...THE...

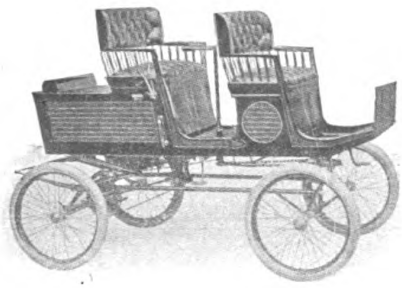
Horseless Age

VOLUME 8. APRIL 3, 1901. NUMBER 1.

Working Drawings of Light Gasoline Carriage, Part IV.

THE "MILWAUKEE."

[redacted]anhope, $750. Delivery Wagon, $1,000.
Surrey, $1,000.



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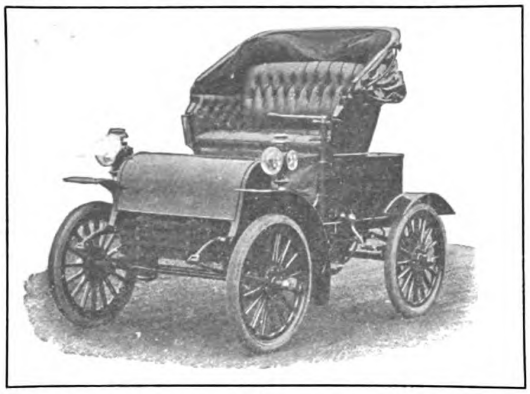

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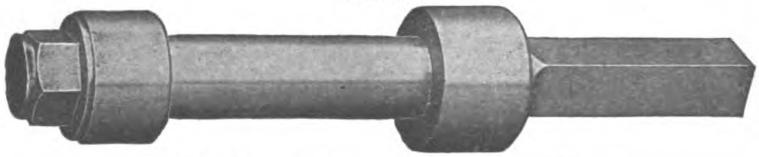

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INDEX TO VOLUME VIII.

April 3d, 1901, to December 25th, 1901, Inclusive.

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GENERAL.

IGNITION.

LEGISLATION AND LEGAL.

LESSONS OF THE ROAD.

MACHINERY AND TOOLS.

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MOTOR CYCLES.

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THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

VOLUME VIII NEW YORK, APRIL 3, 1901 NUMBER 1

THE HORSELESS AGE.

E. P. INGERSOLL, EDITOR AND PROPRIETOR.

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☞ One week's notice required for change of advertisements.

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"LEAD CAB FUNERALS."

The cat is out of the bag at last. Lead Cab officials are going to Jersey City to attend another funeral. The New England Lead Cab Company has given up the ghost, and on April 29 the directors will make a pilgrimage to the birthplace of watered corporations to take formal action on its demise and bury the remains. The semi-annual statement of the company's finances shows that more than $1,250,000 has been invested in the "business," and that for the six months ending March 1, 1901, the gross income, including interest on deposits and rentals, was $95,310, while the total expenditures for the same period were $211,969. The deliberations of the directors, therefore, can scarcely be of a protracted nature.

The company states that it has managed to save from the wreck $607,084 in cash and 245 Lead Cabs, in a more or less dilapidated condition, and not likely to be "distributed among the other branches," as was given out to be the destination of the Chicago Lead Cabs at the recent discontinuance of business.

The ill starred company also controls the stock of the Boston Transit Company, organized some time ago, with a cash capital of $400,000, ostensibly to run Lead Cabs in the fashionable Back Bay district of Boston. It also maintained a Lead Cab establishment at Newport, R. I., where it owned real estate, as well as at 541 Tremont street, the site of its central station.

After two years of studied deception on the part of the promotors of this colossal speculation the public is finally getting an insight into its rottenness. In spite of the assistance of a purchasable crew of henchmen and a servile press the truth has prevailed. The outraged stockholders have demanded investigation and the figures are public property. Subterfuge will avail no longer.

When, about two weeks ago, the dissolution of the Chicago branch was announced the management and a parrot press stated that the heavy losses sustained were due to the bad streets of the Western metropolis, overlooking the annual report of the Philadelphia branch, almost as unsatisfactory, where roads are of good surface. And now, to settle all controversy, the Boston company appears at the confessional and adds its doleful story to the growing tale of Lead Cab woe. With such overwhelming evidence of the worthlessness of the system staring the public in the face, how much longer will the New York branch be able to drag out its miserable existence? We shall await its annual statement with interest, for, adept in financiering as its promoters are, it is impossible to see how they can prevent like disclosures and follow the other companies to the limbo of exploded humbugs.

