then mix to the required consistency with the following preparation: Ten parts silicate of soda, one part glucose and four parts water.

Probably the simplest plan of keeping the exhaust pipes in a presentable condition and protecting them against rust is to polish them with stove blacking once in a while. The muffler usually does not get so hot as to burn off ordinary paints.—Ed.]

Wants a Truck for Sandy Country.

Editor Horseless Age:

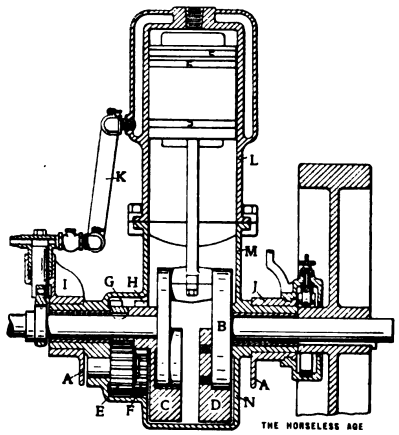
I wish to use a motor truck on a very sandy road, but am told by several people—two of whom are using trucks—that I cannot run a loaded truck in deep sand. Now, I have only a few extra dollars and cannot afford to lose them. Therefore, will some one of your staff who is posted tell me what make of truck is likely to pull a load in sand, and what kind of tires it must be equipped with? C. W. B.

[Ordinarily, motor trucks are built to be operated on hard roads, and not in sand, and it is doubtful whether any of the regular stock trucks would serve your purpose. In the first place, it requires a great deal more power to propel a truck through sand than over a hard road, and, besides, even if there is sufficient power, if the sand is very deep and the wheels are comparatively narrow the latter are likely to sink into the sand and spin around, failing to move the truck. We would advise you to get into communication with the leading truck manufacturers, whose addresses we will send you by mail. You want, in the first place, a very powerful truck, and one that is low geared, so there can be no question of insufficient propelling power. A four cylinder motor will be preferable to one with a smaller number of cylinders. If the truck is to be used on sand only we believe that steel tires with crossbars, as used on traction engines, would be the most satisfactory, whereas if the machine is to run also on hard roads, rubber block tires would probably give the best all around service.—Ed.]

A New Balancing System.

Editor Horseless Age:

There are two sources of vibration in an engine: first, vibration due to the inertia



A New Balancing System.

of the reciprocating and rotating parts, and, second, vibration due to the reaction of the explosions in the cylinder. The writer has invented a construction in which vibration is eliminated by simple means. To prevent vibration from the first cause, a counterweight C is provided which is driven concentrically to the main shaft and at the same speed but opposite direction, by means of gears G, E, H and F. The effect of this counterweight in combination with the weight D—connected to the crank shaft and rotating with it as shown—is to counterbalance very accurately the inertia of the piston and connecting rod.

To reduce the vibration from the second cause—the explosions of the charge in cylinder—the engine is mounted on bearings in the frame A, which extends entirely around the crank case. The engine is restricted in its rotation in these bearings by springs, not shown in this view. Flexible connections are used from the pump and carburetor to the engine. With each explosion the flywheel is accelerated in one direction of rotation, and the engine reactively in the opposite. This recoil is cushioned by springs, instead of being rigidly transmitted to the supporting surroundings.

To test this scheme a small two cycle engine was built and mounted in an 18 foot canoe of the ordinary light canoe construction—a regular 18 foot Old Town canoe. Such a canoe is too frail to stand the vibration of an ordinary gasoline engine, to say nothing of the discomfort of the passengers. With this engine, however, the outfit works to entire satisfaction. The engine is hung in the boat by supports from the gunwale, and requires no reinforcing of the boat, as is necessary when vibration is present. No vibration is noticeable to the passengers.

I believe that the engine may be built in large units (hitherto impracticable in single cylinder engines because of vibration), and applied with advantage to the propulsion of boats and motor cars, and even in fields now exclusively supplied by electric motors because of their lack of vibration.

F. H. Lewis.

To Facilitate Starting in Cold Weather.

Editor Horseless Age:

I would like to inquire through your paper if there is any method of wiring a car fitted with a low tension magneto, to help its starting in cold weather? I would like to hear through your paper the experience of any parties that are using this method of ignition. William B. Haskell.

[You do not state whether you use make and break or jump spark ignition, but as the magneto is a low tension one we presume it is the former. In that case it would be an easy matter to carry in addition to the magneto a storage battery. One terminal of this battery should be grounded and the other run to a two way switch by which either the magneto or the battery can be connected to the sparkers. The storage battery will give a stronger spark when cranking, and provided the trouble is due to too weak sparks, it should remedy it. When jump spark ignition is used it is generally not such an easy matter to substitute one source of current for another, as the interrupter or timer is usually an integral part of the magneto, and practically a complete extra ignition system would be required.—Ed.]

Duties of a Driver in Overtaking Another Vehicle.

Editor Horseless Age:

Can you refer me to any court decision in reference to the rights of a vehicle being propelled or driven along the public highway and wishing to pass another vehicle traveling in the same direction?

The specific question is whether a vehicle that is being passed is obligated to give a certain part of the beaten track where the

road is of sufficient width. One of our members has been sued for catching the bridle of a horse that he was passing upon the brace to his top and pulling it from the horse.

From a thorough investigation by our grievance committee it would seem the plaintiff has no case unless he can show that he was not obligated to give any portion of the beaten track to the passing vehicle. The outcome of this suit will be of interest to every motorist in this state (Minnesota), if not to the whole country. The suit will be tried in the District Court the first week in December.

A. B. STEWART.

[In our opinion, whether the automobilist is liable under the conditions stated in your communication is purely a question of negligence. If reasonable care was exercised in passing the vehicle ahead, then there can be no liability on the part of the motorist. Of course whether due care was exercised is a question of fact for the jury to determine.

