

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

Volume XVIII

New York, December 26, 1906

Number 26

THE HORSELESS AGE

E. P. INGERSOLL, PUBLISHER.

PUBLICATION OFFICE:
FRANKLIN BUILDING, 9-15 MURRAY ST.,
NEW YORK.

Telephone: 8974 Cortlandt,
Cable: "Horseless."
New York and London.
Western Union Code.

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SUBSCRIPTIONS FOR THE UNITED STATES
AND CANADA, \$2.00 a year, in advance. For
all foreign countries included in the Postal
Union, \$4.00. Single copies, 10 cents.

BRENTANO'S, 37 Avenue de l'Opéra, Paris,
France.

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Address all communications and make all
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New York.

Entered at the New York post office as
second-class matter.

Thermo-Siphon Cooling for Commercial Cars.

At present there is a decided tendency
among designers of gasoline trucks and de-
livery wagons to try out thermo-siphon cir-
culation. For commercial work it would
seem that the simpler method was the better,
as the additional weight of cooler and water
needed over that for pump circulation
amounts to but a small fraction of the total
weight of the vehicle. Then, too, truck de-
sign may be readily adapted even to ver-
tical motors, since cooler location is not
fixed, as in pleasure cars, and the return
pipe from the top of the cylinders to the
top of the radiator may be given the proper
angle to insure good circulation by raising
the latter. This elevated position has the
added advantage of getting the radiator
where it is less liable to injury by accidents.
By using a vertical tube radiator of suffi-
cient capacity and making the piping and
jackets considerably larger than for forced
circulation, a very simple and dependable
system is obtained. If carefully designed, it
secures very uniform cooling with conse-
quent even expansion and sweet running.

For pleasure cars the advantages of this
system are less marked; but many cars
with horizontal motors have always em-
ployed it, and several four cylinder vertical
cars both in this country and abroad suc-
cessfully use this method.

The cooling water for a pleasure car can
usually be taken from sources containing
little lime, and, furthermore, it is ordina-
rily carefully strained. These two precau-
tions reduce radiator encrustations and the
wear on pumps to a minimum. The de-
signer of a commercial car cannot count
on any such care being taken of the cooling
system, and must provide apparatus that
will, as far as possible, use either hard or
dirty water without injury. He should de-
sign his motor to work at a somewhat
lower temperature than is usual in pleasure
cars, even if the efficiency is decreased, so

that the motor will not be dangerously over-
heated, even if the radiator is encrusted
from poor water or the use of antifreezing
mixtures. The thermo-siphon system lends
itself most advantageously to these require-
ments, and its extended use on water cooled
gasoline motors for commercial work is
very probable.

Breakdowns in the Desert.

Reliability in service should be the chief
aim in all public passenger transportation
enterprises, and where motor buses are
being introduced for public service it is ab-
solutely necessary to provide system and to
employ only competent and dependable driv-
ers. If the time schedule is not adhered to,
or if the cars frequently break down en
route, leaving the passengers stranded or
greatly delaying them in reaching their des-
tination, the service will soon acquire a bad
reputation. If freedom from break down
is an essential feature in service in subur-
ban districts, or between towns at a short
distance from each other, how much more
important a feature is it when the cars are
operated in a desert district between mining
camps and railroad stations a great distance
apart. The alleged unreliability of motor
vehicles was urged against their adoption
for this purpose for a long time, but now
several such services are in apparently sat-
isfactory operation in the West. A number
of instances have been reported where the
stages were "stuck" en route, and the pas-
sengers were forced to walk long dis-
tances, but it is reassuring to learn that
in one of the latest instances of this kind
it was entirely due to the fact that the
driver had failed to completely fill his gaso-
line tank before starting out on the trip. It
would thus seem that interruptions in ser-
vice are now as likely to result from mis-
takes of the driver as from defects in the
mechanism of the cars, and the occurrence
emphasizes the necessity of picking out de-
pendable men for these positions.

Red Gasoline Cans.

On the 1st of January next there will go into effect in the State of Iowa a new law relating to the handling of gasoline, which requires that all cans for handling the fluid be painted a bright red color, and forbids dealers filling any other cans. The law is said to have been passed as a result of numerous accidents reported in the papers, due to the use of wrong cans for gasoline. These accidents have evidently mostly occurred in households, where very frequently both gasoline and kerosene are used and kept in the same size and shape of galvanized iron cans, so that it is a very easy matter to mistake the gasoline can for the kerosene can. If a kerosene lamp should be filled with gasoline in this way, or if gasoline should be poured into a stove to get the fire burning, a serious accident is almost certain to occur. There is less chance for such mistakes and resulting accidents in connection with the use of gasoline for automobiles, as in a garage gasoline and kerosene are used in greatly differing quantities, and are, therefore, not likely to be handled in the same kinds of cans. The law, however, will apply generally, and make it a punishable offense to use a gasoline can of any other than a bright red color, as well as prescribe penalties for filling such cans. The measure will evidently tend to greater safety in the handling of gasoline, and deserves the consideration of other legislatures.

The Amixture of Oxygen Carriers With Hydrocarbon Fuel.

Up to the present point in the development of the internal combustion vehicle engine, most of the thought and energy lavished upon its perfection has been directed toward improvements of the motor as a mechanism. The fuel from which its propulsive energy has been derived has received comparatively little attention, and its properties have been to a large extent taken for granted and not generally subjected to close and critical study.

The approaching advent into the field of alcohol, as a commercial fuel, seems to have been one of the principal causes of the recent widespread interest in the fuel question in general, which is becoming so marked a feature of present day automobile technic.

From recent researches in this field, the fact is becoming apparent that in order to obtain the maximum output from a cylinder

of given dimensions it is not merely necessary to crowd into it, previous to the moment of ignition, an amount of fuel representing the maximum possible number of thermal units, but that it is necessary that such a fuel should be employed as possesses the most favorable rate and manner of burning with respect to the giving out of its thermal energy. In other words, the value of a fuel for engine purposes is not necessarily to be measured in terms of its total heat value, for different fuels also differ as to the proportion of their heat energy which is capable of being converted into the mechanical form under any particular conditions. Assuming the same efficiency of utilization of the heat in a fuel, the fuel having the largest specific thermal value will insure the largest output from a given size of cylinder, but not otherwise. Maximum power output from a cylinder of given size, irrespective of all economic considerations, seems to be the present desideratum in the pleasure automobile field.

As it is not practicable to employ as fuel any substances of higher specific thermal value than our commercial hydrocarbons and alcohols or mixtures thereof, the efforts in the direction of fuel improvements are mostly in the way of adding to these fuels substances capable of facilitating their combustion without material increase of bulk.

In the cylinder of a gasoline engine saturated gasoline vapor is mixed with a certain number of volumes of atmospheric air sufficient to supply oxygen enough to secure its perfect combustion. If pure oxygen were to be used instead of air, only about one-fifth as much volume would be required to combine with a given volume of saturated gasoline vapor, and the specific thermal value of a given volume of mixture would be increased several times. That is, a cylinder of a given volume would then be capable of containing several times as much potential fuel energy as if air were used to form the mixture. Indeed, it is stated that this use of oxygen has been at times resorted to in automobile racing.

Such an expedient not being advisable for many reasons, it is sought to introduce oxygen into fuels by mixing with the combustible substances capable, upon chemical decomposition, of freeing oxygen in a nascent or chemically active form, to aid in the combustion. The object sought by so doing seems in part to be the provision of a part of the oxygen in a less bulky form than by the use of air—the oxygen produc-

ing substances being introduced in the form of solutions—but more especially with the intention of effecting a quicker combustion. The nascent oxygen of the chemical substance being in intimate contact with the fuel particles, there is claimed to be a very rapid spread of the combustion upon ignition. In fact, the use of oxygen freeing substances in fuel puts such mixtures, technically speaking, under the head of explosives, although nothing destructive in their action is necessarily implied. The quick combustion said to be obtainable by the employment of ammonium nitrate or picric acid seems to be of the order of that secured by the use of an exceedingly large hot spark, an increase of initial pressure, with a slight reduction of the losses to the cylinder wall and in the exhaust, being secured. The use of ammonium nitrate as an admixture in fuels seems to be attracting considerable attention, and has been treated of in these columns.

It may in general be stated that the nature and action of motor fuels, as such, are worthy of the deepest study, not only in the hope that investigation will lead to methods of safely increasing the specific output of motors, but more especially on account of the possibility of advances of an economic nature being made. Indeed the experimental investigation of the thermal behavior of different fuels upon and after ignition, as bearing upon the percentages of utilizable heat present under different conditions, bids fair to be very fruitful. Enough has already been accomplished to render further researches along the same lines deeply interesting.

Steel Cylinders.

We had an inquiry recently from a reader in Cleveland, as to the success that had been obtained with steel tubes for engine cylinders. Our reply was that, disregarding the experiments of Pennington, steel tubes had never been used commercially for automobile motors, and that the one French and one Belgian firm who at one time made steel cylinders, worked out of the solid metal, had given them up again. We now learn that the C. G. V. firm in 1904, voluntarily and free of charge, replaced with cast iron cylinders a large number of steel cylinders on cars delivered to customers. This indicates that the steel cylinders must have been very unsatisfactory, and should prove rather a discouragement to those who may be inclined to experiment along this line.

High Spots in the Show.

By HERBERT NOBLE, M. D.

The frequent use of the first personal pronoun in this article and in the article published December 12 is and has not been apologized for because of its purpose. It is my desire to emphasize my own responsibility for all the observations, accurate or otherwise, for all misstatements and for all generalizations. I can present my own opinions and my own observations alone. Their value is problematical, and must be judged in light of my experience, which is of some seven years' development.

All motorists have at times experiences of an unpleasant nature, of more or less seriousness, due to lack of proper adjustment or to imperfect design. The responsibility for the first rests with him who takes care of the car; for the second, with the firm that made it. Of such troubles as could be prevented by a change in design a list was made and the exhibition examined with an eye for such changes and incidentally for novelties.

In this part of the country the water is of such quality that in the course of a few months it will honeycomb the bottom of any but a copper tank with small holes. Tanks, and even radiator headers, were two or three years ago often made of galvanized iron. I found but one or two water tanks of this metal and no radiators. Copper is universal, even in the cheaper cars.

Pumps of any kind are apt to give trouble in two ways: broken shafts and leaky glands. Inasmuch as the universal material is brass, and the stress is occasionally very severe, it seems that more attention should be given to this small point. Bronze might be substituted for brass, the universal half-inch shaft diameter might be made three-quarters, and a coupling between driving and pump shafts provided which would slip under unusual stress. I saw no pumps with shaft diameters greater than half an inch. There were one or two examples of slipping clutch couplings. The stuffing boxes were universally of a design like Fig. 1, a. This

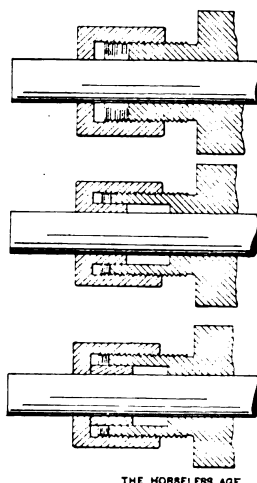
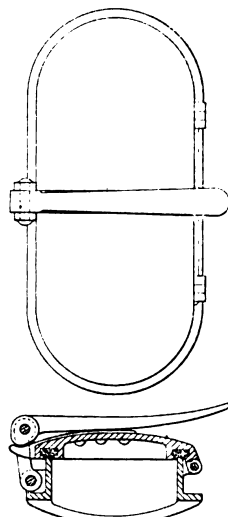


FIG. 1.—A, B AND C.



THE HORSELESS AGE

FIG. 2.

type, while it generally gives satisfaction, requires much more attention than Fig. 1, b, which sometimes, after having been tightened up many times, grinds up its packing, owing to the fact that the follower ring is an integral part of the cap and moves on the packing when the gland is screwed down. There were several examples of this design. Fig. 1, c, is an easy modification of b. In it the follower ring is separate, does not turn on the packing, and gives no trouble, as to which I can testify. There were no examples of this design, or, rather, I should say, I did not find any.

While Renault, Maxwell-Briscoe and others maintain a satisfactory cooling design without a pump, it seems appropriate that other designers should relieve us of all pump troubles. To this end the prevalent small diameter of water manifolds and tubing does not contribute. The general designs, however, showed a marked improvement in the matter of short distances and easy curves, and in the maintenance of a considerable body of water at a level higher than the top of the cylinders. With large diameters and centrifugal pumps this allows of fairly efficient circulation, even with the pump out of business entirely, and large piping, few and easy curves, and short distances contribute to pump efficiency and economy. Pumps as a rule were positively driven. When mounted elsewhere than on the motor itself some sort of device acting as a universal joint was generally interposed. In the Ford runabout a gear driven pump is mounted on the radiator itself. This seems to me a step in the right direction. There appear to be advantages in making the pump an integral part of the radiator, and could its driving power be introduced above the water level, so much the better.

Radiator filling caps have been a source of much annoyance, especially when hot. They are universally so small that a funnel or its equivalent is needed when filling without a hose. What is wanted is an orifice big enough to allow one to pour water

into it from a pail. The B-L-M showed an attempt to provide this. The orifice is oval and closed by a hinged cover, locked with an eccentric latch. The B-L-M, a new and untried car, shows some unusual features. It belongs to the class of cars with fixed ignition points, like the Brasier, having a starting point and another for speeding. I was informed that the second point was about on the centre and the first a decided retard. Again like Brasier and differing from Duryea, which sparks about on the centre and provides no retard. B-L-M, however, show one startling innovation. They exhibited a model with high tension ignition with fixed sparking points. Three of them only—a retard, a centre and an advance. This is on the authority of the attendant, and was elicited after my failure to find any arrangement for manually or automatically advancing the ignition. The throttle is actuated by a small pedal, and the changes in the fixed points in both high and low systems are actuated by a push rod conveniently reached by the occupant of the second front seat only. The steering column bears the wheel only. I am afraid to comment upon this arrangement. I introduce it in view of editorial comment.

Trouble with valve springs leads to great exertion and profanity. I can imagine no more disagreeable job than to remove or replace a valve spring on a double opposed motor under the body, especially when the valves are under the motor, as in the old Ford. Designers have sought to remedy this by bringing the valves of this class of motor on top and placing the engine under

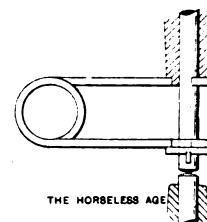


FIG. 3.

the hood, as in the Maxwell, or putting the body on hinges, as in the Rambler. But the valve springs are as stiff and unruly as ever. None of them can be uncovered or replaced without a wrestling match and the disassembling of part of the motor. To this rule there was one exception. The valve was rigged as in Fig. 3. A similar arrangement was in use by the Columbia and abandoned. It has been used by Duryea for years. The arrangement in the Fiat racing cars is the same in principle, though a leaf spring is used. It is not so neat as the helix, but the extreme ease of removal, with no attending disassembling, and its equal facility of replacement seem to me advantageous enough.

In this connection the rotary valve shown at the Duryea stand, which has already been described in these columns, was to my mind the most startling innovation of the show. As to its practicability, the future must decide. But think of a four cycle motor with no springs at all and an absolutely silent

valve system. I learned that the experiments with this valve have extended over a space of five years, and was shown one which had seen continuous service for eight months and still holds its compression. It is revolutionary in its tendency as well as rotary, and is worth watching to see if it "makes good."