Once these Lead Cab fiascos are out of the way, honest automobile manufacturers will breathe easier and honest automobiles find readier acceptance from the public.

THE CRISIS IN MASSACHUSETTS.

Massachusetts is now threatened with restrictive automobile legislation. A bill is before her Legislature, authorizing cities

and towns to regulate the speed of automobiles within their jurisdiction. This bill reads as follows:

Section 1. A city or town may by ordinance or by law prohibit persons from riding or propelling or causing to be propelled, vehicles other than those propelled or drawn by horses or persons upon any of the streets or ways therein at a rate of speed which it deems inconsistent with public safety or convenience, and may by ordinance or by law prescribe penalties for violation of such ordinance or by-laws not exceeding $100 or ten days' imprisonment for any one offense.

Section 2. Any person violating such ordinances or by-laws may be apprehended and punished as in such ordinances or by-laws provided in the same manner as is now provided by law for the apprehension and punishment of persons violating any ordinances or by-laws of cities or towns.

The consequences of such ill judged legislation have already been pointed out in THE HORSELESS AGE and have been sufficiently shown by the law committee of the Automobile Club of America. The confusion that would result from the enactment of absurd and conflicting local laws would make touring by automobile intolerable and lay a heavy hand upon the general progress of the industry. Adverse legislation of this kind has been successfully warded off in New York State, and a bill substituted which is eminently fair to all interests concerned. We have no doubt that this bill, which was printed in full in our issue of March 6, can be adopted as a model in State automobile legislation the country over, and earnestly request our readers, wherever they may be, to exert their influence to that end. In Massachusetts, in particular, the situation appears to be grave, calling for immediate and determined action on the part of both of the Boston automobile clubs. To let the occasion slip and saddle the sport and the industry of the Bay State with such onerous conditions would be inexcusable in the light of New York State's excellent example.

MULTIPLE OILERS.

The construction of special oiling devices for automobiles does not seem to have received the attention of automobile manufacturers, or of firms making a specialty of oilers and other fittings, that it deserves. There are, of course, a number of vehicles on the American market in which multiple oilers are used, but they are relatively few. In the majority of cases the number of oil and grease cups to be filled before starting on a run is considerable, and this preparatory work consumes not a little time. Besides, oil cups always require more or less attention when on the road, lest they become empty, when serious results follow. On leaving the vehicle stand for any appreciable length of time, oil cups must be turned off or much oil may be wasted.

It will be apparent from this that a reduction of oiling devices is much to be desired. One step in this direction is the use of splash lubrication, now common in gasoline motors; another is the piping of a number of the parts to be oiled to a single oil reservoir. These multiple oilers, of which a specimen is illustrated and described on another page, are almost universally used on French automobiles, and there is every reason to believe that they will eventually be common here. Automatic oilers need not necessarily have the pressure feed and the accompanying automatic feature of the oiler referred to above. A gravity feed arrangement which requires the flow of the oil to be shut off when stopping the engine or carriage would be quite sufficient, as the oiler would naturally be placed in a readily accessible location, and one turn of a handle would stop all the feeds at once.

It is unnecessary to further insist upon the trouble that can be avoided by the use of such multiple oil cups. Our manufacturers who do not already use such oilers should adopt them without delay.

THE CONDUCT OF MOTOR TRIALS.

In the case of automobile competitions which are not intended to be speed contests there is always more or less difference of opinion as to what should constitute the basis of judging the competing vehicles and making the awards. The aim of all these trials or endurance tests is, of course, to bring to the fore the most reliable and serviceable vehicles. While the end in view is thus clearly defined, and while exceptions to it are hardly to be expected, the best means of attaining it are less obvious, and as a consequence there is always a good deal of discussion before deciding upon the conditions of a contest, and here and there a protest after the contest is over. It would seem to be well, on the one hand, in judging the performance of vehicles, to take into account only such points as are susceptible of absolute determination, such as number of breakdowns en route, time consumed in covering the distance, etc., and leave out of consideration all points which can be expressed only in relative terms.