Where the road is sufficiently wide a forward vehicle should give up a reasonable portion of it in order to allow an overtaking vehicle to pass. No vehicle on the public highway has a right to block the thoroughfare by remaining in the centre and occupying the whole of the road; but if sufficient space to pass is not given by the forward vehicle, the overtaking vehicle has no right to pass or attempt passing if there is not sufficient room, for to do so would be very likely to cause injury to the preceding carriage. In other words, the man in the rear has an open view, and he sees, or should see, whether he has room to pass. If there is not room to pass, and the driver sees the lack of room, or should have seen it, he passes at his peril and is responsible for all injury committed by him, provided of course the injury is not the result of pure accident, in which case nobody is liable. This may seem to be a rather harsh rule, but in our opinion it is the law, and we quote the following as authority, which is backed up by decisions:

"* * * it has been held that the law of the road applies only to travelers who approach from opposite directions, and that the advance traveler is under no obligation to turn to either side to allow the following traveler to pass." (Bolton v. Colder, 1 Watts (Pa.) 360.)

"In Louisiana it has been held that the driver or owner of the rear vehicle passes at his peril the forward one, and is responsible for all damage caused thereby." (Avegno v. Hart, 35 La. Ann. 235.)

"Even though there may be a set rule how a following vehicle should pass the one in front, it would seem that such a rule, like the one covering vehicles approaching from opposite directions, will be merely a rule of negligence, and the liabilities of parties would be subject to the law of negligence. In fact it has been held that the driver of a vehicle who sees a team on the run overtaking him, but not having any reason to believe that the driver had lost control of his team, was not guilty of contributory negligence in not turning out, where there was plenty of room for the team to pass." (Elenz v. Conrad, 123 Iowa 522, 99 N. W. 138.) (See Huddy on the Law of Automobiles, p. 86.)

We may also cite you a New York decision concerning the question raised in your letter. It is as follows:

"If two persons are traveling in the same direction, and the hindmost traveler, in attempting to pass the other, carelessly or negligently collides with him and injures him; or, if he recklessly drives his horse so as to run into the other's carriage and injures it, an action for damages may be brought by the party injured, if he himself was free from fault and could not have avoided the collision by the use of ordinary care." (Center vs. Tumey, 17 Barb. 94.)—ED.]

ROAD DIRECTION BOARDS ERECTED BY CINCINNATI A. C.

Signboard Work of Cincinnati Club.

Editor HORSELESS AGE:

I enclose two photographs of one of the road directory boards erected by the Automobile Club of Cincinnati. I believe the Cincinnati Club is the first and only club to undertake the erection of signs of this character. The photographs are two views of the directory board erected at Glendale, 13 miles from Cincinnati. Another similar board has been erected at Reading, Ohio. It is proposed to erect two more similar boards. These road directories are erected at points where long through routes practically begin, and will serve to not only indicate which road to take when touring, but will tell the towns passed through and their distance from the point where the boards are erected.

In addition to these road directory boards the Cincinnati Club has this year placed in position 148 small road signs on the main roads radiating from Cincinnati, as far as the confines of the County of Hamilton. These small signs are of metal, with a wood backing, and lettered so as to indicate the direction to Cincinnati and number of miles in one direction, and the direction and number of miles to some other town in the opposite direction. Next season it is proposed to erect similar signs on all cross or intersecting roads in Hamilton County. The entire county will then be posted with these road signs. The county commissioners have agreed to accept these signs, after their erection by the club, as their property and to maintain them.

L. S. COLTER.

In the Market for Large Centrifugal Pumps.

Editor HORSELESS AGE:

I am interested in centrifugal water pumps, and so far have been unable to locate firms who manufacture them. I would be very glad if you could give me the name or names of any firm that manufacture these pumps, say from 700 to 2,000 gallons per minute capacity. If not, could you advise me as to where I could procure the necessary information where such pumps can be obtained? CLARENCE M. FOSS.

209 S. Champion avenue, Columbus, Ohio.

Commercial Applications.

Motor Tower Wagon Used in Los Angeles.

A motor truck supplied with a tower frame to repair breaks in the overhead lines of the electric car system has been in use in Los Angeles, Cal., for a year, and the experiment has been so successful that the company will put similar emergency auto cars into service as soon as the many new street pavements now under way are completed. The motor driven emergency wagon can reach the scene of trouble in a much shorter time than the horse vehicles, and, as each minute of delay tends to throw out the traffic schedules, this factor is of the greatest importance in the peculiar work required of the truck. The maintenance expense is practically identical with that of the horse drawn tower wagons, and only the condition of the streets has so far prevented the use of additional power trucks.

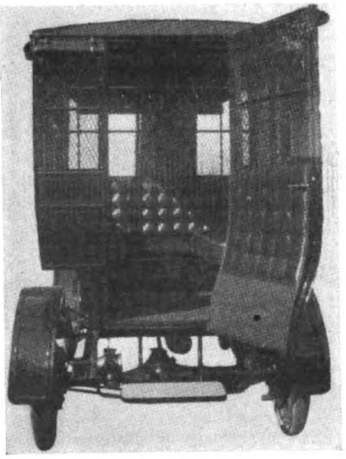
The truck in use now was not built for the special purpose. A 30 horse power commercial truck, capable of carrying a load of 2½ tons, was purchased by the company, the tower removed from one of the emergency wagons and fastened directly onto the motor truck. As the framework weighed only 2 tons, the springs did not have to be strengthened, and a sufficient margin for supplies and the crew was left.