Gear changing has been given much study and needs more. In my opinion a decided step in advance has been made in one car by combining the clutch release, the gear change and the clutch re-engagement in the action of the gear changing lever. This makes the gear control as simple if not simpler than any system except the planetary. But is it possible to obtain an easy and gradual re-engagement of the clutch? This is an absolutely essential point, and any system which neglects it is foredoomed. Another car with a selective system actuated by a lever moving in a single slot. Pushing it forward gave the low speed ahead, back the intermediate, raising it about half an inch, and pushing forward, the direct. The reverse, as in the Packard, was on a separate lever, which was locked at all positions of the other, except neutral. The reverse lever, however, was transverse.

Emergency brakes are in a majority of instances actuated by the side lever and are on the rear wheel hubs. In some the clutch is automatically withdrawn, in some, not. In view of the fact that the reason for application of the emergency brake is that you want to stop, it seems to me that means should be provided so that the movement of the brake or pedal would automatically shut off the ignition and leave the clutch engaged. Thus, in one movement of the hand, the most effective braking combination would be secured. The motor, stopped on the spark, with open throttle, would be in the best condition to resume operation at a slight movement of the advance lever, and consequently the necessary release of the brake lever and opening of clutch and gear change could hardly be considered a disadvantage.

Both the Ranier and Cleveland showed a method of cutting out the low tension ignition by short circuit. A short push rod was so placed in the metal dash that it could easily be brought into contact with the bus bar. No wiring was necessary, and the method seems reliable, but the operating device is too far from the wheel.

Many have been troubled with squeaking springs and shackles. Oil holes could be found in several makes, but I noticed only two in which these holes were protected. These two were fitted with very small oil cups. Such cups act as little more than funnels, since they empty themselves at once. They project in an exposed position and are easily broken off. It would seem that the little spring clip cover, which is used to such good advantage on the bicycle, would be the better design. The same arrangement could easily be extended to the springs and much labor in jacking up the body, separating the leaves and in-

serting grease with a spatula avoided. Spring and shackle lubrication is not a matter of small importance. A broken shackle is not common, and seizing is its general cause. I have known of one broken spring caused by a shackle that moved on the compression and rebound and then stuck. In a similar case the spring held, and the frame itself was bent.

The very commendable tendency toward design which reduces the number of parts was evident. Also that which allows of fine adjustment. And, in addition, the shaper, milling machine or planer have been liberally used to dispose of surplus metal. I section bell cranks even were not uncommon, hollow crank shafts and light and ornamental starting cranks could be found. Such refinement costs money, but is worth it. Cylinders presented a more finished appearance. I refer to the regular motor and not to the polished exhibition chassis. Flywheels were machined all over, and work that "would do" was conspicuous by its absence.

A bonnet is at best a clumsy thing to manage, and little has been done to make it less so. This was forcibly exemplified by the means taken to hold the enormous hood of the eight cylinder Marmon out of the way.

Mud guards have been improved very much by carrying them well down to the frame, but the front guards should be more easily detachable. The irons should fit into taper sockets on the frame and be held by a thumb screw. It is hard work to lean over the guard when adjusting the motor.

An excellent example of the reduction of the number of parts occurs in the Duryea ignition. The Rainier and Cleveland show a like reduction in the spark advance mechanism.

With the material at one's command a paper like this could be extended indefinitely. But to what end? The automobiles of to-day are all serviceable and reliable. No longer do we find "heaps of junk," and a car becomes a "cluck" only by long service and abuse. Almost any variety of taste can be satisfied in the market, and one can buy what best satisfies his prejudices and be reasonably sure of good service.

I cannot blame the editor for his wonder at my definition of science. In the manuscript I retained the sentence reads, "That's common sense." In my list of three cylinder cars I included the compounds, not thinking that their shafts are set at 180 degrees. I stand corrected, but my prophecy remains.

Small Alcohol Distilleries Can Be Established for \$200.

Internal Revenue Commissioner Yerkes, answering a recent inquiry as to how many gallons of denatured alcohol will approximately be needed in the industries for 1907, says:

"Having absolutely nothing to base an es-

timate upon, it is not possible for me to make an estimate as to the quantity of denatured alcohol that will be consumed in that way. No formal applications have as yet been made by distilleries for approval of denaturing bonded warehouses. Such applications could not be filed for the reason that the proper blanks have not as yet been placed in the hands of collectors. At present there are forty distilleries in the United States manufacturing what might be termed commercial alcohol."

In reply to a criticism of the law on the ground that regular distilleries only can engage in the manufacture of denatured alcohol, enabling the whiskey trust to secure practically a monopoly, Mr. Yerkes said:

"This office knows of no process by which alcohol can be manufactured except by distillation, and as regular distilleries are the only kind recognized by the law, alcohol manufactured under the supervision of this department must be manufactured at regular distilleries. There are absolutely no limitations as to the size of a distillery that can be operated under the law. There are over 1,000 distilleries in operation now at each of which the daily spirit producing capacity is less than 30 gallons. Many of these were set up on an outlay of less than \$200. So far as the internal revenue laws are concerned, either in theory or practice, the smallest and crudest distillery can produce alcohol, if as a business proposition it is deemed advisable to do so. The small distilleries have always been treated by this department with the same consideration as the larger ones.

"If a farmer or other person desires to go into the business of manufacturing denatured alcohol, at a plant however small, he will be required to construct his plant in the manner prescribed by the general law and regulations. He will be required to give a bond, the effect of which is to prevent him defrauding the Government of the tax on any distilled spirits produced by him. He will be required to establish a distillery warehouse; to deposit the spirits produced by him in this warehouse; to establish a denaturing bonded warehouse, and to tax-pay or denature, just as he may wish, the alcohol produced by him. All of this will be done under Governmental supervision, but the Government pays for this supervision. The manufacturer of alcohol does not bear one cent of it. There is no objection to a farmer manufacturing his alcohol in 'his back yard' provided he wants to establish a distillery there. If you will take the trouble to investigate you will find, in my opinion, that the laws and regulations relating to the manufacture of alcohol in Germany do not differ to any great extent from the laws and regulations in this country."

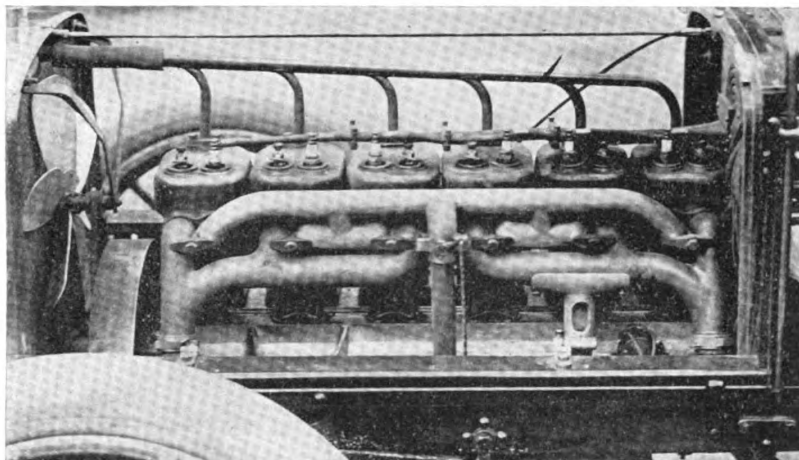
In accordance with the recently adopted Franco-Swiss commercial treaty the import duty on French automobiles into Switzerland is reduced from 60 to 40 francs per 220 pounds.

NEW VEHICLES AND PARTS

1907 Stevens-Duryea Models.

The Stevens-Duryea Company, of Chicopee Falls, Mass., announce three models for 1907, which are practically identical in design and general arrangement with their 1906 cars. These models are known as Model R, Model S, "Big Six" and Model U, the "Little Six." The tonneau of Model R, which is the four cylinder car, has been increased 4 inches in width and 6 inches in length; its specifications are as follows: Motor, 20 horse power; bore, $3\frac{3}{8}$ inches; stroke, $4\frac{1}{2}$ inches. The engine has a compression of 80 pounds. The wheel base is 90 inches and the tread standard. The flywheel clears the ground by 11 inches. A three forward speed and one reverse sliding change gear is used and operates on the progressive system. The same multiple disc clutch as in former models is used. Semi-elliptic springs are used at both front and rear; the drive is by shaft to bevel gear; the wheels are fitted with $30 \times 3\frac{1}{2}$ inch Fisk tires, or any other standard make, as desired. The front wheels are fitted with annular bearings, while the rear wheels run on roller bearings. The car has a carrying capacity of five and weighs complete 1,850 pounds.

The "Big Six," which is practically the same as last year, is shown in the accompanying photo. Its general specifications are as follows: The motor is 50 horse power at 1,000 r. p. m.; bore, $4\frac{3}{4}$ inches; stroke, $5\frac{1}{4}$ inches. The six cylinders are cast individually, with the inlet and exhaust valves on the same side, both of which are mechanically operated; 90 pounds compression is used in this engine. Both brakes are on the rear hub drums. The method of



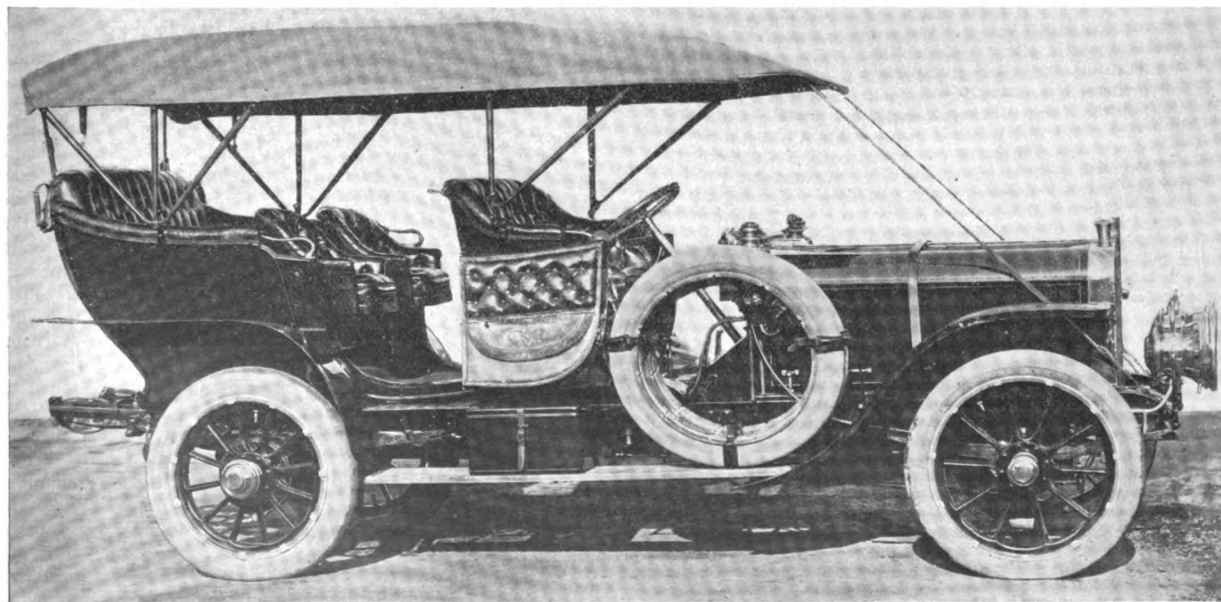
LITTLE SIX STEVENS-DURYEY MOTOR. INLET AND EXHAUST MANIFOLDS.

suspending the unit power plant is the same as in the other models, and the same type of change speed gear is used. The springs are also the same in all three models. The wheels, which are 36 inches in diameter, are all fitted with annular ball bearings, and carry 4 inch front and 5 inch rear tires. This car will seat seven passengers, five of whom are accommodated in the tonneau, which is provided with revolving chairs, with upholstered backs. A special effort has been made to give this car ample road clearance, as is shown by the fact that the flywheel clears the ground by $12\frac{1}{4}$ inches. The weight complete of the "Big Six" is 3,500 pounds. The wheel base is 122 inches, and the tread standard.

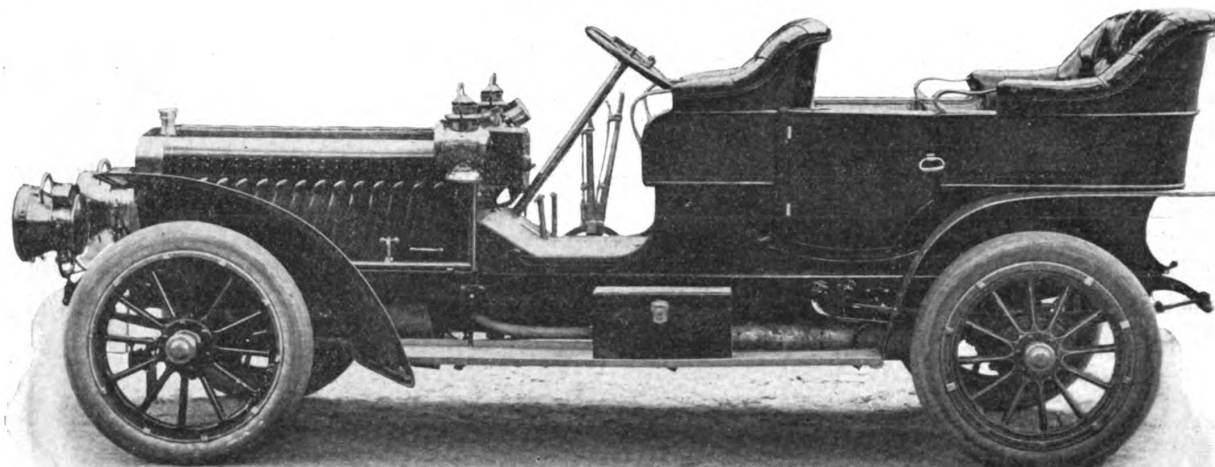
Model U, or the "Little Six," is shown in the accompanying photo. This machine is in all respects similar to the large six cylinder car, having the same motor suspen-

sion, type of springs, change speed gear, drive, etc. However, the motor is only $3\frac{3}{8}$ inches bore by $4\frac{3}{4}$ inches stroke, and is rated at 35 horse power at 1,000 r. p. m. Ninety pounds compression is also used in this engine. The wheels are 34 inches in diameter, and fitted with 4 inch tires at front and rear. The wheel base is 114 inches, tread standard, and the clearance the same as on the large machine. Arrangements are made for five passengers, and the car complete weighs 2,300 pounds.

In the accompanying photo is shown the inlet and exhaust side of the "Little Six" motor. The few changes are the same in all the models, and consist only in minor details. The water pipes carrying cooling water into and from the jackets have been altered, and now consist of tapered copper pipes, as shown in the photo of the other side of the six cylinder engine. This con-



STEVENS-DURYEY MODEL "S" (BIG SIX).



STEVENS-DURYEY MODEL U (LITTLE SIX).

struction does away with the unsightly short pieces of rubber hose which were used to connect the pipes from adjacent cylinders. A change has also been made in connection with the centrifugal water circulating pump, which is now bolted to a bracket on the side of the crank case and driven from the end of the timer shaft. The gland of this pump is now on the outside of the crank case, so that any leak will be noticeable, and the gland can be adjusted more easily. The pump can also be taken off or replaced without in any way affecting the timer shaft. The oiling system has also been slightly altered. A McCord mechanical lubricator is now carried on the dash, and is driven by a flexible shaft, similar to those used on speedometers. This shaft is connected to the end of the water pump shaft, and is shown in the photograph.

All cars sold after September 1 will be equipped with the new type of automatic carburetor, which was used on the six cylinder car in the Glidden tour and, it is

claimed, drove that machine, with five people and baggage, an average of 12 miles to the gallon, which is an exceptional performance for such a large car. This carburetor is provided with an automatic damper that controls the size of the air passage around the gasoline nozzle. This control, instead of being mechanical as in previous models, is governed by the state of the vacuum in the inlet pipe.