While such a standard would have the advantage of simplicity and ease of application, it would not give all the information about the vehicles that prospective users might desire. In the first place, the period of the trial should represent only a comparatively small fraction of the life of the vehicle, and as it is self-evident that only new, or practically new, vehicles are entered in the more important events at least, the vehicles at the termination of the trial should still be in good working condition, capable of many miles more. Right here is a point which ought to be considered in drafting the conditions of such trials: The condition of the different vehicles at the end of the contest. To investigate every part of a motor vehicle and judge its condition of wear is not an easy matter, of course, but a report giving information on this point so much enhances the value of an endurance test that it is well worth the trouble it causes. In order that work of this nature may be reliable, competent engineers must be intrusted with the examination of the vehicles and the drafting of the report.

When endurance tests are made to include this feature they will be a means of education, not only of the general public who may chance to witness the trial, but of those more direct-

ly interested, who wish to form an opinion of the serviceability or durability of different types of vehicles.

THE LIVERPOOL TRIALS.

The Liverpool Self-propelled Traffic Association will hold another trial of motor vehicles for heavy traffic next June, of which the conditions are reprinted in another column. The various trials which have been organized in previous years by the Liverpool Association have been of an exceedingly practical nature, and have undoubtedly done much to bring the heavy motor industry in England to the advanced position it has attained. These trials have served a double purpose. In the first place, they have furnished much valuable information concerning the requirements of heavy road traction, on the strength of which further improvements could be made, and on the other hand, they were instrumental in demonstrating to a large class of prospective users—large Liverpool shippers and Midlands manufacturers—the possibilities of heavy motor road traction, thus stimulating general interest in the subject.

By looking through the conditions governing the trial, one is impressed with the fact that they are drawn up very carefully and bear the stamp of previous experience. In the list of points which will be taken into consideration by the judges in making the awards, practically everything which affects the general efficiency and adaptability of such vehicles seems to be included. Some of the conditions which competing vehicles must satisfy are very instructive, as reflecting the experience of actual practice. Thus, vehicles must be provided with means for locking the compensating gear. This locking arrangement seems, therefore, to be thought a necessary adjunct by the Association. Another point worthy of note is the specification of the vehicles' adaptability to be worked in enclosures of limited area. It has always been clear that business vehicles—delivery wagons and trucks—must be capable of getting into and out of very confined places, and the Liverpool Association has now fixed a standard of requirements in this direction by specifying that it must work into and out of an embayment of one and a half times its own length. The drain plugs at the lowest points of boilers, tanks, oil baths and pipings are necessary for obvious reasons, but the reason of the provision that the cross section of any pipe connecting two tanks shall be not less than that of the pipe provided for filling the first of the two, are not as clear. Perhaps the provision is intended only to insure facility of filling the tanks.

The trials include rather extended trips in a district in which heavy motor wagons already find considerable application, and there can, therefore, be no doubt that they will greatly stimulate popular interest in heavy motor traffic, while at the same time furnishing new data for improvement in the construction of such vehicles.

"AGENTS WANTED."

There is a general demand for automobile agents, and all sorts of offers are held forth by manufacturers (and those who expect to be manufacturers) to parties willing to act as local representatives. While there are undoubtedly many instances in which arrangements to the mutual advantage of both manufacturer and agent can be and have been made, a word of general warning will not be amiss at the present time. Willingness to act as agent and to sell vehicles on a commission or other basis, is generally not the only requirement exacted of the would-be agent. He is asked to make a substantial deposit with the "manufacturer," and to invest in a sample automobile which, in many recorded cases, has either failed to appear altogether or might better never have seen the light. When such demands are made the agent cannot be too careful, as there are, beyond doubt, many concerns now canvassing or advertising for agents which will not be able to make good their promises.

Scarcely a town of any size in the country but has its automobile company in some of the incipient stages of promotion. No matter how unsuited it may be in its location for a manufacturing business of this kind, the glib tongue of some local inventor or itinerant promoter has succeeded in interesting local capital and the initial steps toward manufacture are taken. It is needless to say that in 99 out of 100 cases failure early and certain awaits such ventures.

THE CHICAGO AUTOMOBILE SHOW.

By E. C. Oliver.

The automobile show just closed at the Coliseum, Chicago, adds another to the already extensive list of the season's exhibitions. The exhibitors were in most cases those firms having local agencies, yet not all having such agencies were represented. In this respect the show was disappointing, not affording a broad enough field for comparison, and not bringing to light the improvements expected in this year's models of the various machines.

The principal exhibitors of automobiles were as follows:

STEAM.

Mobile Company of America—Standard types of one and two seated carriages (nine machines).