The truck is driven by a two cylinder, water cooled engine, capable of developing a speed of from 18 to 25 miles an hour. The former speed was the maximum, while the gear, as supplied by the maker, was used, but the first few runs showed that this speed was insufficient, and the speed was increased to 25 miles by a new gear. On paved streets it was found that the motor truck outdistanced the horses in every instance, lifting the traffic blockades caused by broken trolley wires with greater dispatch than had been possible before its advent. Even on unpaved streets it held its own with the horse vehicles during the summer months, but when the winter rains changed these unpaved streets into bogs and quagmires the radius of action of the motor truck was restricted to the paved streets.

In the year that the truck has been in operation it has traveled 6,000 miles, with an operating expense equal to the cost of 1 gallon of gasoline for each 5 miles. For a period of two weeks it received an overhauling in the shops of the company, but only minor repairs were necessary. An experienced driver has charge of the truck. Solid tires are used.

Motor Bus Line for St. Louis.

The Wagner Electric Company, St. Louis, Mo., is promoting an automobile bus line which will connect the Union Station with hotels and connect all street car lines with the Art Museum in Forest Park. The company, which has still to secure a franchise to traverse the city's streets and collect fares, will be known as the St. Louis Auto Exchange, and is capitalized for $30,000. Its assets are said to be $130,000, $110,000 of which is invested in machines. It is further stated that forty-six gasoline-electric buses will shortly be delivered to the company, including nine specially adapted to sightseeing. The plans are that these shall start from the Union Station and tour the city. Short stops will be made en route, and a fare of 25 cents will be charged. Twelve cars are to be used for hotel service alone, and will ply between the station and the principal hotels.



COMBINATION MAIL AND PAY CAR.

Motor Patrols for Brazil.

We illustrate herewith one of three motor patrol wagons which have recently been furnished by the White Company, of Cleveland, Ohio, to the police department of Rio de Janeiro, Brazil. These three vehicles are built on standard 30 horse power chasses, the bodies being built in accordance with specifications furnished by the Brazilian Government. The coat of arms of Brazil is shown conspicuously on either side. The body is of sufficient size to accommodate thirteen to fifteen persons.

Combination Mail and Pay Car.

The accompanying cut shows a special combination mail and pay car built by the Maxwell-Briscoe Motor Company, of Tarrytown, N. Y., for the General Electric Company, Schenectady, N. Y. The interior of the car contains facilities for carrying mail, and also accommodates a steel safe.

Commercial Vehicle Notes.

Oshkosh, Wis., is reported to be in the market for a high powered automobile runabout for the chief of its fire department.

The Brooklyn *Daily Eagle,* which has had a Locomobile delivery car in its delivery service for a year, has now bought two more cars of the same make.

J. Rollin Gray, of Stevens Point, Wis., is experimenting with a four seated sightseeing vehicle, made by the Chicago Motor Company. If successful he will start a "Seeing Stevens Point" line in the spring.

The city of Berlin recently placed in service an electrically propelled street washing machine. The outfit consists really of an electric tractor and the washing machine proper. The latter combines a sprinkler and sweeper.

The Milwaukee Merchants' and Manufacturers' Fire and Burglar Dispatch has bought three Rambler cars to use in its service. These cars are sent on emergency calls reporting fires, burglary, open safes or vaults, neglected lights or windows and unlocked doors. They are dispatched to the residence of an owner to take him to and from his place of business between 6 p. m. and 6 a. m., and are also provided for railroad station service or medical calls.

MOTOR PATROL FOR RIO DE JANEIRO.

The Chicago Reliability Contest.

This contest, under the auspices of the Chicago Motor Club, was a three-day event (November 26, 27, 28), the cars being obliged to cover a total of 600 miles with bonnets sealed. The first day's run was from Chicago to South Bend, Ind., and back, a distance of 222 miles.

The start was made at 5:01 a. m. by a Royal Tourist car, the remaining cars getting away at one minute intervals. A Thomas car was the first to withdraw, due to the breaking of an axle while taking a turn too rapidly. Next a Royal Tourist snapped an axle, but replaced it by another, for which it was penalized. The following cars were penalized for various faults: Reo, Maxwell, Frayer-Miller, Pierce Arrow No. 2, Matheson No. 6, Pierce Racine, Dragon and Locomobile. A pilot car was sent ahead with confetti each day to mark the route. Eleven cars finished the first day with perfect scores.

The second day's run, from Chicago to Rockford, Ill., and back, 186 miles, was over rough roads, and resulted in sixteen perfect score cars, most of which were piloted by old-time drivers. The Royal Tourist, Autocar, Maxwell, Rapid, Studebaker, Reo, Pierce Racine, Knight, Premier and National cars were penalized.

The last day (November 28) saw quite a number penalized, and three contestants withdrew, the Wayne, Matheson and Jackson. The Wayne broke the right steering knuckle, and was allowed to continue, although a menace to all other road users, and at Aurora it forced Maxwell No. 13 to run against a brick house, damaging a spring and breaking a wheel. The pace maker, an Apperson, also took to the ditch for the second time. Owing to this, a number of cars lost the road and were obliged to drive at top speed when the fact was discovered. Seven cars all told deviated from the course, and the judges decided not to penalize them for violation of the speed laws. Two White cars were also penalized on technical grounds.

On Thursday night the winner was announced as No. 14, Haynes, driven by Frank Nutt. According to the judges, this car made the only perfect score out of the thirty-five starters. The following are the penalties against the first ten cars: Haynes, 0; Pierce Arrow, 2; Oldsmobile, 6; Rambler, 8; Auburn, 10; White, 12; Locomobile, 14; Studebaker, 16; Kisselkar, 18; National, 26. Trivial causes were subjects for penalization, such as loose grease cups (Pierce Arrow, 29), lost lamp glass (Rambler), etc. The majority of the cars were in hopeless shape, having sagged springs, patched axles, defective steering gear, etc. The Pierce Arrow was declared second, with a penalization as above.