The method of control on all the models remains the same as in previous years, and consists of spark and throttle levers on the steering wheel; side emergency brake lever and change speed gear lever and clutch and brake pedals. Jump spark ignition is used on all the models, as well as the unit power plant and three point suspension, which have been exploited in previous years.

This company are one of the first to take a stand against the custom of changing the models each year, and have placed practically the same cars on the market for three years.

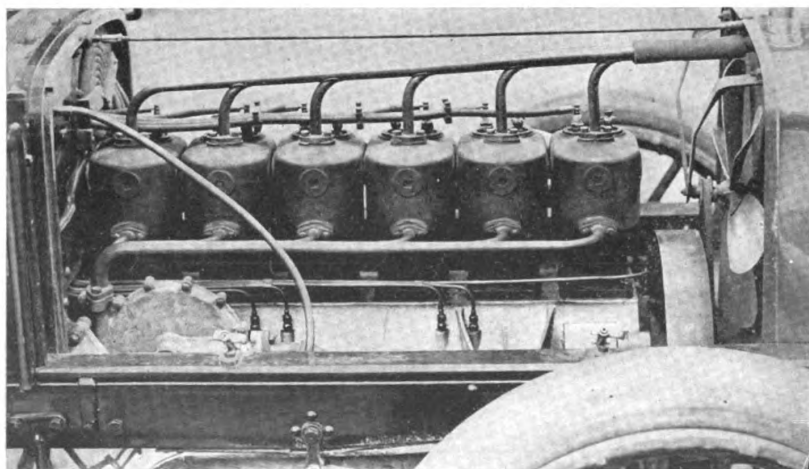
The 1907 "Simplicity."

The Evansville Automobile Company, of Evansville, Ind., are manufacturing one type of chassis for 1907, to which various styles of bodies are fitted at the purchaser's option. The distinctive feature of this car is the friction transmission and its method of control.

The car itself is of medium size, having a wheel base of 105 inches and 56 inch tread. A four cylinder vertical $4\frac{1}{2} \times 5\frac{3}{4}$ inch Milwaukee motor is used. This motor has the cylinders cast in pairs and the valves all on the left side. Cooling water is circulated by a gear pump. The radiator is of the vertical flat tube type, and the fan is an eight blade sheet metal affair supported from the radiator and belt driven from the crank shaft.

Jump spark ignition is employed. The plugs are in the screw caps over the inlet valves. A Heinze coil and timer are used, the former being located on the dash and the latter on the rear end of the cam shaft.

The motor is supported in a peculiar manner. Through the centre of the crank case passes a large diameter tube, whose ends are secured to the side members of the frame. No flywheel of the ordinary design is used, but the crank shaft is coupled to another shaft extending to the rear horizontally in the middle of the frame. This shaft is carried in two plain bearings, which are supported in spherical seats fast to cross members of the frame. Bolted to flanges on this shaft are two large discs, whose adjacent faces are covered with mineral leather. Between these discs are two cast steel wheels, with finished circumferences mounted so as to slide on keys in their shafts. To the outer ends of these shafts are fastened the front driving sprockets. These cross shafts run on roller bearings. Their inner bearings are mounted in spherical seats in a casing which is adapted to swivel slightly horizontally, and



"LITTLE SIX" STEVENS-DURYEY MOTOR. WATER PIPES AND FLEXIBLE SHAFT.

their outer bearings are mounted in similar spherical seats directly under the chain line. The central casing just referred to is linked to the hand lever, and a slight movement forward of the lever swivels the cross shaft and brings the left friction wheel in contact with the forward disc, and the right against the rear disc. This gives forward motion to the car, whose speed is varied by moving the wheels simultaneously toward the centre or edge of the discs by a mechanism to be described later. Moving the hand lever to the rear brings the right friction wheel in contact with the front disc, and the left against the rear disc, and reverses the car. These movements are very slight and have practically no effect on the alignment of the chains. For the forward speeds the hand lever is secured in position by a ratchet, but when reversing it must be held in its rear position by the driver.

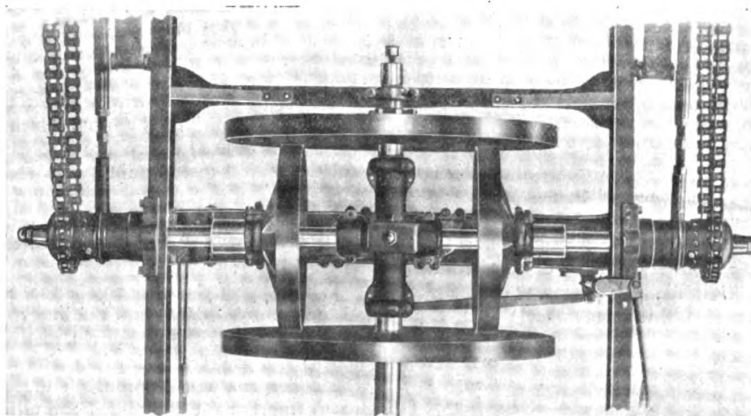
Speed is varied by a wheel on the steering column. This wheel connects to a grooved sheave below, from which a wire cable makes connection to a spur gear carried in a raised bracket above the countershaft. The revolution of this gear slides two horizontal crosswise racks, also carried in this bracket, one in one direction, the other in the opposite. To these racks are fastened forks, which slide the friction wheels equal distances in opposite directions for every movement of the control wheel. A turn-buckle is provided to take up any slack in the cable.

The drive to the rear wheels is through very long chains, and on account of the transmission ratios the difference in diameter between front and rear sprockets is unusually large. Long I section, bronze chain struts hold the rear axle in alignment. All four springs are semi-elliptic, the rear are shackled at both ends, and the front are hinged at their front ends and shackled in the rear.

The frame is pressed steel, with straight channel section cross members having the open side of the channel downward. All four wheels are 34x4 inches and run on ball bearings. The front axle is tubular and has Lemoine type pivots.

Steering is by a worm and sector gear, with fore and aft connection to the right knuckle, and cross connection in front of the axle. Spark and throttle are controlled by levers above the wheel. The throttle control works in connection with a governor on the cam shaft. The throttle itself is of the piston type, and is an addition to a standard Schebler carburetor. A pedal at the right of the steering column applies fibre faced band brakes to drums on the rear wheels. These brakes are cable equalized.

Sheet steel mud guards, full running board and extra step on top of the driving sprocket housing are regularly fitted. The 1907 cars are provided with a large carrying space under the floor, which will carry clothing, tools and extra tires. With the standard type of body, which approaches the double victoria in style, the car is said to weigh 2,500 pounds.



SIMPLICITY FRICTION DRIVING GEAR.
View from underneath car.

The Marvel Roadster.

The Marvel Motor Car Company, of Detroit, Mich., are putting on the market for 1907 a two passenger roadster driven by a 12 to 14 horse power opposed motor set crosswise under the hood. This motor is water cooled on the thermo-siphon system, a vertical tube radiator being used. The flywheel is in front, well up on the radiator, and has fan spokes for creating a draft. The valves are on top and are mechanically operated by direct push rods. Ignition is jump spark, current being furnished by dry cells. A two speed and reverse planetary change gear is used and power is transmitted to the rear axle by an enclosed shaft, with one block type universal joint. Rear axle and pinion run on roller bearings. The front axle is tubular, with Elliott type knuckles, cross connected in front. Steering is through a worm and sector gear. The wheels are 30 inches in diameter, with 3 inch tires. Spring suspension is full elliptic in front and rear, the springs being set directly under the angle steel frame. The brakes are contracting bands, located on the rear hubs. The wheel base is 84 inches and the tread 55 inches.

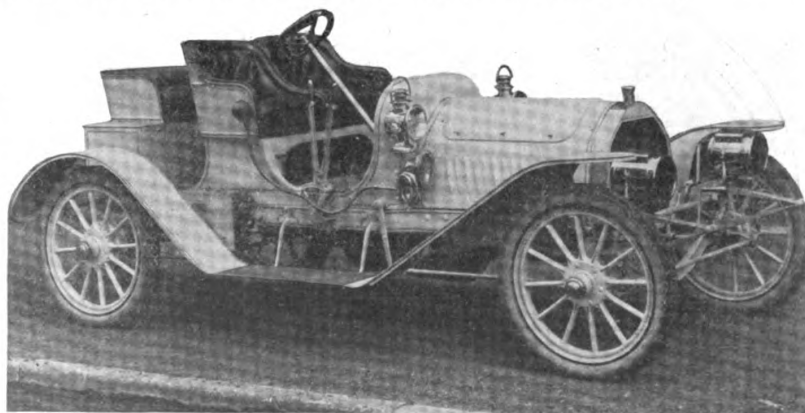
Spark and throttle are controlled by levers under the wheel and both commutator and carburetor are located to the

rear of the motor, making these control connections very simple. The body is of wood and is made with divided seat and ample carrying space in the rear. Asiatic carmine is the standard color. The weight is given as 1,300 pounds. The Marvel Motor Car Company is a new concern, but its members have been connected with the trade for some time. They will devote their entire time and attention to this model.

Premier Runabout.

The Premier Motor Manufacturing Company of Indianapolis have brought out a new runabout, which will become one of their 1907 models. The runabout is built after the general design of the Premier "24" touring car, with a four cylinder, water cooled engine. The features distinguishing the runabout from those of the touring car are a shorter wheel base and a rumble seat in place of a tonneau. The rumble seat, which has a touch of originality, permits a third passenger to be carried and the seat is not detachable. The runabout will be known as "The Gentleman's Roadster."

The annual convention of the A. A. A. will be held in Chicago during the week of the show, February 2 to 9.



PREMIER "24" GENTLEMAN'S ROADSTER.

The Bell Pneumatic Steel Hub.

A pneumatic hub, which is claimed to do away with the necessity for pneumatic tires on automobile wheels, has been invented by G. W. Bell, of 83 Lafayette avenue, Detroit, Mich.

By referring to the accompanying drawings and photographs it will be seen that the device embodied in the pneumatic hub of the wheel consists of three essential parts, viz., a vertically disposed hollow piston rigidly secured to the axle; cylinders above and below the axle operating on the piston with $1\frac{1}{2}$ inch (front wheel) and 2 inch



BELL PNEUMATIC STEEL HUB.

(rear wheel) vertical displacement; a hollow hub entirely enveloping the piston and cylinders, revolving on hollow arms forming integral parts of the cylinders, the wheel spokes being attached in the usual manner to the outer hub between the flanges shown.

When the car is in service, air under pressure is provided by a small air compressor driven by the engine, which communicates with a reservoir or air tank, to which a safety and regulating valve is provided and controlled from the dashboard. The air pressure on the tank, etc., is controlled by the valve at the driver's seat, and the resilience of the suspension can be adjusted to the requirements and condi-

tions of the load and road while the car is in motion. This is claimed to have never been possible before by any other combination.

The upper cylinder forms with the top of the piston an air recoil spring, which incidentally is utilized to produce a forced circulation of oil to maintain by its viscosity airtight packing, and complete lubrication to the parts.

Briefly in action the circulation of the oil is as follows:

When the wheels strike an obstruction the piston is forced down into the lower cylinder, compressing the air therein, and on the top side of the piston, drawing air through the upper row and oil through the lower row of ports as it descends. The oil flows immediately into the concave top of the piston and also lubricates the top piston rings and the guides. It is here trapped so that on the rebound of the wheel the piston rising in the upper cylinder forces the oil to the back of the cup leather and the front of the rings at the lower end of the piston. It escapes past the piston rings by the motion of the piston through ports, and down the outside of the lower cylinder, dropping into the outer revolving hub, from where it is carried up by centrifugal force and conducted into the reservoir located on the top of the upper cylinder, thus completing the cycle. In this way, it is claimed, loss of air and wear of parts are reduced to a minimum.

We are informed that these pneumatic hubs have been tried out during the past year on a double chain driven stock car weighing 3,000 pounds with full complement of passengers, having 36 inch wheels of the artillery type, with solid rubber tires.

The Pittsburgh Automobile Vise.

The Pittsburgh Automatic Vise and Tool Company, of Pittsburg, Pa., realizing that the average touring automobilist was equipped with practically all the necessary tools for meeting any difficulty which might arise, but that so far no means was provided for holding the piece upon which work was to be done, have recently placed

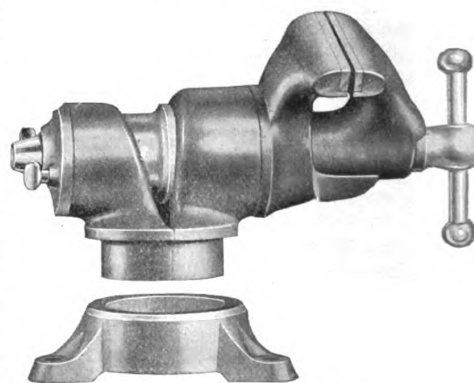
on the market the automatic double swivel, heavily nickel plated vise shown in the accompanying illustration. This tool weighs but 3 pounds, is but 7 inches long and 4 high, yet has a jaw opening of $3\frac{1}{2}$ inches and can be swung into any desired position and is rigidly clamped by friction in this position by simply tightening the jaws upon the work. The device is made in two sections. The base, which is only $2\frac{1}{2}$ inches in



BELL PNEUMATIC STEEL HUB.

diameter and $1\frac{1}{4}$ inches high, is rigidly fastened to the running board as a permanent fixture. It is hollow and slightly elevated upon three legs, so that dirt, water, mud, etc., are allowed to pass through without clogging it. The body or vise proper when not in use is carried in the tool box, and when wanted can be set into position in its base, which, without the use of bolts, clamps or other devices, holds it rigidly. However, it can be easily lifted out in a vertical direction.

This tool is also very useful in garages and repair shops, where it can be used not

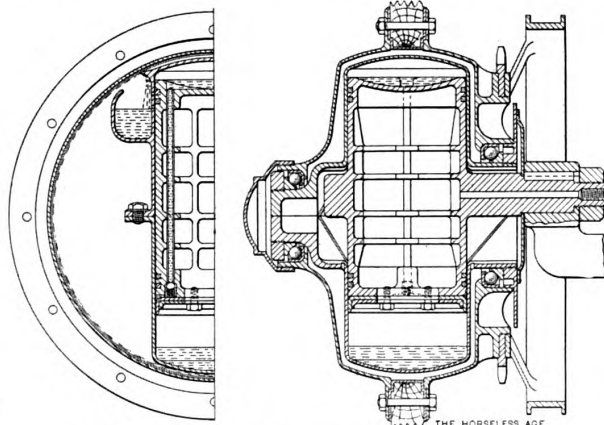


THE PITTSBURGH AUTO VISE.

only as a vise, but when employed in conjunction with a special base can be used effectively as a chuck on the drill press planer or other machines, and in this capacity gives a very large range of holding positions.

Glycerine for Anti-Freezing Solutions.

With the arrival of cold weather each motorist who owns a water cooled machine is considering the best anti-freezing solution to be used. Many solutions can be compounded which will not freeze at temperatures rang-

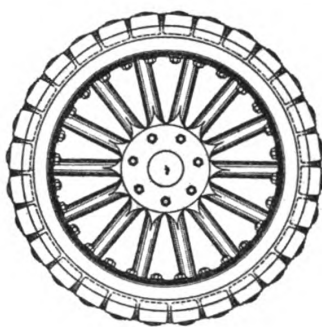


SECTIONAL VIEWS OF BELL STEEL PNEUMATIC HUB.

ing from 5 to 10 below zero, but in some instances these are injurious to the jackets, tanks, radiator, etc., and in many cases are difficult to maintain in the proper proportion. Marx & Rawolle, manufacturers of glycerine, when interviewed on this subject, stated that they had placed on the market a special glycerine of a specific gravity of about 30° Baumé, or .875, which, when mixed with water in the proportion of two-fifths glycerine, makes an anti-freezing solution which will withstand a temperature of about zero, and that a mixture of 50 per cent. glycerine would require in the neighborhood of 27° below zero to cause it to congeal. The two-fifths compound raises the boiling point of water to 217° Fahr., and the 50 per cent. mixture boils at 217° Fahr.; therefore, a greater heat can be reached without causing the radiator to boil over, and the cylinders can be kept at a higher temperature, which causes more efficient running of the engine. Glycerine is also very readily obtainable and does not injure rubber pipe joints or corrode the radiator, pump or piping. It also has in its favor the fact that it does not readily evaporate or change its condition.