Milwaukee Automobile Company—Standard one and two seated carriages, a 2-ton truck, a light delivery wagon and a special racing machine (ten machines).

The Reading Automobile and Gear Company—Single seated carriage, equipped with a four-cylinder, single acting steam engine (one machine).

GASOLINE.

De Dion-Bouton Motorette Company—Various types of motorettes and parts (four machines).

Knox Automobile Company—A standard three-wheeled runabout, with single steering wheel in front and air cooled motor (three machines).

Friedman Automobile Company—A three-wheel runabout, with single driving wheel behind (two machines).

ELECTRIC.

National Automobile and Electric Company—One and two seated carriages, finished in various styles (eleven vehicles).

Woods Motor Vehicle Company—Various types of carriages, a wagonette, brake, etc (six vehicles).

Electric Vehicle Company—(Three machines).

Hewitt-Lindstrom Motor Vehicle Company—Carriages and a heavy omnibus (four vehicles).

O. V. Bachellé—Electric Stanhope.

Fanning Manufacturing Company—Electric runabouts (two machines).

A review of the number of vehicles of each type will show that the electrics were very much in the majority.

Among the steam machines one which received much attention and much favorable comment as to design and appearance was the steam racer built by the Milwaukee Automobile Company. This machine is not an adaptation of one of the standard machines, but has been designed especially for this use by the company's Chicago agent, F. P. Illsley, and is a very creditable piece of work. [This vehicle will be illustrated and described in our next issue.—ED.]

Among the gasoline machines the one receiving most favorable comment in regard to quietness of running and ease of control was the Knox three-wheel runabout. This machine captured the honors in the obstacle contest, making one-eighth of a mile, with boxes and barrels every 20 feet, in 57 seconds, coming in contact with but one piece. The machine produced neither smell, smoke nor noise, and demonstrated its facility in turning corners by going around short curves in the track at a high rate of speed.

In the electric class there were many vehicles deserving notice for beauty of design and elegance of furnishings.

The Fanning electric vehicle is a new type of runabout built by the Fanning Manufacturing Company, of Chicago; it is very neat in appearance and has a type of running gear of somewhat novel design.

The exhibitors of parts and sundries were the following:

The Ralph Temple Automobile and Supply Company—This firm represents some twenty or more different manufacturers, and the exhibit was in itself a considerable automobile and bicycle show. It included, among others, the Century steam carriage, with engines set fore and aft and driving the differential direct through bevel gears. This carriage was the only one shown having a foot reverse. The Loomis gasoline carriage, also a part of this exhibit, is a neat appearing machine; it has a Crest duplex motor and is provided with the Upton transmission. The steering handle is outside of the body at the right hand side, and the turning is accomplished by a forward or backward movement of this handle; this arrangement leaves the front of the carriage entirely free.

This exhibit contained also the Crest Manufacturing Company's gasoline motors, Janney, Steinmetz boiler shells, the Eastman Automobile Company's steel bodies and other exhibits.

The Automobile and Cycle Parts Company had a very complete and tasty exhibit of its rolled rims, automobile chains and steel balls.

H. F. Boerbein & Co. exhibited running gears.

The Midgley Manufacturing Company exhibited for the first time its tubular steel automobile wheel; although a comparatively new product it received much attention. Several types of wheels, adapted to various purposes, were shown. It may be interesting to know that Major Davidson, of Northwestern Military Academy, who is designing a gun carriage with which he expects to make a trip to Washington this summer, has his machines equipped with this wheel, together with the New York long distance tire.

The Standard Welding Company showed several samples of their work in welded boiler shells, wheel rims and tubing approaching in perfection seamless work.

The Snell Cycle Fittings Company showed various types of drop forgings for automobiles.

The Badger Brass Manufacturing Company exhibited automobile lamps.

Veeder Manufacturing Company, odometers and cyclometers.

The Liberty Bell Company, automobile bells.

American Roller Bearing Company, various types of light and heavy roller bearings.

Baldwin Cycle Chain Company, many styles of chains and sprockets.

Moffet Roller Bearing Company, various sizes of bearings.

The tire exhibits were by the well-known firms B. F. Goodrich, Goodyear Tire and Rubber Company, India Rubber Company, New York Belting and Packing Company, Diamond Rubber Company and Munger Vehicle Tire Company, each showing its product in various sizes and styles.