New Boulevard Being Ruined by Speeding.

One of the supervisors of Oakland, Alameda County, Cal., says that the new boulevard to the foothills is being ruined by automobilists, who speed along it at a rate of 60 miles an hour. The supervisor says that the board shall appoint an officer, equipped with a motorcycle, to police the boulevard and arrest all who violate the speed ordinance. Violations occur chiefly late in the afternoon or at night. The boulevard cost the county more than $100,000.

CHICAGO RELIABILITY CONTEST—AT ELGIN, ILL.

A. A. A. Technical Board.

President William H. Hotchkiss, of the American Automobile Association, announces the appointment of the new technical board, which was authorized at the annual meeting of the board of directors held in New York, November 8, 1907: N. H. Van Sicklen, chairman, Chicago, Ill.; David Beecroft, Chicago, Ill.; H. O. Smith, Indianapolis, Ind.; Edgar Apperson, Kokomo, Ind.; Walter C. Baker, Cleveland, Ohio; Henry Souther, Hartford, Conn.; S. N. Colburn, Minneapolis, Minn.; E. R. Thomas, Buffalo, N. Y.; Clarence E. Whitney, Hartford, Conn.; E. T. Birdsall, Rochester, N. Y.; Angus Sinclair, Newark, N. J.; J. C. Kerrison, Boston, Mass.; Henry Ford, Detroit, Mich.; H. M. Rowe, Baltimore, Md.; A. C. Newby, Indianapolis, Ind.; A. L. Riker, Bridgeport, Conn.; Roy F. Britton, St. Louis, Mo.

The first meeting of the board will be held in Chicago on December 6, at which time its organization will be perfected and plans laid out, which will, it is hoped, lead to a number of technical contests in different parts of the country, beginning early in the year of 1908.

Continental Tires to Be Manufactured in America.

The Continental Caoutchouc Company, incorporated under the laws of New York State in 1903, as the American branch of the Continental-Caoutchouc- und Guttapercha-Compagnie, of Hanover, Germany, have arranged for the manufacture in America of the tires required for their trade here, instead of continuing to import them, and

CHICAGO RELIABILITY CONTEST—AT SOUTH BEND.

thus save the import duty. It is stated that the American made Continental tires will be of exactly the same quality as those which have been imported. Recently Herr Willy Tischbein, a director of the German company and president of the New York Continental Caoutchouc Company, and Albert Gerlach, Ph.D., a tire expert from the Hanover works, visited this country, and while here made arrangements with the Revere Rubber Company, of Boston, whereby the Continental tires will be produced at the latter's works at Chelsea, Mass. As a result of these arrangements a new price list for Continental tires has been issued, which reflects the saving not only of the import duty but also of ocean transportation.

Spare Wheel to Be Manufactured in America.

The Spare Motor Wheel Co. of America, Limited, with £85,000 capital, was registered in London October 14, 1907, to acquire the United States patents on the Stepney spare wheel and certain other patents relating to automobile accessories. The factory has been acquired of the St. Anne Kerosene Motor Company, at St. Anne, Ill. (about 60 miles south of Chicago). The directors are English, with the exception of Lester E. Broyles, late president of the Bradley Stillwell Company (Kansas City, Mo.), who becomes managing director. The resident secretary in America is Ivor F. Thomas, at St. Anne. The spare wheel is a complete wheel that is carried along like an extra shoe, and secured to a wheel in case one of the tires is punctured or otherwise damaged. It is claimed that a large number of these spare wheels have been sold in England, and a branch factory has been established in Germany. In the prospectus for the American company some rather fanciful figures of estimated sales and profits are given.

New York-Paris Automobile Race.

The Paris *Matin* and the New York *Times* are jointly promoting an automobile race to start from New York city, and to lead through British North America and Alaska, over the ice of the Bering Strait, and through Siberia and Europe to Paris. No definite date for the start has yet been set. It is announced that the promoters are inundated with letters from persons who are eager to be enrolled, but presumably most of these letters are from adventurers and not from manufacturers. It is not likely that many American manufacturers will undertake the enormous expense connected with this most uncertain undertaking.

Efforts are now being made in Germany to hold next year's annual show, instead of in Berlin, in Frankfort-on-Main, a financial centre, where a large show building is now being erected.

LEGISLATIVE and LEGAL

Proposed Jersey Legislation.

Strong efforts are to be made to amend the automobile law of New Jersey at the next session of the Legislature, which convenes January 10, 1908. The farmers will endeavor to have the speed limit reduced, and they will be opposed by Senator Frelinghuysen, father of the present law. The automobile associations of New York and Pennsylvania have served notice on Senator Frelinghuysen that they will undertake to have the law so amended that automobilists from these two States will be permitted to operate their machines in New Jersey without paying for the privilege in the form of a license fee. The Senator has told them that he will oppose their efforts and go a little further by trying to have the license fee for heavy machines increased. He says that the State under the present law receives about $90,000 in fees, all of which goes toward improving the highways. He thinks that by raising the fees the State would benefit to the tune of about $200,000.

Automobilists will combine in an effort to have a law enacted requiring owners of horse drawn vehicles to have their wagons equipped with lamps while on the highways after dark, and Senator Frelinghuysen is in sympathy with that proposition, which the farmers are against.

Charged With Defrauding an Automobile Company.

A warrant was issued recently by a San Francisco police judge for the arrest of James C. Dunphy, son of a Nevada "cattle king" and millionaire, on a charge of defrauding J. T. Degman, a chauffeur employed by the Broadway Garage. In payment of a bill for automobile hire Dunphy gave a check on the Crocker National Bank for $50. He had previously given a check for $100 on the same bank in part payment of a bill of $130 due to the same garage. Both checks were returned marked "no funds." Young Dunphy has lots of suits on his hands. Tailors and haberdashers are suing him for unpaid bills and his wife is suing him for divorce.