The Hubbard Patent Wheel Tire.

The Hubbard sectional solid rubber tire for heavy vehicles, which has been referred to before in these columns, is now being manufactured by Arthur H. Middleton, of 2821 North Broad street, Philadelphia. An ordinary artillery wheel is fitted with a cast steel rim with recesses for receiving the square rubber blocks. As will be seen



HUBBARD WHEEL.

from the illustrations there are two rows of blocks all around the circumference of the wheel, the blocks in one row being staggered with relation to those in the other. The blocks are held in place by large steel bolts which pass through the steel rim and the wooden felloe of the wheel, and are provided with nuts on their inner ends. A set of wheels with this kind of tires on has been used on a heavy tractor employed by the Oil Well Supply Company of Pittsburgh in switching freight cars in a railroad yard for a period of 18 months, and later on the vehicle was used by the Standard Roller Bearing Company of Philadelphia for transferring machinery from their old to the new plant. The tires are said to have given good service throughout this entire period, but their actual mileage is not definitely known.

Benzol and Gasoline.

Benzol, an unusually important product of our chemical industry, is recently attracting increased and general interest, says the German *Chemiker-Zeitung*. Since benzol is being derived as a by-product in coking coal, and its production has been greatly expedited and increased, it is being used for the most varied technical purposes. The consumption of benzol for this purpose has, however, always been strongly influenced by the price of gasoline, as it was first of all the field of application of gasoline which was to be conquered by benzol.

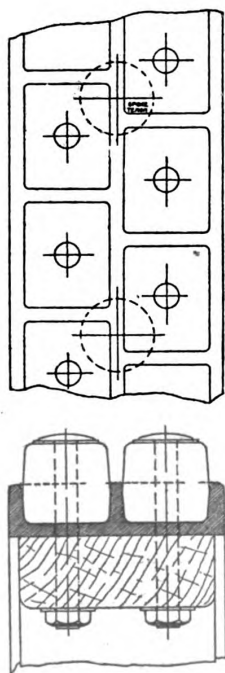
At the present time the enormous and rapidly increasing demand of gasoline for power purposes has raised its price to such an extent that all users are forced to look for a substitute, and as such benzol is the first to be considered. It can not only be used directly and alone for power generation and for cleaning, extraction and solution purposes, but may also be used to cheapen gasoline by being mixed with it, it being possible to use a quite high percentage of benzol without detrimentally affecting the action of gasoline. The most suitable benzol for technical purposes is the 90 per cent. commercial benzol (90 per cent. boiling at

100°; specific gravity, .88). This product may be obtained commercially in large quantities. Since the beginning of this year practically the whole German production of benzol is controlled by the German Benzol Association, and uniformity of price and quality and the delivery of the necessary quantities in case the demand should increase are therefore assured.

Among the fields of application for benzol there stands pre-eminently the generation of power in explosion motors. For a long time the opinion obtained that benzol did not possess the necessary qualities for this purpose. The gasoline interests maintained that, owing to the high carbon component in benzol, it would be impossible to vaporize it as completely and perfectly as gasoline, and that, consequently, deposits of solid carbon particles would shortly interfere with the regular operation of the ignition devices and valves. However, this assertion has been shown to be erroneous as applied to stationary motors. Extensive experiments carried out at a number of the most important motor factories have proven, without the shadow of a doubt, that without making any structural changes in the motor benzol will burn as completely as gasoline, and is commercially superior to it if a higher degree of compression is used. It is well known that with gasoline it is impossible to increase the compression beyond that now usually employed, as in that case preignition would interfere with the regular operation of the motor. Thermo-dynamics teaches us, however, that in internal combustion motors the efficiency increases with the degree of compression, and this has enabled us to reduce the expense for fuel consumption in vertical motors from 15 to 25 per cent., as compared with the cost when gasoline is used. An additional factor to be taken into consideration is that benzol is a domestic product, and offers, therefore, notable advantages, both from an administrative and a commercial point of view.

That the use of benzol is not limited to stationary motors has recently been shown by experiments with vehicle motors. It is directly obvious that in this field the advantages of benzol as a domestic product are even greater than in the case of stationary motors, and it is obviously only a question of time when benzol will secure as wide a field of application in vehicle motors as in stationary motors. This condition should be particularly pleasing to automobilists, in view of the great increase in the price of gasoline.

The prices of benzol in Germany are as follows: Crude benzol, 18-20 marks per 220 pounds; 90 per cent. commercial benzol, for the manufacture of aniline dyes, 23.50-24 marks per 220 pounds; motor and industrial benzol purified, 20-22 marks per 220 pounds; chemically pure benzol, 30-35 marks per 220 pounds, when taken in wagon loads from a tank wagon at the freight station.



HUBBARD PATENT WHEEL TIRE.

The Automobile at Shanghai, China.

BY GEORGE WILKINS.

Shanghai, the metropolis of the Far East, at the present time is one of the best motorizing centres of China. The streets of the foreign settlement were originally 30 feet in width, but of late years they have been gradually widened, so that now most of the roads are at least 40 feet wide. The Shanghai Municipal Council for several years past have spent an enormous amount of money for this purpose, paying large sums to property owners to surrender strips of land, so that the roads which were at one time nothing more or less than narrow alleys are now splendid streets, finely macadamized and as level as a billiard table.

Of course some of the roads right in the heart of the settlement, where the traffic is the heaviest, are still very narrow, owing to the mercenary spirit of some of the property owners, who are holding on to their land and demand fabulous prices from the Municipal Council for a small strip measuring possibly 2 or 3 feet. Beyond this 40 foot width there is no probability of further improvement in this direction. The roads outside the settlement are on an average at least 100 feet in width and are as fine roads as anywhere in the world, and are simply perfect for motoring. The roads in the French Settlement are also on an average about 40 feet in width, while the outside roads are 100 feet in width. The roads in both the English and French Settlements that are available for motoring will be about 53 to 58 miles, with no hills or grades in any direction.

EXAMPLES OF GOOD ROADS.

The Bund and Yangtzepoo road to the Point are 100 foot roads and are favorite roads for a spin on a hot summer's night. Nanking road, Bubbling Well road, Jessfield, Sicawei and the Rubicon are perfect for speeding, as are also the French roads, and some record motor times are made on these roads. The North Szechuen road and the extension to the Rifle Butts are also favorite roads for driving and speeding purposes, although some wonderful times are made in the settlement proper, as there is no legal speed limit in Shanghai, and, as a

result, some of the more reckless, of whom there are quite a number, drive their cars at their highest speed.

The greatest sinners in this respect are a couple of German and English doctors, who seem to have no respect at all for the lives or limbs of the pedestrians not agile enough to get out of the way. A few of the

wonder no more accidents of a fatal nature have occurred. There is danger of creating a hostile movement against motor cars and their chauffeurs, which may culminate unpleasantly any time, and in which both culprits and innocents may suffer at the hands of an indiscriminating Chinese mob.

CHINESE MOBS BURN FOREIGN MOTOR CARS.

On the morning of the memorable 18th of December, 1905, occurred the riot arising out of the troubles at the Shanghai



SCENE AT THE 1904 SHOW.

women that reside in the far famed Kiangsi road may also be classed among the reckless ones. Still, with all the reckless driving, there are but few accidents to record. A couple of months ago a car that was being driven by a doctor turned from the Soochow road into the Szechuen road and knocked down a native and ran over him. The man was very badly injured and died the next day. A money compensation was given to the family of the deceased, and the matter was hushed up. Still more recently another native was knocked down in the crowded Maloo by a car that was going at the rate of about 40 miles an hour. The injured man was conveyed to the Shantung Road Hospital, where he was attended to, but he eventually succumbed to his injuries. At the rate some of the automobiles are at present allowed to be driven on the Maloo and other crowded thoroughfares it is a

Mixed Court, brought on by members of the police force arresting the widow of a Mandarin on the charge of kidnapping young children from Szechuen. On the morning in question G. D. Pitzipios, H. B. M. Vice Consul General, was coming along the Nanking road (the Maloo), and when near the corner of Chekiang road his further progress was barred by a howling mob of infuriated natives, who, with shouts and yells and threatening weapons, compelled Mr. Pitzipios and a friend to alight from their motor car, which they did hurriedly, and fortunately managed to make their escape with a few bruises.

The mob then turned their attention to the empty car, and, quickly turning it upside down, they poured the gasoline from the tank over the car and then set fire to it and gleefully watched it burn, saying they would serve the foreigners the same way.



DECORATED CARS AT 1904 SHOW.



CHINESE CHAUFFEUR NEAR CAR.

In the midst of their enjoyment, however, a body of British blue jackets and a company of the Shanghai Volunteers came along and dispersed the mob, who scattered in all directions, leaving the motor car to its fate, which was dragged to one side of the road, where it remained for several days a silent tribute to what the Chinese are capable of doing when their passions are aroused in earnest. About noon on the same day J. Arnold, American Vice Consul, and a friend were going along the Nanking road in a Columbia automobile, when they were held up by an infuriated mob of rioters, taking advantage of the temporary absence of the blue jackets and volunteers, and were forced to alight from their car, which was set on fire amid the laughs and jeers of the crowd. To add to the blaze a couple of rickshas were seized and added to the flames. The return of the troops quickly put the mob to flight.

OLD STYLE VEHICLES.

The principal modes of locomotion at present are carriages and the humble but necessary rickshas. The first named are very expensive, the stabling of a pony and mafoo's wages ranging all the way from \$60 to \$100 per month, while the second ranges from \$10 to \$18 per month for the puller's wages and food. There is a splendid future for motor cars in Shanghai, despite the congested state of the traffic, which, by the way, is regulated as well here as anywhere in the world. The only thing that has prevented motor cars from coming into universal use is the initial cost, which deters a great many people from purchasing. At present there are about eighty cars of various makes in use in both settlements. The Chinese are going in for motor cars more and more every month, and if some such system as lately adopted by the Singer Sewing Machine Company, that is, a certain amount down and then monthly in payments, were adopted, there would be a great boom here in this mode of locomotion. People here on the average get very good pay and could well afford to make good, substantial monthly payments. As the settlement is growing very rapidly the inhabitants are being forced to move out into the suburbs, where cheaper rents prevail. If such a time system could be introduced here there is not the least doubt but that motor cars would be the principal means of locomotion. Another thing that is wanted is a cheap car; the ones so far sent here have all been of an expensive make, and even when sold second hand at auction they fetch all the way from 400 to 2,000 taels. A couple of doctors whose livery bill used to be \$75 to \$100 per month have now entirely dispensed with their carriages and taken to motor cars, and have thereby effected a saving of a goodly sum monthly.

As the roads are all flat and there are no hills at all, hill climbing cars are not needed. Heavy cars are of no use here at all. What is wanted is a light 6 to 8 horse power car to hold two or three people. A

narrow car is also desirable, as there is now a system of tramways being built and when it is completed it will take up considerable room in the roads. Some of the French cars that are now in use are far too wide and cumbersome, and when the tramways are finished there will be no room for these wide cars in some of the roads.

MOTOR FIRE ESCAPE, S. F. D.

A 40 horse power fire escape is now in

the command of the volunteer forces was enabled to visit all the danger spots at a high rate of speed.

Another occasion on which its value was shown was during a jail break that occurred at the municipal jail, and in which over twenty prisoners were killed and wounded and a number of the European warders were also badly wounded. A number of motor cars were pressed into service and were used to rush reinforce-



MOB BURNING BRITISH VICE CONSUL'S CAR.

use by the Shanghai Volunteer Fire Department. It is a Merryweather machine, built in England, and has given splendid satisfaction up to the present. It runs at the rate of 30 miles an hour and has not yet had a single breakdown.

It carries a large supply of chemicals and can put out a blaze in short order. The escape is very handy and can be raised and put in position very quickly and has been instrumental in saving considerable lives during some recent fires.

This machine is instilling more confi-

ments to the jail, and the outbreak was quelled inside of half an hour.

AUTOMOBILE SHOW.

In the autumn of 1904 a very interesting motor car show was held, at which numerous types of cars were represented. The American, British and French were the favorites, but most of the cars were too big and clumsy for the settlement. There is talk of holding another show soon.

A road to the hills, about 15 miles distant, has been talked of for some years, but up to the present nothing has been



THE AMERICAN VICE CONSUL'S COLUMBIA WRECKED BY MOB.

dence in the Chinese mind, and it is going to be the Chinese that will be the biggest buyers in the future if the obstacles mentioned can be overcome. The benefits of the motor car were made apparent here during the riot above alluded to, when

done, owing to the opposition of the Chinese officials, due to the fact of there being a couple of Chinese graves in the line of the projected road, but this difficulty will probably be overcome, and then there will be a large demand for automobiles.

CARS NOW REPRESENTED.

The cars that are at present in use are Oldsmobiles, Reos, Darracqs. Whites, Brasiers, Asters, Thomas, Gregoires, Columbia and Rex Tri cars and other good American and English makes. Another thing that is necessary is good tires. The makers at home make a great mistake in sending out poor tires, as they do not last and the maker gets a bad name. Some American tires which come out here are of no use whatever, and in one case recently a new car came out and in less than two months no less than five new tires were changed, owing to the outer cover simply bursting, which naturally gives the tires a name not to be proud of in the Far East and also serves to lower the good name of American manufacturers in general and put them on the same level with the cheap German made goods. It is perfectly useless to send

national settlements. On passing a satisfactory examination the chauffeur is supplied with a license on payment of a small fee and the license must be renewed quarterly. The car itself is also supplied with a license and number, the license being renewed quarterly. When a legal speed limit is put in force, which is now only a matter of a little while, and the present reckless driving done away with, motor cars will become more popular than ever before.

THE LOCAL TRADE.

The International Cycle Company are the principal people for American and other makes of machines, while Pinguet & Co. are the largest dealers in the French settlement. These firms also undertake to make any necessary repairs, that may be needed. There are also, in addition, a couple of smaller repair shops. Messrs. Sennett Frères & Co. are the agents of

car. The roads in Hongkong are somewhat limited, the principal roads available for motor cars being Pok Too Lum, Victoria road to Aberdeen and from Shaikwan, the bathing resort, back to Hongkong. The roads are very gritty, but if a car with good, serviceable tires was sent there it would be certain to find buyers among the wealthy class, both foreign and native. There is but one thing to be borne in mind by American manufacturers, and that is, no shoddy goods are wanted in the Far East; what is wanted is a strong, light car, cheap, and, if possible, some system of time payments, and, above all, a good, strong tire, and not a tire that has to be renewed in a month's time. Do this and the American car will be a success in China and lead all other makes.