A novelty in electric automobiles was shown by a Chicago inventor, in a machine having two 8-foot driving wheels, with motors in the hubs, the seat and battery being hung on springs between the wheels. The idea of the inventor is that to make a storage battery efficient and lasting it must be protected from jars and shocks, and that the large wheels overcome obstacles much easier than small wheels. Another point claimed is the ideal simplicity of the arrangement, there being but two bearings on the machine, and the steering being effected by means of two brakes, one on each wheel, by applying one brake or the other, thus retarding the wheel on the side to which it is desired to go.

A spectacular feature was a speed registering machine, on which a carriage could be placed and run at any speed desired while tied to a post behind.

It must be said that the track manners at this show were not above reproach; to the lack of good track management are due a number of accidents, some of which were very serious indeed. The drivers were allowed to run their machines at any speed desired, pass others at any time or place, and even novices were taught to handle machines when the track was occupied by many other vehicles. In short, it seemed that the track part of the affair was decidedly "go as you please," and a good portion of the time of one or two men was required in repairing the railing around the track where machines had been lost control of and broke through.

NEW YORK FERRIES AND AUTOMOBILES.

There is still much confusion among the ferries plying about New York in regard to the carriage of automobiles, notwithstanding that notice of the Platt bill amending the old prohibitive law has been sent to the companies by the Treasury Department.

The Riverside and Fort Lee ferry, crossing to the Jersey shore at 128th street, accepts automobiles under the usual conditions, i. e., that the fires of steam vehicles be extinguished and that they be placed at the rear of the boat.

The Staten Island Ferry Company has not as yet taken action in the matter, owing to the uncertainty in the insurance policies, companies insuring the boats having come to no decision in regard to the effect on the risk of the transportation of vehicles containing gasoline. The same uncertainty bars automobiles from the boats of the Long Island Railroad and the Union Ferry Company, operating the main Brooklyn

ferries, Fulton, Wall and Catharine. In the case of the Long Island ferries two special trips are made for the benefit of automobilists one at 7:40 a. m. from Long Island City and the other from New York at 9:40 p. m. Those who do not wish to conform to this schedule may pay $2.50 to have their automobiles transported by special boat.

The East Twenty-third street, the Pennsylvania, Erie, B. & O. and Astoria ferries have open gates at all times for all kinds of automobiles, provided, in the case of steam vehicles, the fire is extinguished before the vehicle comes aboard.

All the companies insist, however, that the automobiles shall be sent to the rear to avoid any possible trouble.

THE PORTER STORAGE BATTERY.

The Porter Battery Company, of Monadnock Building, Chicago, have just issued an "automobile catalogue," describing their automobile batteries, and a book of instructions for users. The Porter battery, which has been manufactured since 1898, is of the Faure type and is claimed to have a high capacity in comparison to weight. From a table of weights, dimensions and capacities we gather that a cell weighing, complete, 11 pounds, and measuring 5¼x2⅛x10 inches, will give 48 ampere hours when discharged in three hours, 57 ampere hours when discharged in four hours and 69 ampere hours when discharged in five hours. A cell weighing 21 pounds and measuring 5¼x3⅝x10 inches gives 96 ampere hours in a three-hour discharge, 114 for a four-hour discharge and 138 for a five-hour discharge. The capacities of the other cells listed are in proportion to these. We observe that the jars of all the cells have a standard width of 5¼ inches and a standard height of 10 inches. The width and height of the battery space in a vehicle, therefore, are always the same, and only the length of the space varies with the size of the battery used.

The following directions for using the Porter battery are equally applicable to other automobile batteries:

"Be sure that the electrolyte (liquid) covers the plates at all times in all cells. In replenishing use only pure water. Always open carriage bodies when charging batteries. Never light a match near a battery when charging. Never throw on or off your carriage controller while charging. Never spark your battery. Always charge promptly after using your carriage. Charge at a slow rate ten or twelve hours once each month."

The instruction book is a very practical little guide, strongly bound. It gives an elementary theory of the storage battery and hints on the application of batteries to vehicles, their installation and connection to the controller, charging stations, charging, replenishing the electrolyte, cleaning, etc. In regard to storing batteries for any length of time, it says: "Should you wish to store your vehicle for a time, say through the winter, the batteries should be charged, taken out and washed, and laid away dry. The positives should be kept entirely separate from the negatives at all times. When wanted the plates can be put back and the batteries are ready for use without deterioration." It is well known that when batteries are kept idle for any length of time in the assembled condition they will sulphate; by storing them as described above this sulphating is avoided.