Chauffeur Charged With Manslaughter.

Alfred Van Cott, the chauffeur who was driving a motor car owned by the People's Water Company, of Oakland, Cal., when W. J. Murray, a San Francisco commission merchant, was struck and fatally injured in the town of Fruitvale, has been charged by the district attorney of Alameda County with manslaugher. It is believed that Van Cott was driving the car, in which A. L. Adams, chief engineer of the People's Water Company, was riding, at a dangerous speed.

Supreme Court to Decide Garage Question.

An order of notice returnable probably during the week of December 9 has been issued by the Superior Court upon the application of Elizabeth S. Tobey, Augustus S. Lovett and George E. Lyford, of Brookline, and Jennie Wilson, of Boston, owners of adjoining real estate, for an order restraining the storing, keeping or selling of gasoline in the brick building at 31 Harris street, by R. P. and T. H. Barnett, on the ground that such use of the building is dangerous to the public health and safety.

They also claim that it is a source of annoyance and damage and is conducted with an unlawful disregard of the public. The building is now used as a garage, and the petitioners claim that another person has previously twice asked for the privilege and has been refused both times. They ask that the use of the building as a garage be decreed to be a nuisance, and the respondents be permanently enjoined from so using it.

Business Troubles.

The Back Bay Automobile Company, of 171 Huntington avenue, Boston, Mass., petitioned into bankruptcy August 15, filed its schedule in the United States District Court—liabilities $39,344 and assets $11,635. Almost all the claims are small. There is one promissory note of $1,000, and a promissory note and money loaned amounting to $1,415. Claims amounting to $12,000 are secured by a chattel mortgage and company stock. The assets are principally stock in trade, automobiles, etc. Arthur P. Hardy is receiver.

Schedules in bankruptcy of the Rees Company, automobile storage at 42 West Sixty-second street, show liabilities of $14,061 and nominal assets $18,979, consisting of two automobiles $1,700, machinery sold for $1,500, accounts $4,524, cash $207, insurance rebate $48, and a claim for $11,000 for return of money deposited for rent of 42 West Sixty-second street, from which the bankrupt was dispossessed. Among the creditors are Otto Heinze & Co., bankers and brokers, $2,808, secured by accounts; Otis Elevator Company, $3,000, secured, and Standard Oil Company, $820.

The suits of John H. Broughton, Trenton, N. J., against Peter D. and Thomas H. Thropp and the Thropps against Broughton have been ended, the jury deciding that neither had cause for action. The suits arose from a collision of the machines owned by the principals last June.

Fred Rice, chauffeur for W. M. Cummer, president of the Atlas Dryer Company, Cleveland, Ohio, sued his employer for $110 on the ground that Cummer turned off the heat in Rice's apartments after the latter had been discharged but refused to move.

MINOR MENTION

The E. N. B. carburetor, described in one of our recent issues, was erroneously called the E. C. B.

The Ohnhaus Auto Company, Fort Wayne, Ind., has moved from 219 Pearl street to 216 and 218 Perry street.

The Continental Caoutchouc Company has removed its Detroit branch from 226 Jefferson avenue to 260 Jefferson avenue.

The Illinois Chauffeurs' Association has been incorporated in Chicago, Ill., by John O'Hara, T. T. North and F. W. Kickbush.

The Morgan & Wright Tire Company has closed its branch office at 226 Jefferson avenue in Detroit, and removed it to its factory.

H. O. Nattinger, a garage owner of Des Moines, Ia., was killed and Frank Getchill fatally injured in an auto collision last week. Three women escaped.

The factory formerly occupied by the Royal Motor Car Company, East Fifty-fourth street, Cleveland, Ohio, was sold to J. F. Sipe, of New York, for $20,000.

The first meeting of the creditors of Howard E. Whiting, Cambridge, Mass., will be held in the Old Probate Court room, East Cambridge, on December 7.

A large additional building to the plant of the B. F. Goodrich Company at Akron, Ohio, and which is to be devoted to the manufacture of tires, has been occupied.

The Y. M. C. A., Erie, Pa., will start an automobile school the first week in December. The course will be given at the garage of J. Roth, who will be one of the instructors.

The Supplementary Spiral Spring Company, St. Louis, Mo., has placed its Chicago agency with Page & Palmer, 1712 Michigan avenue, whose territory also includes the States of Michigan and Wisconsin.

The Steel Swallow Auto Company, of Jackson, Mich., is demonstrating a light car, with solid rear axle and friction equalizer, to business men of various towns in Michigan, evidently seeking for a location.

The Middletown Township, Bucks County, Pa., has collected $3,000 from automobile speeders since last spring, which has been used to repair the roads. It is claimed that speeding has been practically eliminated in that vicinity.

The new building of the Diamond Rubber Company's plant at Akron, Ohio, has been completed and will be occupied shortly. One of the objects in putting up this building was to provide more room for tire manufacture.

There have been 843 registrations in Maine up to November 26, for which the State has received $1,686. The law requiring the registration of automobiles in that State went into effect June 1, 1905, and during that year there were 736 registrations and in 1906 there were 649.

The Oscar Lear Automobile Company, Springfield, Ohio, is about to close a contract with the Farmobile Company for the manufacture of the former company's air cooled motors to be used in the Farmobile Company's automobiles.

The Compania Vulcanizadora Mexicana has been organized to repair tires in Mexico City. The members of the firm are Jack M. Davis and Archibald Farrington, and their establishment is located at the corner of Avenidas Juarez and Balderas.