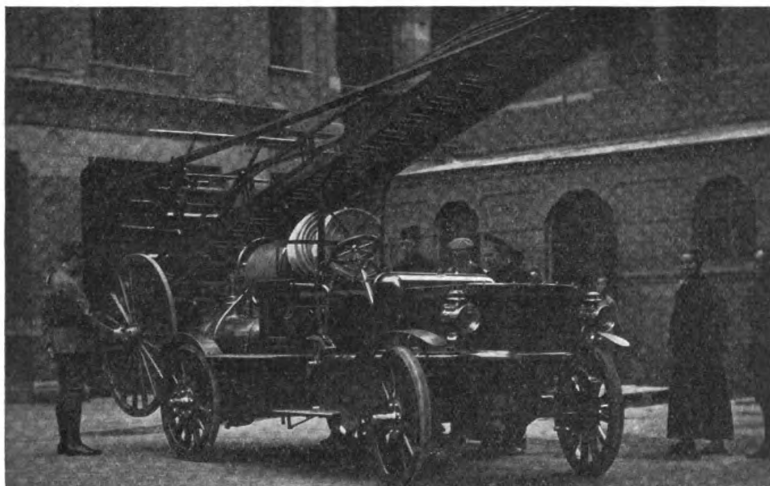
Book Reviews.

Automobiltechnischer Kalender und Handbuch der Automobil-Industrie fuer 1907 (Automobile-Technical Year Book and Handbook of the Automobile Industry for 1907).—Fourth edition. Compiled by E. Rumpel. Published by M. Krayn, Berlin, W.

This year book is arranged somewhat on the order of the mechanical engineering pocket books so familiar in this country, although a comparatively large portion of its contents consists of descriptions of particular cars and parts. The handbook is revised every year, with the object of keeping it up to date; nevertheless a considerable portion of its contents consists of obsolete matter. The handbook is very liberally illustrated with both half tones and line drawings, though many of the illustrations are on such a small scale that it is very difficult to make out the details. Among the more comprehensive articles or chapters are one on spring suspension and another on brakes. The chapter on steam propelled pleasure vehicles furnishes an illustration of the contention made above, that the book contains a good deal of obsolete matter, as this chapter contains descriptions of the old flattened and twisted tube type of Serpollet generator and of the Stanley runabout as made in 1899. The book is in pocket form, cloth bound, and contains 652 pages of text, illustrated by nearly 600 cuts.

The Auto Guest Book of Mobile Maxims.—Ethel Watts-Mumford. Grant and Richard Butler Glanzer responsible. Paul Elder & Co., San Francisco and New York, publishers.

This book contains "the wise sayings or maxims of Punbad the Railer," who appears to have been (or to be) the philosopher of the automobile. Following are some examples of his maxims: "Say not we shall return at five; ye may return at sixes and sevens." "Broker, see that thy brake break not, lest thou be broken." "When thy auto is out for repairs stay thou at home, and so spare thy chauffeur the embarrassment of an encounter."



SHANGHAI MOTOR FIRE ESCAPE.

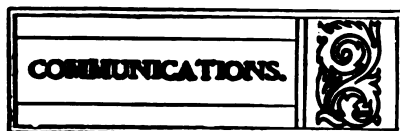
shoddy stuff out here, as when it has once been used and found wanting the Chinese and others will have no more. The roads for the most part are made of a sort of small broken rock, cement and sand, and a good tire is necessary to stand the wear and tear.

Charles J. Glidden was in Shanghai last spring with his touring car on a trip around the world and in the course of a conversation he made the remark that Shanghai was the best regulated place in the world as far as the traffic was concerned, and that the roads were perfect, but it was really necessary to have good, strong tires to stand the wear of the roads in the East. There is no opening at all for foreign chauffeurs. The owners here usually drive their own cars, or else have a Chinese chauffeur. The native chauffeurs pick up the business remarkably quickly and understand the working parts of the machines to a certain extent. They, however, must pass a very rigid examination before the municipal authorities before they are allowed to drive a car along any of the public roads in either the French or inter-

the Brasier car, but owing to the high price of that machine but few sales are effected. There are also a few motorcycles in use, but owing to their high price there is but little demand for them. If these machines could be put on the market here for about 150 taels (about \$225) they would probably find ready sale.

AT OTHER PORTS.

Tientsin has some very fine roads of good extent, but at present there are but few cars there, and if a good, cheap, strong car could be sent out it would find a ready sale among both the foreign and native residents. Hankow, which is situated up the Yangtzekiang River, is another place that offers a good market for the same class of motor car required for Shanghai. It is blessed with some splendid roads of good extent, and if the cars were properly introduced they would find a ready sale among the Chinese. Hongkong comes next. At present there are but four cars in use; Dr. Noble has an Oldsmobile and J. W. Kew has another American car, while Lai Ming, a Chinese millionaire, has an American Oldsmobile and a French



Progress in the Selden Patent Case.

Editor HORSELESS AGE:

In your last issue I notice the comments over the signatures of W. A. Redding and S. R. Betts upon my statements as to the progress of the Selden case.

It will be noticed that no denial of the testimony quoted is made, but it is asserted that "the Selden patent covers all automobiles that are accepted as commercially practicable, and from the patent standpoint broadly covers all the gasoline automobiles which are being made, sold and imported in the United States," and that "this contention * * will be absolutely insisted upon at the final hearing thereof."

I earnestly hope this assertion will not be forgotten when that hearing takes place, as I shall be delighted to meet that contention on their own testimony alone.

As for "trying the case in the newspapers," it is well known that the complainants have been doing it for more than three years.

As an example: When Mr. Selden was under cross-examination in May I asked to look at his Exhibit 89 with my experts. In order to get them an appointed time was set. At that appointed time not only the parties interested were present, but several reporters, invited without my knowledge or consent, and a grand stand play of the examination was made and reported in the papers, with photographs of his so called "1877 gas buggy," built in 1905-6.

Accompanying the illustrations were statements more or less erroneous, to speak mildly, of the exhibit and its character. See HORSELESS AGE, May 23, 1906, page 739, in which this statement appeared:

"An automobile built by Henry R. Selden and Geo. B. Selden, Jr., sons of Geo. B. Selden, said to be an exact reproduction of the vehicle constructed by their father in 1877." (Italics mine.)

Now it is unquestioned that their father not only did not build an automobile in 1877, but never built an automobile earlier than 1905-6.

I suppose if I had written to the trade journals at the date of these illustrations, correcting this and other misstatements, I would have been charged with trying the case in the newspapers. R. A. PARKER.

High Road Clearance Required in the West.

Editor HORSELESS AGE:

I believe that you struck the keynote in your issue of December 12, when you say that touring cars for American roads should have a minimum clearance of 12 inches. I have read that some of the makers of American touring cars were going to South

America and other places to find out what kind of a car would be adapted for export. I think it would be much wiser for them to build cars adapted to the Northwest and take care of home consumption first. I have scanned the advertising pages and sent for many catalogues, but I find no car of medium price that has sufficient clearance for the Dakotas and Montana. The tracks are swept out by the winds, and all roads have ruts at each side varying from 2 to 15 inches deep. To run a car with a 9 inch clearance over these roads in daylight is exasperating, and it is practically impossible to run after dark unless one is well acquainted with the road. There are stones sticking up in the middle of the road, too, that are hard on sprockets and flywheels if they project very low. The only drive for this country is side chain, and I find it only in the high priced cars. F. B. I.

Wish to Urge Good Roads Legislation in Indiana.

Editor HORSELESS AGE:

Enclosed find copy of road map of our county that may be of service for reference. What would be your opinion as to a private auto thoroughfare across counties approaching the leading cities where tourists centralize? Let the same be concreted or otherwise improved to render the most efficient service.

In our State (Indiana) I think we could resurrect an obsolete "plank road" or "toll road" law that would enable us to condemn and secure right of way in comfortable and picturesque localities such as might be desired. With whom should we take the matter up?

P. KNIGHT & SONS.

[We are not familiar with the road improvement laws of Indiana, but, judging from the comparatively great number of improved highways, particularly in the northern part of the State, these laws are not at all bad. To urge any special road legislation you should approach the representative of your district in the State Legislature or your State Senator.—Ed.]

Good Roads Movement in Washington State.

Editor HORSELESS AGE:

In connection with the good roads movement in this district (Tacoma), the Pierce County Good Roads Club and the automobile clubs of Seattle and Tacoma met at the Tacoma Chamber of Commerce on December 13 and set in motion plans for the construction of a grand boulevard connecting the two principal cities of western Washington, Seattle and Tacoma, which will be between 45 and 50 miles in length, along the shores of Puget Sound and through a picturesque country.

The promoters are confident of carrying it into effect before the Alaska-Yukon-Pacific Exposition opens, which is to be held in Seattle in 1909, and which will attract thousands of visitors to the Puget Sound country.

Messrs. J. M. Frink, Stuart Rice, S. A. Perkins and James Hart were chosen as a special committee to prepare a detailed and comprehensive plan of the proposed boulevard and to frame legislation necessary to assist in the general good roads and boulevard schemes for action at the coming session of the State Legislature.

The above meeting was held as a result of a "Good Roads" talk by W. E. Lancaster, consulting engineer at Washington, D. C., and who, in all probability, will be stationed here during the next few years.

F. K. HASKELL.

Properties of Gasoline.

Editor HORSELESS AGE:

Will you please inform me through THE HORSELESS AGE: 1. What is the correct mixture of gasoline and air to give the best explosion? 2. What is the volume ratio liquid and volatilized gasoline of 76 test?

GUY J. SPEAR.

[The amount of air theoretically required to completely burn gasoline is 17.7 times the weight of the gasoline. In practice, however, about 30 per cent. excess of air, that is to say about 23 times the weight of air as gasoline, gives the best results.

The ratio of volume of liquid and gasified gasoline depends upon atmospheric pressure and temperature. For ordinary atmospheric conditions the ratio of liquid gasoline to air for a perfect mixture is 12.4 : 100,000, and of vaporized gasoline to air 2.15 per cent., hence the volume ratio of liquid to vaporized gasoline is $\frac{2150}{12.4} =$

173.—Ed.]

Method of Securing Timer on Shaft.

Editor HORSELESS AGE:

I am thinking of putting a new timer on my car, which has a two cylinder gasoline engine. I notice that many of the timers on the market today are fastened by one or two set screws. Please advise me through the next issue of THE HORSELESS AGE if these set screws will hold tight enough, or should the timer be keyed to the shaft to make a satisfactory job? Thanking you in advance, I am,

JOHN GAUL, JR.

[Whether a set screw or other means of fastening should be used for the timer is largely a matter of personal preference. The power that has to be transmitted is very small in amount, and a set screw set up tightly would easily take care of it. However, a set screw is likely to jar loose, and, personally, we would prefer to put a taper pin through timer hub and shaft, after the timer had been set correctly by means of the set screws.—Ed.]

Favors Calcium Chloride as Cooling Solution.

Editor HORSELESS AGE:

Calcium chloride is all right. We can prove it. Have used it three winters in all kinds of radiators with and without

pumps. Have used it thin and used it thick. Have used any kind, simon pure and the commercial kind at a penny a pound. Have used it red rusty, an old job lot exposed to the air until of the consistency of molasses, before mixing with water. Have prepared it in charred vinegar barrel, cold, which is a slow process and takes much stirring. Mostly it has been boiled in a tin pail until it would form fancy frost-like figures over the surface when cool, and a Baumé hydrometer would pretty nearly tip over. And the tin is on the pail and inside the pail yet. We have used it at 30 below zero, and the same solution during the blaze of summer. It has boiled out, evaporated, steamed until the motor hammered and stuck. We have had the pet cock self open and been warned only by the laboring and drag of the car. Replaced solution and motor ran fine as ever. It never "baked on" or left either deposit or sediment.

We have raced with the solution and let it stand for weeks at a time in mid-winter, taking the weather as it came. We have drained it out and replaced with water to find the difference, and did not notice any. Have used the same solution two succeeding winters. Never had to mend a leaky radiator; same ones, three years old, performing to perfection. Same hose also. Never had to worry. Never had a car freeze up. Never made a test after solution was put in, simply replaced loss with water.

Have used alcohol 33 1-3 per cent. and boiled it out in an hour. Have used glycerine just as the books read. It made soap. We are totally disassociated from prejudice or personal opinion. We have not a theory or hobby to promulgate. We have the utmost respect for scientific research as the basis of all progress and chemical analysis as the safeguard of advanced civilization, but in the matter of non-freezing solutions for motors we do back our successful personal experience against a thousand bulls of doubtful disputation.

H. LAVERNE COLE.

Muffler Design.

Editor HORSELESS AGE:

If you have any data on the proper dimensions and construction of a muffler for an automobile engine having four cylinders, 4½x5 inches, we would like to have it.

MUFFLER.

[So far as we are aware there are no standard dimensions or constructions for mufflers. However, it is good practice, whatever the type of muffler used, whether sieve pipe, baffle plate or expansion chamber, to make the aggregate area of the holes or openings from one compartment to the next at least equal to the area of the exhaust pipe. In any case as large an area in the receiving end of the muffler should be provided as possible. In fact, the larger the muffler carried the better. The minimum length and diameter that can be used

without giving too much back pressure are usually determined by experiment, and are largely dependent upon the amount of baffling done. A study of the existing types of mufflers is suggested.—Ed.]

A Hill Climbing Feat.

Editor HORSELESS AGE:

I enclose a clipping which appeared in the "Automobile Notes" of last Sunday's *Sun*. It seems to me that such statements ought not to be passed over unnoticed. They are, to say the least, misleading and might influence persons who have not much knowledge of such matters. I should think some editorial comments on such statements in *THE HORSELESS AGE* might be timely. It is simply absurd to say that a car could ascend, under its own power, a 36 per cent. grade on high speed even with only the driver, especially if it had to start in 6 inches of sand, as the notice seems to give the impression.

J. GRANT CRAMER.

(Inclosure.)

"Talking about grades," says H. B. Phinney, of the Royal Tourist, "perhaps there are no greater grade tests that cars can be subjected to than those to which the Royal cars are once they leave the assembly room. Not a great distance from the Royal factory at Cleveland is a spot where contractors go to get sand. It is about 300 feet from the main thoroughfare and descends to about a 36 per cent. grade. When the teams are loaded they are pulled to the top by a donkey engine. Every one of the Royal cars is sent at this grade, and, though the footing at the bottom is 6 inches deep in sand, the car must negotiate this grade on the high speed as a preliminary stunt to others that it has to go through before Robert Jardine, the designer, pronounces it fit."

[We do not believe that there is occasion for any comment, except that there is probably some typographical error in the item which accounts for the apparent anomaly. Instead of 36 per cent. is should probably have been 3 to 6 per cent., as going up a grade varying from 3 to 6 per cent., through sand 6 inches deep, on the high gear, is about as much of a task as any high powered car can be expected to cope with. Clerical or typographical errors in statements of the steepness of grades are not at all uncommon, and we need only refer to the certificate which the New York Motor Club issued to the owners of a car which made a run from New York to Poughkeepsie in which a very glaring error of this nature occurred.—Ed.]

Road Adherence.

Editor HORSELESS AGE:

I recently had a discussion as to the traction of heavy and light weight cars. I contend that traction is dependent on weight and speed, and is in no way related to power, provided there is enough power to turn the wheels.

I was told that there are always teams to help motor cars over Jacob's Ladder, and that runabouts get over with no difficulty, but that heavy touring cars are frequently pulled over, as there is not enough "road grip" to hold the wheels. Will you please give a short article on this subject?

READER.

[You are right in your contention that traction depends upon weight and speed, and is not dependent upon power. Within the limits of touring speeds, and especially of speeds that can be attained on steep hills, the traction depends only on the weight upon the driving wheels, and of course on the nature of the road surface. That runabouts get over Jacob's Ladder without difficulty, while touring cars often require the aid of horses, is probably explained by the fact that one or two men pushing behind greatly increases the climbing ability of a 10 horse power 1,000 pound runabout, but does not make nearly so much difference with a 30 horse power 3,000 pound touring car.—Ed.]

A. C. A. Standing Committees.

President Colgate Hoyt, of the Automobile Club of America, has announced his appointment of members of the various standing committees of the organization for the ensuing year as follows:

Executive Committee—Dr. Schuyler Skaats Wheeler, chairman; A. R. Shattuck, Henry Sanderson.