The method of filling the cells with electrolyte, the connecting of the battery in the vehicle, connections for charging, etc., are illustrated by drawings.

THE HAYNES-APPERSON TWO-SEATED ROAD CARRIAGE.

One of the latest machines to leave the Haynes-Apperson Works, at Kokomo, Ind., was recently brought to New York for a wealthy merchant, and is stored at the Automobile Exchange and Storage Company's station, 133 West Thirty-eighth street. The vehicle is a surrey, and is equipped with an 8 horse power, opposite cylinder, balanced motor, placed lengthwise in the body. Touch spark ignition is employed, and the electric current is furnished by a magneto-generator driven by a belt from the engine crank shaft. In starting a set of dry batteries furnishes the necessary current, and when the motor is up to speed the circuit is switched over to the generator by means of a switch lever located convenient to the operator.

The two pistons work on crank pins set at 180 degrees, and the motion of the reciprocating parts is therefore balanced. The engine has been considerably simplified. The front exhaust and scavenging connection between crank and combustion chamber are omitted and the inertia hit and miss governor is no longer used. The explosive mixture is supplied to the cylinders by simple carburetors, which can be controlled from the seat by means of a foot button. The stems of the gasoline needle valve and the air throttling valve are geared together by means of gear sectors, and when the throttling governor is operated both valves open or close together. By this means the speed of the engine can be varied within wide limits. The air admission ports of the two carburetors are connected by a stout rubber hose, pierced with small holes for part of its length. The air is thus drawn in at numerous small openings, reducing the noise of the suction.

The cooling water is carried in two tanks of sheet copper, forming the side panels of the body. To increase the cooling surface of the tanks, the part outside the wall of the body is pierced by a number of tubes in the direction of the carriage. The gasoline tank, which has a capacity of 12 gallons, is located in the front seat, which also provides room for the dry battery and a tool box.

The variable gear gives three speeds ahead and one reverse, and all of these speeds are obtained through separate friction clutches by means of a single operating lever. The highest speed forward is about 20 miles an hour and the lowest 5 miles. A countershaft below the engine shaft receives the power from the latter by means of spur gearing. The gears on the countershaft corresponding to the various forward speeds mesh directly with their respective pinions on the motor shaft, while the gear for the reverse motion gears with its pinion on the motor shaft through an intermediate pinion. The clutches are placed on the motor shaft. The change gearing is protected by a covering of fibre. From the countershaft the power is transmitted by spur gears to a short shaft mounted in bearings, which are free to move in an arc around the axis of the countershaft. This shaft carries a gear wheel and a sprocket pinion, and from here the power is transmitted by a 1½-inch pitch Baldwin chain to the rear driving axle. The differential gear is placed on the driving axle, on the engine side of the carriage, just inside one of the rear axle bearings. The rear axle is divided, and a yoke passes over the differential gear to stiffen the axle. The frame to which the engine and change gearing are attached is partly tubular and partly of flat iron, and is hung on springs. To maintain the distance between the axes of the sprocket pinion and the sprocket wheel a distance rod is in-

terposed between the rear axle bearings and the bearings of the short shaft above referred to.

The bearings of the rear axle are connected to the front axle by two tubular reach rods uniting at the centre of the front axle, where they form a horizontal king bolt, the whole constituting a flexible running gear, permitting the wheels to adjust themselves to the unevenness of the road. The wheels, which have wooden spokes, are 36 inches in diameter and are fitted with 3-inch Diamond tires. The front or steering wheels are mounted on short axles pivoted to the main axle as close to the centre plane of the wheels as possible without locating the pivot inside the hub of the wheel. The carriage is steered with a lever.

The carriage is tastily trimmed, well finished, provided with a top extending over both seats, and fenders for the rear wheels. The cover of the body behind the rear seat has a gauze panel to permit a free circulation of air around the motor and transmitting gear.

THE CENTURY STEAM CARRIAGE.