At the December meeting of the American Society of Mechanical Engineers, to be held in New York city, will be read papers on "Control of Internal Combustion for Gas Engines," by Prof. C. E. Lucke, and "Duty Test on Gas Power Plant," by J. R. Bibbins.

R. D. Benson, Jr., Western representative of the Wetherell Finished Castings Company, of Philadelphia, has closed his office with the Morgan & Wright branch in Detroit, and has moved to 214 Jefferson avenue, with the International Rubber Company.

The Motor Specialty Company has been organized in Detroit to build a racing type of fender which may be attached to low-priced cars. Their building is at 1329-1331 Woodward avenue, and Perry C. McFedries, formerly with the Detroit Auto Equipment Company, is manager.

The Studebaker Brothers Manufacturing Company have been notified by the Jamestown Exposition Jury of Awards that their exhibit of automobiles, street sprinklers, garbage and dump wagons, contractors wagons and trucks has been awarded a diploma and gold medal for vehicles of that class.

The Automobile Dealers' Association, Cleveland, Ohio, held its annual meeting at the Cleveland Automobile Club rooms on November 20 and elected the following officers: President, W. D. Price; vice president, F. W. Phelps; secretary, Bert Adams; treasurer, H. S. Moore. Arrangements were made for the annual show, which comes during the week of February 17.

At a meeting of the Beloit (Wis.) A. C., on November 20, a constitution and by-laws were adopted and the following directors chosen: L. F. Bennett, H. M. Vale, E. D. Bullock, R. K. Rockwell, Mr. Williamson, F. M. Strong and D. H. Foster. The directors elected the following officers: President, Dr. Bennett; vice-president, F. M. Strong; secretary and treasurer, H. M. Vale.

The Curtiss Motor Vehicle Company has been incorporated at Hammondsport, N. Y., with a capital stock of $600,000, to manufacture the Curtiss light gasoline motor, Curtiss motor cycles and light automobiles, Baldwin dirigible airships and Jones orthopters. The officers of the company are: President, W. G. Critchlow, Dayton; vice president and general manager, G. H. Curtiss, Hammondsport, N. Y.; secretary-treasurer, L. D. Masson, Hammondsport, N. Y.

At the annual meeting of the Barndt-Johnson Auto Supply Company, Columbus, Ohio, C. Chris Born, C. S. Barndt, W. R. Johnson, William Bauer and Frank L. Packard were elected directors.

Dragon Automobile Company Reorganized.

The Dragon Automobile Company, of Philadelphia, has been superseded by the Dragon Motor Company, a new organization, with a capitalization of $1,000,000. The new company will take over the plant of the old Dragon concern at Thirty-first and Chestnut streets, Philadelphia, and will immediately begin the manufacture of taximeter cabs, a number of which have already been completed and are now running. Contracts are said to have been signed for the construction of over 200 more, which will be used mainly in New York city. The officers of the Dragon Motor Company are: J. Edward Calhoun, president; A. L. Kull, vice president; R. G. Kelsey, secretary and treasurer.

The directorate includes these officers, and H. F. Rawle and C. A. Pickard, president of Salisbury Wheel Works. The financial department of the new corporation will be in charge of J. Edward Calhoun, the president. The sales department will be looked after by A. L. Kull. The factory will be managed by R. G. Kelsey, assisted by John O'Brien. John W. Haynes and J. C. Middleton will remain as assistant sales managers. For the present there will be very little change in the selling organization in the various cities. In addition to the taxicab business, the regular touring car and the new roadster model will be manufactured.

Automobile Auction Sales.

Van Tassell & Kearney will hold an auction sale of new and second hand cars on Wednesday, December 11, at their sales ring, 126-132 East Thirteenth street, New York city. This will be the opening sale of a series of regular auction sales of automobiles to take place every Wednesday thereafter.

Muncie Auto Parts Company Fails.

The Muncie Auto Parts Company, of Muncie, Ind., went into the hands of a receiver on November 29, owing, it is said, to the financial stringency, which prevented it from getting currency to carry on business. Suit for a receiver was filed by Harvey Hooke, manager of the company, who is also a large stockholder. It is said that the company is solvent, and that the receiver was appointed in order that business might continue uninterrupted.

Garage Notes.

Bellinger & Co. are erecting a fine garage on Landis street, Newburgh, N. Y.

G. H. Borland has formed a stock company to build a garage in Haywood, Cal.

A new garage has been opened on North Broadway, Santa Maria, Cal., by Reed & Donnelly.

The Studebaker Auto Co., South Bend, Ind., will open a branch house in Cleveland, Ohio.

The garage of the Peacock Inn, Mayville, N. Y., was totally destroyed by fire on November 23. The building was valued at $10,000.

Contracts have been awarded for the work on the garage being built for the Newby Automobile Co. on West Broad street, Muncie, Ind.

The Colt Runabout Co., Chicago, Ill., has taken quarters at 1549 Michigan avenue, under the management of C. K. Robinson and A. W. Kane.

The Guy L. Smith Co., Omaha, Neb., will occupy the building formerly used by the First Christian Church, Nineteenth and Farnam streets.

The Orcutt Brothers garage, Council Bluffs, Ia., has been closed and the unfinished repair work on hand has been turned over to the Madsen shop.

The Chattanooga Automobile Co., with headquarters at the Southern Hotel, Chattanooga, Tenn., has leased a large building on Broad street, and will move in at once.

A permit has been issued to the Indianapolis Motor Car Co. for the erection of a two story brick garage at 419-423 East Market street, Indianapolis, Ind. The building will cost $8,500.

Patterson & Ingalls, Montgomery, Ala., will equip a garage on Monroe street, to be ready for business January 1, under the name of the Alabama Auto Garage. They will have the agency for the Rambler.