House Committee—Dr. Schuyler Skaats Wheeler, chairman; A. R. Shattuck, Henry Sanderson, Dave H. Morris, George F. Chamberlin.

Good Roads Committee—A. R. Shattuck, chairman; Col. John Jacob Astor, John F. Plummer, Jr.

Exhibition Committee—Gen. George Moore Smith, chairman; Alan R. Hawley, William Piereson Hamilton.

Runs and Tours Committee—Waldron Williams, chairman; Carl H. Page, Cortlandt Field Bishop, Augustus Post, A. R. Shattuck, J. M. Porter, Winslow Tracy Williams.

Library Committee—A. R. Shattuck, chairman; Phillip T. Dodge, the Rev. Wilton Merle Smith.

Membership Committee—Melville D. Chapman, chairman; Charles B. Dillingham, Gage E. Tarbell.

Law and Ordinance Committee—W. W. Niles, chairman; Winthrop E. Scarritt, William H. Page.

Racing Committee—George Isham Scott, chairman; William K. Vanderbilt, Jr.; James L. Breese, Samuel B. Stevens, E. R. Thomas.

Map Committee—Cortlandt Field Bishop.

Building Committee—Dr. Schuyler Skaats Wheeler, A. R. Shattuck, Gen. George Moore Smith, Dave H. Morris.

Signpost Committee—Jefferson Seligman, chairman; J. Horace Harding, Melville D. Chapman.

Committee on City Streets—W. W. Niles, chairman; William R. Warren, C. E. Knoblauch.

Paris—Madrid Motor Vehicle Contest.

An endurance contest for pleasure and commercial vehicles is being planned to be held between Paris and Madrid, in May next, in connection with the first automobile show in Madrid. It is to be supplemented by a hill climb up the Guadarrama, an appearance competition and a flower parade, and is to be held under the patronage of King Alfonso.

OUR FOREIGN EXCHANGES.



Commercial Vehicles at the Berlin Show.

Four entirely distinct types of commercial motor vehicles were exhibited at this year's fall show in Berlin. In the tent there were particularly represented the heavy trucks and omnibuses, which from a technical standpoint belong to one and the same class, while in the main hall light delivery wagons, cabs and motor carriers were mingled with pleasure vehicles, applying the latter term to all motor vehicles which are not "exclusively used for commercial transportation of persons and goods," as the new automobile tax law has it.

In the construction of omnibuses and trucks the automobile industry of Germany now undoubtedly has a considerable lead over other countries, and in Germany there are five firms which are leading in this branch. These are the Daimler Works in Marienfelde, the N. A. G. of Berlin, Bussing of Brunswick, Stoewer Brothers of Stettin, and the South German Automobile Works of Gaggenau.

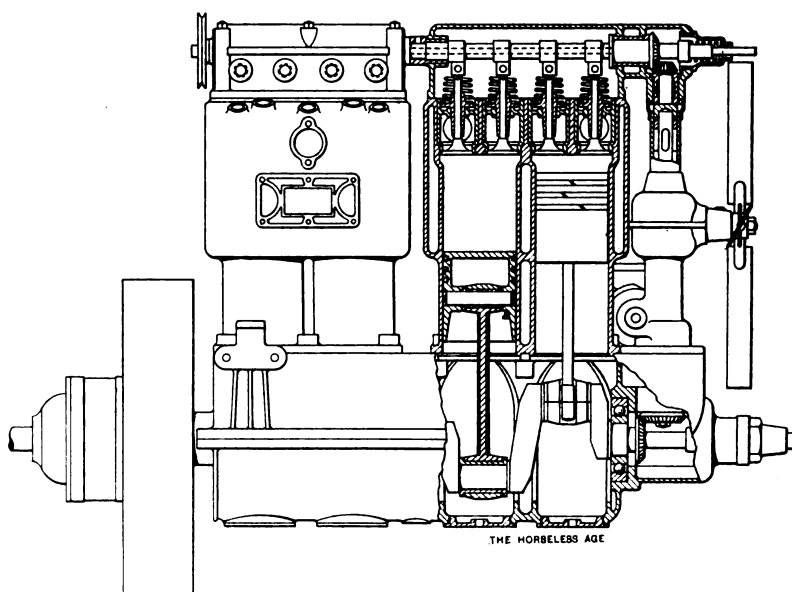
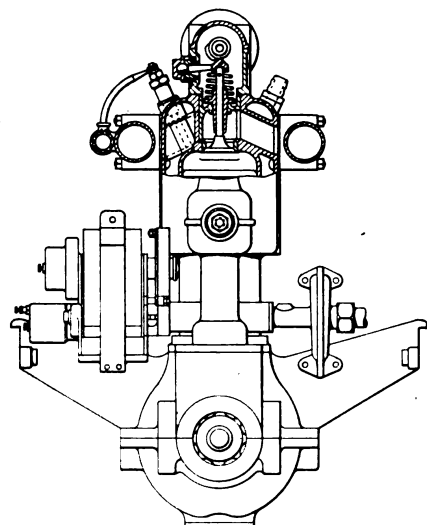
The Daimler Motor Works have had extensive experience with their omnibuses in England, which experiences have been availed of in the design of the vehicles delivered to the Berlin General Omnibus Company. This firm exhibited a 24 horse power omnibus or truck chassis, which reflected the high grade workmanship for which its works are renowned. The pressed steel frame is designed for a useful load of 3 tons. The road wheels are fitted with solid rubber tires, single in

front, double in rear. The brake block of the hand brake does no longer act directly on the rubber tires, as formerly, but on a special brake drum fixed to the side of the rim. The power of the four cylinder motor is transmitted by means of the well known Daimler gear, through a shaft and pinions, to the rear wheels; the toothed wheel, however, is no longer exposed, but is completely enclosed, so that the admission of dust and dirt and the wear are reduced to a minimum. A very practical innovation is made in connection with the lubrication system. At all places where grease cups were formerly used (which easily jar loose or break off) the part of the mechanism concerned is now developed in the form of a grease reservoir. The transmission brake is water cooled. The same chassis was shown with a lorry body for 3 tons useful load with downwardly swinging side panels, for the transportation of bales, cases, machinery, etc. Another vehicle shown was a delivery wagon finished in dark blue, on a 16 horse power chassis, with chain transmission. A very luxurious equipment characterized a 28 horse power omnibus for twenty-one passengers, which is completely enclosed and provided with individual seats and electric illumination inside and out. Another product of this firm was the 16-20 horse power, four cylinder, transport vehicle, for 3 ton loads, which was shown at the stand of the Royal Stables.

Quality and quantity were also both represented in the truck division of the Neue Automobil Gesellschaft. This firm divides its delivery vehicles and trucks into two classes. The first of these classes comprises vehicles with a light frame, which will permit of useful loads up to only 1 ton, and the running gear of which is similar to that of passenger vehicles. The drive on these

cars is by Cardan shaft, while in the case of vehicles of the second class, which are designed for useful loads between 1½ and 6 tons, and are built with correspondingly strong frames, the drive is by chains. The 8-9 and 10-12 horse power types are equipped with two cylinder and the 16-18 and the 24-26 horse power types with four cylinder motors. All motors are fitted with low tension magneto ignition, the make and break mechanism being of a special design, permitting of quick adjustment. The well known round N. A. G. surface radiator is also used on all commercial vehicles, and is designed for a water capacity in direct proportion to the number of horse power. The elastic leather covered cone clutch possesses the advantages of being readily renewable, as the leather facing is not secured to the cone itself, but is riveted to clutch segments, which are bolted to the flywheel. The change speed gear is of the sliding type. All vehicles are equipped with two double acting brakes, the one acting on the countershaft being operated by a pedal, and the internal expansion brake on the rear wheels by a hand lever. The fuel consumption shown by extensive trials is stated by the firm to be as follows: Gasoline per horse power hour, 88 pounds; 90 per cent. alcohol with a 20 per cent. addition of benzol, 1.32 pounds. The very satisfactory experiences with chrome-nickel steel have recently induced the firm to adopt this material exclusively for all parts subjected to hard service.

Among the vehicles exhibited by the N. A. G. the greatest attention was undoubtedly attracted by the new omnibus of the Great Berlin Omnibus Company, an offshoot of the Great Berlin Street Railway Company, as a large number of these vehicles will soon be placed in service. The four cylinder motor belongs to the 24-26 horse power type. The frame is designed



FOUR CYLINDER GAGGENAU OMNIBUS MOTOR.

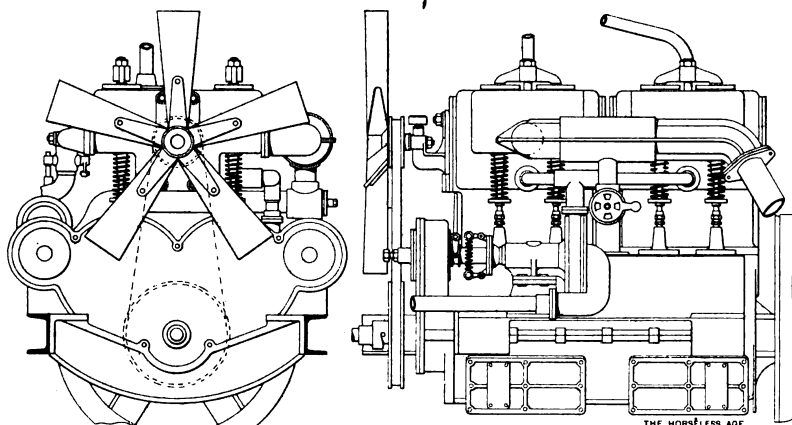
for loads of 6 tons. In general the omnibus is very similar to the one which has been in use for some time on Route 19 of the Berlin General Omnibus Company. It has seats for sixteen passengers inside and for eighteen on the upper deck, while there is standing room for three on the rear platform. On a four cylinder, 15-18 horse power chassis the N. A. G. showed a brewery wagon of 3 ton load capacity and a coal wagon with tilting arrangement of the Berlin Electrical Works.

The firm of H. Bussing, in Brunswick, builds exclusively motor trucks and motor omnibuses, and is the only large firm in Germany specializing in this field. It furnishes motors of 20-24 horse power. These are provided with a cam shaft on top of the cylinders serving for the operation of both the inlet and exhaust valves. The cam shaft is arranged in a special casing, and can be taken off with the latter without being taken apart. There are hand

what more substantial frame, which is reinforced by an under-running truss. I was told that about thirty buses of this type are now running in London, and the firm ships two or three chassis regularly every week to the London house of Straker & Squire, which are there fitted with bodies.

The Stettin firm of Stoewer Brothers have also met with success in England, as they have secured from the London and District Motor Bus Company, Limited, an order for no less than 200 motor omnibuses. A vehicle of this type was on view at the show. It is fitted with a four cylinder motor of 28-30 horse power, the in London obligatory four speed gear, a metal clutch, chain drive, two foot brakes and one hand brake, and offers accommodation for sixteen passengers inside and eighteen outside. A second omnibus of the same power, but with an enclosed rear platform and without deck seats, intended for a route in Baden, shows that these vehicles

and to minimize the number of parts. The cam shaft can be slightly moved toward the front of the motor, to bring a special set of cams into operation to reduce the compression for starting the motor. After starting the shaft is returned to its normal position by a spring. Ignition is by high tension magneto, which is driven by a cross shaft at the front of the motor, receiving its motion from the vertical shaft already referred to, through the intermediary of a pair of helical gears. The circulation pump is arranged on the opposite side of the motor from the magneto, and is driven by the same shaft. The cooling fan is also positively operated from the vertical shaft. All gearing is completely enclosed, and there are absolutely no movable parts visible at the front end of the motor. In addition to the magneto there is provided a storage battery ignition system to facilitate starting and to provide a reserve in case of accident to the magneto. In the lower half of the crank case, underneath each connecting rod head, there are large circular screw plates, which, when taken out, permit of the removal of the connecting rod bearings.



THE STOEWER OMNIBUS ENGINE.

holes on both sides of the crank shaft which facilitate inspection and adjustment of the working parts. This truck is also fitted with low tension magneto ignition, and the radiator is of the so called film tube type. A special arrangement permits of very smooth starting. The power is transmitted by chains to the rear wheels, and the reaction is taken up by a spring supported torsion rod, the free end of which is connected to the frame and has a range of motion of about three-quarter inch. This is claimed to minimize jars and shocks in the chain during operation. A transmission brake is operated by a pedal, while the rear wheel internal brakes are operated by lever. The firm exhibited a complete omnibus for Route 19 of the Berlin General Omnibus Company, one of which has already been in service for some time. The bus has a 20-24 horse power motor and a three speed gear, and contains seats for thirteen passengers and standing room for six, there being no seats on the upper deck. At this stand was also shown a sample of the chassis delivered to the London General Omnibus Company, which differs slightly from the type used in Berlin. The vehicle has a four speed gear and a some-

are also appreciated in the land of their origin. A 24 horse power truck completed the exhibit.

The South German Automobile Works, in Gaggenau, exhibited an omnibus intended for the Berlin General Omnibus Company, which was built in accordance with the regulations issued early this year by the London police commissioner. The driver's seat is arranged on top of the motor space, and in this manner accommodation for forty-four passengers is obtained. We show herewith two views of the new motor of this firm, which is of rather unusual construction. Only a single cam shaft is used, which runs centrally across the top of the cylinders, being driven through two pairs of bevel gears and a vertical shaft at the front end of the motor. The cam shaft is thus located in the most advantageous position from the standpoint of accessibility, as it is only necessary to remove the cover from the cam shaft housing to get at the shaft and the valve springs.

The valves are all located in the cylinder heads, in a single line, and are operated directly from the cams, without the intermediary of push rods, the object being to render the machine as compact as possible

Alcohol Made from Peat.

Consul R. S. S. Bergh, who made previous reports on the Swedish experiments in making alcohol from peat, now writes from Gothenborg:

"In 1903 Victor Frestadius, civil engineer, started these experiments. The Government granted him a subsidy of \$2,680 and private persons subscribed \$10,720, so that the experiments could be carried further, on a larger scale. The experiments seem to have been expensive, however, and last spring operations had to be stopped on account of lack of money. In the fall operations started again, with assistance of the inventor's friends, and it is claimed that a satisfactory result has been obtained, especially as it has been found that the by-products of the process can also be sold. A company, Aktiebolaget Tourbière, has now been organized in Stockholm for the purpose of exploiting the invention. It is stated that the inventor thinks that the price of alcohol made from peat will be less than one-half of the present price of alcohol, and lower than the lowest price of refined petroleum."

Charles Jeantaud, a pioneer French electric road vehicle manufacturer, and the first to formulate the principle of the Ackermann steering diagram, committed suicide in Paris a short time ago. He built his first electric vehicle in 1881, and successfully competed in the historical Paris-Bordeaux race in 1894, changing storage batteries twenty times en route. He was born in Limoges in 1840, and was therefore sixty-six years of age. Pecuniary difficulties are said to have been the cause of his tragic end.

Commercial Applications.

Automobiles for Northern California Stage Lines.

The California Northwestern Railway runs north from San Francisco as far as Sherwood, 152 miles distant. The Eureka, Scotia and Camp Five line runs south from Eureka, Humboldt County, to Camp Five, 36 miles. Between Sherwood, in Mendocino County, and Camp Five there is a gap of about a hundred miles, which must be covered by stage.

W. A. Cross owns the stage line between Willits (14 miles from Sherwood and until recently the terminus of the railroad) and Camp Five. During the past summer he has been making a trial of automobiles of various makes, and undertook to purchase three motor cars if an agent could show him a car that would make the round journey and carry four passengers without difficulty or overheating of the engine.