Henry C. Lea, who recently purchased a lot on Broad street, Philadelphia, Pa., is preparing to erect four three story garages at a cost of $100,000. The buildings will be of fireproof construction, 25x100 feet, and running through to Watts street.

New Agencies.

Troy, N. Y.—B. C. Bernard, Corbin.
Syracuse, N. Y.—Clark & Davis, Corbin.
Stamford, Conn.—Bell Brothers, Corbin.
Portland, Me.—Covey & Wallace, Corbin.
Chicago, Ill.—Ralph Temple Auto Co., Rapid.
Waterbury, Conn.—E. H. Towle Co., Corbin.
Cleveland, Ohio.—Reese Motor Car Co., Corbin.
Seattle, Wash.—Pacific Coast Auto Co., Corbin.
Walla Walla, Wash.—Inland Auto. Co., Corbin.
Sioux City, Ia.—Wirick-Bennett Auto Co., Corbin.
Bridgeport, Conn.—Bridgeport Auto Co., Corbin.
Danbury, Conn.—Pyramid Motor Car Co., Corbin.
Fort Wayne, Ind.—The Randall Motor Car Co., Mitchell.
Bakersfield, Cal.—Bakersfield Garage, Pope-Hartford.
Brooklyn, N. Y.—Carlton Garage and Repair Co., Corbin.
New Haven, Conn.—New Haven Auto Corporation, Corbin.
Boston, Mass.—George J. Dunham, 182 Columbus avenue, Corbin.

Trade Personals.

E. W. Gans, treasurer and general manager of the Reliance Motor Truck Co., Detroit, Mich., severed his connection with that company on December 1.

D. W. Henry, formerly with the Electric Vehicle Co., New Haven, Conn., will represent the Columbus Buggy Co., Columbus, Ohio, as traveling salesman.

N. A. Hawkins has been appointed commercial manager of the Ford Motor Co., and will have complete charge of all the Ford branches and the whole sales organization.

F. C. Lindoerfer, who for the past three months has been associated with the sales department of the Logan Construction Co., Chillicothe, Ohio, has severed his connection with the company.

R. M. Jones, formerly with the Detroit Automobile Company, has been appointed manager of the Fee-Vincent Electric Car Co. Eugene Vincent has severed his connections with that company.

Charles A. Davis, formerly with the G & J Tire Co., as Pacific Coast manager, has joined the selling force of the Michelin Tire Co. Mr. Davis will be the special factory representative to the Pacific Coast trade.

E. R. Benson, who has for a number of years been connected with the Hartford Rubber Works Co., and who lately has been secretary of the company and in charge of the sales department, has resigned to join the sales department of the Cadillac Motor Car Co., Detroit, Mich.

New Incorporations.

St. Louis Auto Exchange, St. Louis, Mo.—Capital, $30,000; to carry on general automobile business.

American Rotary Motor Co., Sanford, N. Y.—Capital, $1,000,000. President and treasurer, W. H. Hitchcock.

Corning Motor and Engine Co., Corning, N. Y.—Capital, $50,000. Directors, Charles C. Clark, Merrill S. Baker and Laverne J. Johnson.

Auto-Bi Co., Buffalo, Erie County.—Capital, $50,000. Directors, Clarence E. Becker, William C. Chadeayne and John W. Van Allen, Buffalo, N. Y.

Thomas Battery Co., New York.—Capital, $5,000; to manufacture storage batteries. Incorporators, Dr. Julian P. Thomas, Thomas S. Witherbee and Frederic T. McIntyre.

American Automobile Supply Co.—Capital, $50,000; to manufacture automobiles, parts, supplies and accessories. Incorporators, F. M. Roosa, W. R. Reid, E. D. Roosa, Springfield, Ill.

Philadelphia Taxicab Co., Philadelphia, Pa.—Capital, $200,000; to manufacture, buy, sell and hire automobiles. Incorporators, Lowden T. Taylor, John F. Hickman, George H. B. Martin.

National Taxicab Co., New York.—Capital, $25,000; to manufacture, deal in and use self propelled vehicles, motors, engines, etc. Incorporators, W. Bernard Vause, Louise N. Vause, George A. Knoblock, Woodford Mobry and E. Van Elten.

Coming Events.

December 14 to 21—St. Louis Automobile Dealers' Show.

December 28 to January 4—Importers' Show, Madison Square Garden, New York.

January 14 to 18—Hartford (Conn.) Dealers' Show in the Foot Guard Armory.

January 18 to February 2—Turin (Italy) Show.

February 10 to 15—Tri-State Auto and Sporting Goods Association Show, Light Guard Armory, Detroit, Mich.

March 7 to 14—Sixth Annual Boston Automobile Show, Mechanics' Building; C. I. Campbell, manager.

March 9 to 14—Buffalo Automobile Club's Show.

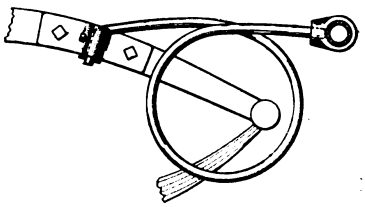
April 6 to 11—Pittsburg Automobile Club Show.

No Vienna Show in 1908.

Until now the Austrian Automobile Club has each year held a show in Vienna, but there will be no repetition of this show the coming year. The Dealers' Association decided that it would not participate in the show, and when the matter was put to a vote in the Manufacturers' Association only a small majority favored the holding of a show. There was, moreover, a desire among the manufacturers that their association should share with the club in the management of the show. When the result of this vote became known the club decided to drop the show entirely.

Review of Specifications.

No. 864,985. Buffer.—Andrew P. Olson, of Chicago, Ill., September 3, 1907. Filed September 19, 1906.