On December 1 a San Francisco agent started for Eureka in a 30 horse power car and made the trip of 208 miles in 20 hours and 35 minutes without mishap. After demonstrating the car in Eureka and the neighborhood he made the trip from Camp Five to Willits, about 100 miles, over rough, mountainous roads, with steep grades. The steepest hill to be surmounted is Rattlesnake Mountain, which is 12 miles, six to the summit and six down to level ground again. In the first two miles it ascends 800 feet. The test was so satisfactory that Mr. Cross ordered three 30 horse power cars, to be delivered in the spring.

The difficulty of the trip may be gathered from the fact that several automobiles that have attempted it have been laid up for weeks. Twenty-four hours' rain had fallen before the car went over the road, and the water in some places came into the tonneau.

During the winter it is practically impossible to reach Eureka by land, as the mountain streams rise so high as to be unfordable by passengers carrying vehicles. At this season travelers reach Eureka by coasting steamer from San Francisco, and the mails are carried by pack mules. Mr. Cross owns 120 stage coaches, and intends to use automobiles on the road between Willits and Camp Five first. If he finds that they do the work he will put automobiles on some other routes. The automobiles will carry three passengers on an average, and the fare for the hundred mile trip will be \$20.

An Attempted Motor Bus Line in California.

J. C. and George B. Long, proprietors of several stage lines running out of Susanville, Cal., inform us that they purchased a 16 horse power steamer November 1 for their line from Susanville to the railroad

station at Doyle, a distance of 45 miles. After it had been in service about two weeks the water froze in one of the pipes, causing it to burst. This damage was repaired, but as it gave some trouble afterward it will not be used on the stage line regularly until next spring, when they purpose buying another car. They think two cars will be required to make a success of the use of motor cars on this stage line.

Trouble Over a Motor Bus Line.

Citizens of Onalaska, Wis., are said to be much incensed over the action of the Auto Rapid Transit Company, of La Crosse, in soliciting support for an automobile line between La Crosse and Onalaska, which was to have been in operation last summer. A

War Automobiles.

One of the features of the Boston Show, March 9 to 16, will be an exhibit of cars equipped as they will be by the Government in time of war. Some will be partially armored and provided with Gatling guns and ammunition cases; others will be equipped for carrying dispatches, and others for telegraph service. The Red Cross will be represented by an automobile ambulance.

Competition for Military Motors.

The competition for heavy motor vehicles suitable for military purposes from Paris to Marseilles and back has just come to an end. The honors of the competition rest with the Darracq-Serpollet Company, which entered two trucks and an omnibus.



ONE OF THE REO MOTOR BUSES IN USE ON VAN NESS AVENUE, SAN FRANCISCO.
(See article on page 731 of HORSELESS AGE for November 21 last.)

large sum of money was subscribed by the business men of Onalaska for stock which, it is said, has not been delivered. Action in court is threatened unless the company makes a settlement. The company recently went into the hands of a receiver.

The steady and regular running throughout the whole test was as noticeable as their mean speed, which was 33 kilometres an hour. All three gained full marks.

Commercial Vehicle Notes.

Charles H. Davis, manager of Ringling Brothers' circus, denies that the circus will travel by automobile instead of by railroad next season.

Edgar F. Clarke and I. F. Bishop are to form the San Diego (Cal.) Package Delivery Company, for delivering packages with motorcycles.

It is reported that the Couple-Gear Freight-Wheel Company's truck, described in our issue of October 31, has made a successful ascent of Mt. Wilson, near Pasadena, Cal.

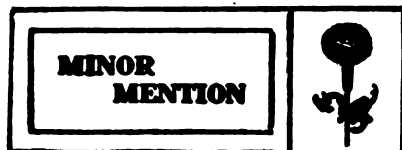
The Post Office Department has closed a contract with the Johnson Service Company, of Milwaukee, for three steam automobiles for delivering and collecting mail in Milwaukee. The company will furnish the cars, drivers and repairs at \$3,500 a year for each.

Exhibitors at the A. L. A. M. Show.

The following is the complete official list of the exhibitors at the Madison Square Garden Show, January 12 to 19:

Royal Motor Car Co.
Northern Motor Car Co.
Haynes Auto Co.
Cadillac Motor Car Co.
Buick Motor Co.
Elmore Mfg. Co.
Olds Motor Works.
De Dietrich Import Co.
Darracq Motor Car Co.
Archer & Co.
Auto Import Co.
Sidney B. Bowman Auto Co.
Wyckoff, Church & Partridge.
Smith & Mabley, Inc.
Hol-Tan Co.
Winton Motor Carriage Co.
Packard Motor Car Co.
E. R. Thomas Motor Co.
Electric Vehicle Co.
Stevens-Duryea Co.
H. H. Franklin Mfg. Co.
Peerless Motor Car Co.
Autocar Co.
Pope Mfg. Co.
Pope Motor Car Co.
Locomobile Co. of America.
The Geo. N. Pierce Co.
Knox Auto Co.
Lozier Motor Co. of New York.
Studebaker Auto Co.
Walter Auto Co.
Hewitt Motor Co.
Waltham Mfg. Co.
Apperson Brothers Auto Co.
F. B. Stearns Co.
Matheson Motor Car Co.
Columbus Buggy Co.
Corbin Motor Vehicle Corp.
Babcock Electric Carriage Co.
Pope Motor Car Co.
Electric Vehicle Co.
Cantano Electric Forecarriage.
Baker Motor Vehicle Co.
Diamond Rubber Co.
Pittsfield Spark Coil Co.
Goodyear Tire and Rubber Co.
C. F. Splittorf.
Dayton Electrical Mfg. Co.
G & J Tire Co.
Gray & Davis.
Veeder Mfg. Co.
Manufacturers Foundry Co.
Whitney Mfg. Co.
Brown-Lipe Gear Co.
Byrne, Kingston & Co.
Autocoil Co.
N. Y. & N. J. Lubricant Co.
Baldwin Chain Mfg. Co.
Remy Electric Co.
Utility Co.
Motsinger Device Mfg. Co.
Steel Ball Co.
National Carbon Co.
The Webb Mfg. Co.
Briscoe Mfg. Co.
Morgan & Wright.
Kilgore Auto. Air Cushion Co.
Republic Rubber Co.
Cook's Railway Appliance Co.
Winchester Speedometer Co.
Holley Brothers Co.
Firestone Tire and Rubber Co.
Phineas Jones & Co.
Hartford Suspension Co.
Shelby Steel Tube Co.
Swinehart Clincher Tire and Rubber Co.
Warner Instrument Co.
Timken Roller Bearing Axle Co.
Warner Gear Co.
Consolidated Rubber Tire Co.
Jones Speedometer.
Pennsylvania Rubber Co.

R. E. Dietz Co.
Standard Welding Co.
American Ball Bearing Co.
International Rubber Co.
Badger Brass Mfg. Co.
Fisk Rubber Co.
Hyatt Roller Bearing Co.
Whitlock Coil Pipe Co.
Rose Mfg. Co.
Midgley Mfg. Co.
Hartford Rubber Works Co.
B. F. Goodrich Co.
Post & Lester Co.
Stevens & Co.
Charles E. Miller.
Hartford Auto. Parts Co.
Oliver Instrument Co.
Uncas Specialty Co.
Dixon Crucible Co.
Valentine & Co.
Vestal Shock Absorber Co.
Muncie Auto. Parts Co.
Eastern Carbon Works.
Bethlehem Steel Co.
Wm. Cramp & Sons Ship and Eng. Bldg. Co.
American and British Mfg. Co.
Schwarz Wheel Co.
Carpenter Steel Co.
J. H. Sager Co.
O. W. Young.
Avery Portable Light Co.
Springfield Metal Body Co.
Oliver Mfg. Co.
Thos. Prosser & Son.
English & Mersick Co.
Rushmore Dynamo Works.
Duplex Ignition Co.
Light Mfg. and Fdry. Co.
A. R. Mosler.
Lipman Mfg. Co.
Vacuum Oil Co.
W. C. Robinson & Son Co.
Diezemann Shock Absorber Co.
A. W. Harris Oil Co.
R. H. Smith Mfg. Co.
Spicer Univ. Joint Mfg. Co.
The Chandler Co.
Gilbert Mfg. Co.
Motor Car Specialty Co.
Gray-Hawley Mfg. Co.
Edmunds & Jones Mfg. Co.
Weed Chain Tire Grip Co.
Conn. Tel. and Elec. Co., Inc.
Stackpole Battery Co.
Witherbee Igniter Co.
Atwater Kent Mfg. Works.
Noera Mfg. Co.
Acetyvone Co.
Globe Mach. and Stamping Co.
E. M. Benford.
Hopewell Bros.
Vesta Accumulator Co.
Voorhees Rubber Mfg. Co.
Way Muffler Co.
Sprague Umbrella Co.
Direct Drive Axle Co.
Detroit Motor Car Sup. Co.
Hess-Bright Mfg. Co.
American Elec. Novelty & Mfg. Co.
Rands Mfg. Co.
Wm. J. Duane & Co.
The Pantasote Leather Co.
Turner & Fish Co.
National Battery Co.
Brennan Motor Mfg. Co.
Ajax-Grieb Rubber Co.
S. F. Bowser & Co.
Diamond Chain and Mfg. Co.
C. T. Ham Mfg. Co.
Detroit Lubricator Co.
Gemmer Engine Co.
Wray Pump and Register Co.
Aurora Automatic Machinery Co.
Gabriel Horn Mfg. Co.
Herr & Co.
Heinze Electric Co.
Hoffecker Speed and Mile Register Co.
F. H. Wheeler.
Pope Motor Car Co.
Knox Auto. Co.
H. H. Franklin Mfg. Co.
General Electric Co.
Blue Ribbon Horse and Carriage Co.
Garvin Machine Co.
J. M. Quinby & Co.
Michael Ehret.
Hewitt Motor Co.
Studebaker Auto. Co.
General Vehicle Co.
Thos. D. Buick Co.
P. Rielly & Son.
Electric Rubber Mfg. Co.
Manhattan Storage Co.
Franco-American Auto and Supply Co.
Albert Champion Co.
Aster Co.
Motor Car Equipment Co.
Leon Rubay.
E. F. Hodgson.
Kitsee Storage Battery Co.
Motor.
Autmo Cabinet Co.
Sibley & Pitman.
Motz Clincher Tire and Rubber Co.
Trident Tire Co.
E. J. Willis Co.
Patterson, Gottfried & Hunter.
N. Y. Sporting Goods Co.
R. & P. Traction Tread Tire and Tube Co.
Hill Mfg. Co.
Metal Stamping Co.
M. E. Schoening.
Graham & Goodman, Inc.
Class Journal Co.
Manhattan Auto. Top Co.
Standard Brake Co.
John T. Stanley.
Lavalette & Co.
Dow Tire Co.
Robert Bosch, N. Y., Inc.
National Sales Corporation.
Samson Leather Tire Co.
S. Smith & Son, Ltd.
Vehicle Apron and Hood Co.
Hewitt Motor Co.
Mutual Auto Accessories Co.
Duff Mfg. Co.
Trade Advertising Pub. Co.
Auto Accessories Mfg. Co.
National Oil Pump and Tank Co.
Brooklyn Motor Supply Co.
Gould Storage Battery Co.
E. P. Ingersoll.
Julius King Optical Co.
Harburg Tire Co.
Heath Dry Gas Co.
Springfield Portable Construction Co.
Continental Caoutchouc Co.
Havemeyer Oil Co.
C. Cowles & Co.
C. A. Shaler Co.
Watres Mfg. Co.
Syracuse & Elbridge Glove and Mitten Co.
The Auto Supply Co.
Manhattan Lamp Works.
Adam Cook's Sons.
Cleveland Cap Screw Co.
Peter A. Frasse & Co.
Allen Auto Specialty Co.
Harry A. Allers & Co.
J. S. Bretz Co.
Electric Storage Battery Co.
E. T. Kimball Co.
P. M. Hotchkiss.
Morrison, McIntosh & Co.
Leather Tire Goods Co.
Harrington Lubricant Co.
George Loring Co.
Punctureproof Tire Co.
Tire Safety Device Co.
T. Alton Bemus Co., Inc.
C. F. Ernst's Sons.
Stall & Dean Mfg. Co.
Portable Electric Safety Light Co.
Energine Refining Co.
Semi-Dry Battery Co.
Standard Metal Work Co.
National Novelty Co.
The A-Z Co.



A chauffeurs' club has been organized at Hartford, Conn.

The Royal Motor Car Company, Cleveland, Ohio, plan to erect a factory on Gordon Park boulevard in that city.

The Eclipse Machine Company, of Detroit, will shortly place a light, high grade four cylinder car on the market.

The name of the Buffalo (N. Y.) Gasoline Motor Company has been changed to the Selden Motor Vehicle Company.

The Samson Leather Tire Company have leased the store at the northeast corner of Broadway and Fiftieth street, New York.

S. F. Bowser & Co., Inc., report that they have recently moved into a new factory in Toronto, Canada, erected at a cost of \$25,000.

An automobile engineering department has been opened in connection with Heald's School of Engineering, San Francisco, Cal.

The Autocoil Company of Jersey City inform us that they have secured the Autocar Company's contract for their entire supply of coils for 1907.

The Hays Manufacturing Company are to occupy the former old engine factory at Lansing, Mich., as a branch after January 1. They enamel automobile specialties.

It is reported that a company, capitalized at \$500,000, is being formed at Fond du Lac, Wis., to manufacture a storage battery invented by Frank G. Curtis, of Milwaukee.

Fred H. Ream, Broken Bow, Neb., has decided to open a repair shop for automobiles in that place, and would like to hear from firms who can supply suitable tools and stock.

The Great Western, Woolner's and Clarke's distilleries in Peoria, Ill., are building big warehouses for denatured alcohol, and the Cornings distillery are also preparing to build.

A correspondent, referring to our recent remarks anent the use of fixed spark points, informs us that in addition to the Duryea and Brasier cars the Holsman embodies this practice.

The Boston Gear Works have discontinued their Boston office and will transact all business at their factory, Norfolk Downs, Mass. Their freight address is Wollaston, Mass.

Grand Rapids (Mich) motorists are planning a signboard tour, which shall have for its purpose the placarding of the highways with directions as to the distance and routes to prominent points.

The Autocar Company have installed a new rear wheel power testing plant at their factory. This consists of two sets of friction wheels which are connected by a belt to a dynamo, which in turn is wired

up to a certain number of electric lights. The rear wheels of the car are placed on the friction wheels and the motor is then started up and made to generate current for a certain number of lamps.

The Cleveland A. C. expects to raise \$25,000 by subscription to reconstruct Euclid avenue from Euclid Creek to the county line. This had long been regarded as an exceptionally bad road for motoring.

The first models of the Kisselkar, the new automobile manufactured at Hartford, Wis., have been received by the McDuffee Automobile Company, of Chicago, who will handle the entire product of the factory.

S. F. Bowser & Co., Inc., of Fort Wayne, Ind., have opened a New York branch at 299 Broadway, New York city, in charge of W. T. Hatmaker, formerly manager of the mail order department of their Boston branch.

The Locomobile Company of America this year offered a substantial sum in cash as a prize for the branch manager whose agency made the best showing for the season. Irving J. Morse, the Philadelphia manager, was the winner.

The Brush Motor Car Company has been formed in Detroit to manufacture a small car after designs by Alonzo Brush, formerly designer of the Cadillac Company. Frank Briscoe, of the Briscoe Manufacturing Company, is general manager.

The Philadelphia business of the Knox Automobile Company has been taken over by the recently incorporated Knox Motor Car Company. They will be permanently located at 510-512 North Broad street. E. L. Thrasher will be general manager.

Georges Dupuy, American correspondent for the French daily *L'Auto*, has addressed a circular letter to American automobile manufacturers inviting them to a competitive tour in Europe during June and July, 1907, for a trophy to be known as the American gold cup.

At the annual meeting of the A. C. of Buffalo the following officers were elected: President, Seymour P. White; vice president, Frank B. Hower; secretary, Dai H. Lewis; treasurer, John M. Satterfield; directors, E. R. Thomas, E. H. Butler and Charles Clifton.

The board of directors of the Port Huron (Mich.) Chamber of Commerce let the contract on December 15 for the construction in that city of the new factory of the Northern Motor Car Company. It will be built of concrete and brick, and is to be completed within 60 days.

Officers of the Automobile Trade Association of Buffalo for the year 1907 have been elected as follows: President, J. A. Cramer; vice president, W. C. Jaynes; secretary, Dai H. Lewis; treasurer, J. J. Gibson; executive committee, J. B. Eccleston, G. H. Poppenberg and E. C. Bull.

State Highway Commissioner Earle, of Michigan, reports that during the 17 months his department has been in existence 52 miles of stone roads have been built in Michigan, in addition to 33 miles of first

class gravel road and enough clay-gravel roads to make 90¼ miles. The total value of all the roads constructed was \$163,177. The State has paid for completed roads \$61,826, and the value of the roads pending is \$77,082.

The addition to the plant of the Wayne Automobile Company, Detroit, Mich., is three stories high, with more than 40,000 square feet floor space. The ground dimensions are 56x240 feet. Machinery is now being installed, and it is expected that the entire plant will be in operation soon.

Plans for the new plant of the Maxwell-Briscoe Motor Company, at Newcastle, Ind., show that the buildings will contain 350,000 square feet of floor space instead of 250,000 square feet, as had been planned at first. The Tarrytown plant will be retained and probably used for experimental and commercial vehicle work.

The Lunkenheimer Company, manufacturers of engineering appliances, Cincinnati, Ohio, have been sued by the Manufacturers of Automobile Parts, Appliances and Accessories Exhibition Company, an Illinois corporation, for \$122.85, the balance claimed to be due for space contracted for by the defendant at the Automobile Parts Show in Chicago, September 22-29, of which A. M. Andrews was secretary.

Garage Notes.

S. E. Arnold is building a garage at Waukegon, Ill.

J. V. Barton is to erect a garage at Long Beach, Cal.

Walter Jennings is building a garage at Cold Springs, N. Y.

M. C. Flewelin is to open a repair shop at Mendon, Mich.

W. N. Woelk has opened a garage and repair shop at Larned, Kan.

The garage of Frank Wright at Marietta, Pa., was burned December 8.

George West, Ballston Spa, N. Y., is said to be planning to erect a garage at that place.

C. E. Myers is to erect a garage at 643 and 645 Maryland avenue N. E., Washington, D. C.

The Alborak Auto Company will open a garage and repair shop at 1875 Broadway, New York.

The Reo Motor Car Company have leased the building at 1344 Michigan avenue, Chicago, Ill.

Charles F. Louk is to open a garage at Council Bluffs, Ia., where he will handle the Maxwell cars.

Ernest Dickinson, of Chillicothe, Ohio, has purchased an interest in the Lash garage at Henry, Ill.

Ware & Floren, Lakota, N. Dak., have opened a garage, where they will handle Reo and Premier cars.

M. H. Dunham is building an addition to his garage 22x55 feet in size at Great Barrington, Mass.

The De Lancey Garage, Twenty-second and Pine streets, Philadelphia, Pa., has been opened to the public.

Snyder & Co. are building a garage at East Orange, N. J., to be ready for occupancy by March 1.

Fred G. Bierlein has sold a half interest in the Reo agency and garage at Long Beach, Cal., to W. T. Neece.

The private garage belonging to the George L. Brownwell estate, New Bedford, Mass., was destroyed by fire December 8. Six automobiles were partially destroyed.

The Treasury Department has leased a garage on Christopher street, New York, for the purpose of examining and appraising importations of for-

eign built automobiles and the registration of domestic cars taken abroad.

H. B. Groves has opened garages at 609 Pierce street, Sioux City, Ia., and on Central avenue, Fort Dodge, Ia.

William H. Furman, of the Auto Car, has leased the second floor of 54 and 56 West Forty-third street, New York.

I. Freeman, San Francisco agent for the Aero-car, will soon move into his new garage on Golden Gate avenue.

The Rarig Automobile Company are to erect a four story garage on Bush street, near Polk street, San Francisco, Cal.

Jos. Maw & Co. are to erect a garage at Winnipeg, Man., to cost about \$80,000, and with 13,000 square feet floor space.

Borgers Brothers, 1314 West Johnson street, Madison, Wis., will erect a \$15,000 automobile garage and repair shop.

The Anthony Motor and Cycle Company, Colorado Springs, Col., have sold their business to the Western Automobile and Supply Company.

The Blue Ribbon Horse and Carriage Company, Bridgeport, Conn., are to erect a concrete and steel garage on Fairfield avenue, in that city.

The building of the Auto Garage Company, the Auto Rink and the Blanchard Oil Company, Pawtucket, R. I., were destroyed by fire December 8.

The Pitman-Nelson Automobile Company are erecting a garage and machine shop at Berkeley, Cal. It will be 50x130 feet in size, and will cost \$30,000.

The National Motor Vehicle Company, of Indianapolis, have established an agency in Cleveland, Ohio, with T. C. Whitcomb as the local representative.

The White Garage, Los Angeles, Cal., has leased the garage at Coronado, formerly under the management of the Hotel del Coronado, and will conduct it as a branch.

William J. Roepke, and H. D. Keller, president of the Northern Foundry and Supply Company, Detroit, Mich., have formed a partnership to build a garage in that city.

The Automobile Company, of which W. W. Brackett is president and F. L. Bonn vice president and general manager, will handle Stearns cars at 365 Fell street, San Francisco.

The Diamond Motor Car Company of San Francisco, Cal., who formerly occupied 365 Fell street, in that city, are now located on Golden Gate avenue. They handle the Northern cars.

The Packard Company have removed their principal office in northern California to San Francisco, but maintain as a branch the quarters that they occupied in Oakland after the big fire.

The Northwestern Cadillac Company, of which L. E. Horton is manager, have opened a garage at 316-322 Fourth avenue, South, Minneapolis, Minn. They will handle Cadillac and Pope-Waverley cars.

The Pioneer Automobile Company of San Francisco have established a branch office and salesroom at Twelfth and Madison streets, Oakland, Cal., in charge of A. C. Wheelock. They will handle Thomas, Winton and Oldsmobile cars.

The Citizens' Motor Car Company has been organized at Cincinnati, Ohio, to take over the garage business of the D. T. Williams Valve Company. They handle the Packard, Pierce, Autocar and Cadillac cars.

The Bird-Sykes Company has succeeded the Bennett-Bird Company, which has represented the Corbin and Dolson in Chicago. George H. Bird, the senior member, was junior member of the old firm, and his new associate, B. G. Sykes, formerly represented the Locomobile in Chicago. As the Corbin has been admitted to the licensed ranks, and the Dolson is an independent, the agency of the latter car has been given up.

New Incorporations.

Pullman Automobile Company, Pierre, S. Dak.—Capital stock, \$50,000.

The American Carburetor Company, Detroit, Mich.—Capital stock, \$30,000 (\$25,000 paid in); to manufacture carburetors.

Active Auto Company, San Francisco, Cal.—Capital stock, \$50,000. Incorporators, J. G. Carey, R. J. McGahie and J. D. Perry.

United States Automobile Exchange, Chicago.—Capital stock, \$2,500; garage. Incorporators, F. M. Grier, E. F. Kemper and Heath Gregory.

Dupont Garage Company, Washington, D. C.—Capital stock, \$6,000. Incorporators, Raymond A. Klock, Charles F. Sponsler and John L. Spencer.

Jackson Motor Car Company, Brooklyn, N. Y.—Capital stock, \$20,000. Incorporators, Charles M. Herring, Henry W. Palmer and Frank H. Palmer, of Brooklyn.

H. S. Haupt Company, New York.—Capital stock, \$300,000; to deal in automobiles. Incorporators, E. M. Haupt, F. J. Titus and A. S. Robinson, of New York.

Reliable Dayton Motor Car Company, Chicago, Ill.—Capital stock, \$25,000; to manufacture vehicles. Incorporators, Edwin H. Lowe, E. R. Tildard and G. I. Weatherstone.

Commercial National Manufacturing Company, Hammond, Ind.—Capital stock, \$12,000; to manufacture automobiles and parts. Clarence Kistlen, L. F. Jonas, E. J. Hathaway.

Atlas Drop Forge Company, Lansing, Mich.—Capital stock, \$100,000. President, R. E. Olds; vice president, Smith J. Young; secretary and treasurer, S. H. Carpenter.

Elizabeth Motor Car Company, Elizabeth, N. J.—Capital stock, \$10,000; to do a trucking business. Incorporators, Robert H. McAdams, Henry I. Pfeffer, Ferdinand S. Brink.

H. Oscar Brown Motor Car Company, Camden, N. J.—Capital stock, \$100,000; to manufacture automobiles. Incorporators, H. Oscar Brown, F. R. Housell and John A. MacPeak.

Hagar Carburetor Company, Nashville, Tenn.—Capital stock, \$15,000. Incorporators, Duncan F. Kenner, Chas. C. Coddington, Charles S. Brown, Frank W. Hagar, Chas. C. Gilbert.

Empire State Motor Car Company, Brooklyn, N. Y.—Capital stock, \$25,000; to manufacture gas engines, etc. Incorporators, H. Raub, O. Trieb and L. D. Ball, Jr., all of Brooklyn.

Westlake Garage Company, Los Angeles, Cal.—Capital stock, \$10,000 (\$9,000 subscribed). Incorporators, S. F. Swain, J. P. Creager, Mendel Meyers, Elizabeth Swain and G. S. Meyer.

The Oklahoma Motor Car Company, Oklahoma City, Okla.—Capital stock, \$25,000. Incorporators, T. B. Funk and Clark Braden, of Oklahoma City, and Jerome Harrington, of Watonga, Okla.

The Broadwell Company, Rochester, N. Y.—Capital stock, \$10,000; to conduct a garage. Incorporators, William C. and Olla E. Broadwell, and George and Julia Bauer, all of Rochester.

The Joseph Menchen Electrical Company, New York.—Capital stock, \$15,000; to manufacture electrical appliances. Incorporators, F. B. Arnold, F. W. Edwards and J. H. Crosier, New York.

The Eclipse Electric Storage Battery Company, New York.—Capital stock, \$1,000; to manufacture storage batteries. Incorporators, W. Knoblock, G. Fendt, G. Pfachler, Jr., all of New York.

Hatfield Motor Vehicle Company, Cortland, N. Y.—Capital stock, \$50,000; to manufacture automobiles. Directors, C. B. Hatfield, C. B. Hatfield, Jr., of Cortland, and C. T. Vance, Lakewood, N. J.

The Buffalo Gasoline Motor Company, Buffalo, N. Y.—Capital stock, \$100,000; to manufacture motors. Incorporators, Albert F. Dohn, William E. Blair, Louis A. Fischer, Julius J. English and Abraham Snyder.

The Automobile Gasoline Company, St. Louis, Mo.—Capital stock (fully paid), \$5,000; to deal in gasoline, oils and automobile supplies. Incorporators, Joseph A. Duffy, Benjamin H. Fellenz and Patrick J. Ludden.

The Corbin Motor Vehicle Corporation of New York, Cold Springs, N. Y.—Capital stock, \$5,000; to deal in automobiles. Incorporators, M. S. Hart, E. H. Brandt, New Britain, Conn., and L. Markle, New York.

The Electro Manufacturing Company, Hartford, Conn.—Capital stock not stated; to manufacture a rubber compound for filling tires. Incorporators, Halsey B. Philbrick, Charles H. Cooley, Edward

S. Young, Charles H. Cooley, Jr., and Leroy S. Lewis, all of Hartford.

Dealers' Automobile Exchange and Development Company, Rahway, N. J.—Capital stock, \$125,000. Incorporators, Charles W. Nichols and Samuel D. Mershon, Rahway, and Herbert W. Walker, New York.

Detroit Motor Car and Supply Company, New York.—Capital stock, \$30,000; to deal in automobiles and parts. Directors, F. E. Weston, New York; A. P. Morrow, Elmira, N. Y., and J. A. Van Wie, Cortland, N. Y.

The General Accumulator and Battery Company, Milwaukee, Wis.—Capital stock, \$25,000; manufacturers of electric machinery and electric automobiles. Incorporators, R. J. Fleisher, A. J. F. Uchitil and H. G. Decker.

Pecos Auto Company, Pecos, Reeves County, Tex.—Capital stock, \$15,000; to run an automobile stage between all points in Reeves, Ward, Pecos and adjoining counties. Incorporators, R. D. Gage, T. Y. Casey and W. D. Cowan.

Wellington Stables, Inc., New York City.—Capital, \$15,000; livery and automobile business. Incorporators, George M. Travis, No. 446 Hudson avenue; Robert J. Ryan, No. 280 Hudson avenue; John W. Gasteiger, No. 17 Sheffield avenue, all of Brooklyn.

The Pope-Toledo Auto Livery Company, 1322 Michigan avenue, Chicago, Ill.—To do a general garage and livery business. Incorporators, Charles Weber, Alfred Reeke and Harry Griffin, of the Orlando F. Weber Company, Chicago agents for the Pope cars.

Detroit Spring Wheel Company, Detroit, Mich.—Capital stock, \$100,000 (\$80,000 paid in); to manufacture automobiles and automobile supplies. Incorporators, Walter Parker, William T. McGraw, Frank G. Smith, Jr.; Harry Bennett, Benjamin S. Warren.

New Agencies.

Richmond, Va.—S. Staggs, Holman.
Saginaw, Mich.—J. P. Beck, Maxwell.
Denver, Col.—Geo. E. Hannan, Jackson.
Tiffin, Ohio.—G. C. Kalbfleisch, Maxwell.
Lebanon, Ohio.—A. J. Kilpatrick, Maxwell.
Jacksonville, Fla.—Fred E. Gilbert, De Luxe.
Columbus, Ohio.—Maxwell Agency, Maxwell.
Cincinnati, Ohio.—Stanley Hooker, Maxwell.
Ann Arbor, Mich.—A. W. McClure, Maxwell.
Dayton, Ohio.—Dayton Auto Company, Jackson.
Norfolk, Va.—W. H. Grover, Premier and Maxwell.

New London, Conn.—J. H. Sullivan, York Pullman.

Buffalo, N. Y.—The Poppenberg Auto Company, Jackson.

Indianapolis, Ind.—Capital Auto Company, Jackson.

Kansas City.—Jackson Motor Car Company, Jackson.

Cleveland, Ohio.—Paxon Motor Car Company, Jackson.

Warren, Ohio.—Reliance Machine Company, Maxwell.

York, Pa.—Snyder Automobile Company, York Pullman.

Louisville, Ky.—Longest Brothers Company, Inc., Jackson.

Boston, Mass.—Northern Automobile Agency, York Pullman.

Baltimore, Md.—Shaffer Manufacturing Company, York Pullman.

Pittsburg, Pa.—Pennsylvania Automobile Company, York Pullman.

Grand Rapids, Mich.—Morton & Luce, Stoddard-Dayton and Maxwell.

Trade Personals.

Warren Noble has been appointed chief engineer of the Matheson Company of New York.

Charles Schmidt, designer for the Peerless Motor Car Company, Cleveland, Ohio, attended the Paris Show.

A. A. Russell has been appointed manager of the New York branch of the Motor Car Company, 1217 Broadway.