No. 864,985.

This is a device intended to reduce the shock when an automobile strikes a high obstruction. The construction may be clearly seen from the cut.

Patents Issued November 26, 1907.

871,797. Cooling System for Internal Combustion Engines.—Gustavus Green, Bexhill, England. Filed September 15, 1905.

871,868. Tire Cleat for Traction Wheels.—William Galloway, Waterloo, Ia. Filed February 28, 1907.

871,930. Patch for Pneumatic Tires.—Gustaf Hagstrom and Emanuel Hagstrom, Lindsborg, Kan. Filed September 24, 1906.

871,949. Ball Bearing.—Paul J. McCullough, St. Louis, Mo. Filed February 20, 1907.

871,973. Multipart Mold for Pneumatic Tires.—Friedrich Veith, Veithwerk, near Höchst, Germany. Filed January 28, 1907.

871,995. Motor Cycle.—Carl O. Hedstrom, Springfield, Mass. Filed March 28, 1907.

872,031. Automobile Body.—Willie O. Thomas, Riverside, and Harry G. Moore, Chicago, Ill. Filed August 29, 1906.

872,043. Air Pump.—John C. Beck and John A. Bowyer, Chicago, Ill. Filed February 25, 1907.

872,075. Sparking Device.—Harry A. Miller, Pasadena, Cal., and Benjamin G. Gilbough, Chicago, Ill. Filed February 14, 1906.

872,101. Controlling Mechanism for Self Propelled Vehicles.—Charles C. Worthington, Dunnfield, N. J., and Henry R. Worthington, Irvington-on-Hudson, N. Y. Filed September 10, 1904.

872,138. Valve Gear.—Heinrich Mayer, Arbon, Switzerland. Filed January 22, 1907.

872,164. Gas and Gasoline Engine.—Earl E. Wright, Mansfield, Ohio. Filed October 27, 1906.

872,203. Hydraulic Transmission Device.—Victor C. Shank, St. Louis, Mo. Filed June 26, 1906.

872,213. Battery Support for Automobiles.—Samuel R. Bailey, Amesbury, Mass. Filed January 4, 1907.

872,219. Variable Speed and Reversing Transmission Gear.—Allen P. Boyer, Goshen, Ind. Filed April 1, 1907.

872,220. Transmission Gear.—Allen P. Boyer, Goshen, Ind. Filed April 1, 1907.

872,226. Spring.—Chauncy T. Edgerton, Richmond Hill, and Welford J. Golden, Oswego, N. Y. Filed September 10, 1907.

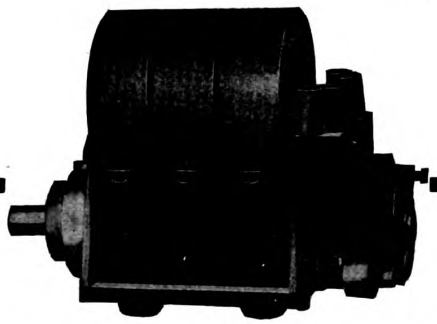
872,246. Fastening Device for Pneumatic Tire Protectors.—Roy H. Morris and Elvin E. Townsend, Oakland, Cal. Filed June 28, 1906.

872,247. Automobile Chair.—Augustus L. Moss, Sandusky, Ohio. Filed May 20, 1907.

872,255. Motor Vehicle for Agricultural Purposes.—Herbert P. Saunderson, Bedford, England. Filed November 12, 1906.

872,282. Expansion Pulley.—George F. Geb, Franklin, Mass. Filed February 1, 1906.

872,306. Cylinder for Gas Engines.—Hans Richter, Nuremberg, Germany. Filed July 9, 1903.



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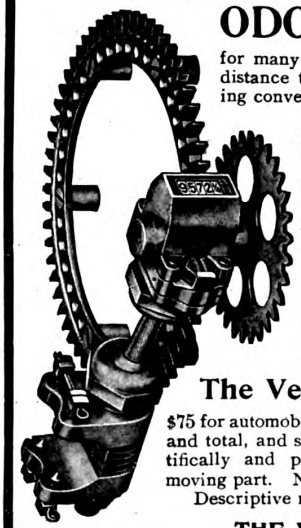

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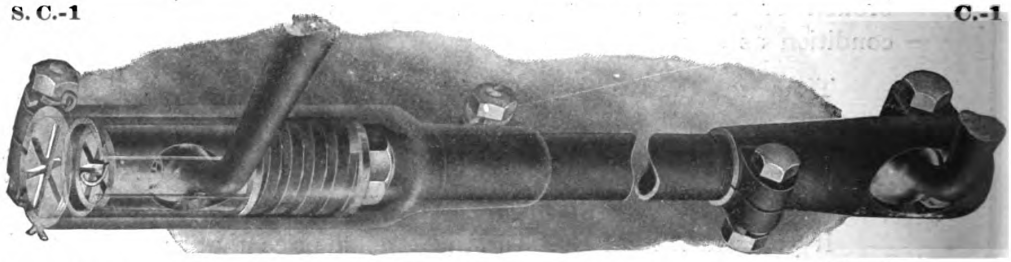
THE B. & S. IMPROVED SPRING STEERING CONNECTION

Made for 1⅛ inch Ball.

Patent applied for.

S. C.-1 C.-1



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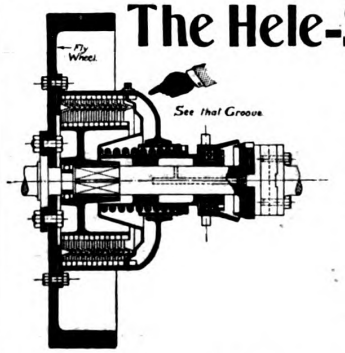

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