In the March 20 issue of THE HORSELESS AGE we gave a brief description of some of the novel points of this carriage, and also illustrated the carriage and the engine. Since then we have had an opportunity to examine it at the New York agency, the Automobile Exchange and Storage Company's store, 121 West Thirty-eighth street, and are able to give the following more detailed description:

The engine is of the double vertical type, with cylinders about 2¾x4 inches. It is located in the centre of the body, under the seat, so placed that its shaft extends directly back to the differential on the rear axle, which it drives by means of bevel gears. To allow for the necessary movement of the engine, as the body moves on the springs, the engine is hung from the body frame by two hangers, one on each side, which are shown in our illustration of the engine. For the same reason there is placed in the steam pipe between the boiler and engine a short piece of vertical pipe, having at each end a ground, steam tight, taper joint, which is free to swivel horizontally. The engine, shaft and differential are all enclosed in dust tight cases, the tube covering the shaft acting also as a distance piece between the engine and the rear axle. The feed pump is placed on the outside of the engine casing and is actuated by the rear cross head, by means of a rocker shaft projecting through the casing. The cylinders are oiled by a single connection, sight feed lubricator, connected into the steam pipe; all the other bearings are lubricated by the splash system, two quarts of oil placed in the crank pit being said to be sufficient for about 500 miles. All the bearings on the engine are plain and adjustable, the only other style used being a ball bearing at each end of the shaft.

The brake operates upon a brake wheel on the engine shaft, placed inside the casing at the rear. As the brake consists of two different straps, operated by separate eccentrics on opposite sides of the shaft, it is claimed to be double acting and very powerful.

The boiler is placed in the centre of the body, directly back of the engine. It is of seamless steel, 15 inches in diameter and 16 inches high, and contains about 375 copper tubes. It is tested to 700 pounds cold water pressure, while the running pressure is 225 pounds. The safety valve is placed above the water line, near the top of the boiler, and is arranged to blow off into the water tank. There are try cocks located on the side of the boiler, and an auxiliary hand feed pump placed beneath the footboard. The water glass connections are fitted with the usual automatic check valves, but each check is so arranged that it can be raised off its seat by turning a small lever. The burner is of the pilot type, the gasoline pipe not being carried through the boiler, but through the burner itself, and over the flame of the pilot burner. In starting it operates on the principle of the well-known plumber's torch; a small quantity of gasoline is allowed to run down into a small cup beneath the pilot burner, and is lighted, thus heating the burner enough to generate vapor. Upon lighting the pilot burner jet it heats the main gasoline pipe leading to both burners, and the main burner can then be lighted. The gasoline supply is controlled, in the usual manner, by an automatic diaphragm regulator. But during any stop, while operating the carriage, the main burner can be extinguished and the pilot burner left lighted; as the flame from the latter keeps the main gasoline pipe hot, the main burner can be instantly relighted at any time later, regardless of what the steam pressure may be.

The water tank is extra large, filling the whole of the rear part of the body and surrounding the boiler. It has a capacity of 34 gallons, has large openings on each side for filling, and is provided, in the pipe leading to the pump, with a combined strainer and filter, which can be readily cleaned by unscrewing a small plug. The gasoline supply, about 10 gallons, is carried in a large seamless, cylindrical tank, placed under the footboard. As the capacity of this tank is over 12 gallons, there is an empty space at the top sufficient to hold the necessary air pressure, thus dispensing with the usual air tank.

As this carriage is operated from the left side, all gauges, water glass, regulating valves, etc., are placed on that side. The throttle is operated by a twist of the spade handle at the end of the steering lever, and the reverse by a foot lever, moved by the right heel of the operator and held in forward gear by the action of a spring. The valves of the engine are set so that it runs with a cut-off of about ⅝ stroke, when the reverse lever is in the extreme forward position. To get an earlier cut-off than this it would be necessary to keep a slight pressure with the heel on the reverse lever.

The brake is operated by a second foot lever, so placed as to be moved by the operator's left foot.

The boiler feed is controlled, in the usual manner, by means of a by-pass valve, placed under the end of the seat alongside of the operator's knee.

The running gear has heavy, straight axles, the usual addition of an arched member to the axles being dispensed with. There are two pairs of reaches (arranged in the form of a V), one on each side, the forward end of each pair being combined in a horizontal swivel joint, passing through the front axle a few inches from each steering knuckle. This arrangement, it is claimed, gives great strength and the necessary flexibility to the carriage in passing over obstructions. The wheels are 28 inches in diameter, and are equipped with ball bearings, extra heavy wire spokes and 2½-inch pneumatic tires. The body and seat are of extra width, and are made of wood, except the top of the rear box, which is of sheet steel, and has the cross draught flue for the boiler riveted to it. The wheel base of the carriage is 5 feet, and the gauge of the wheels 4 feet 8 inches.

A large number of women were said to be present when the stock books of United States Mobile and Power Company were opened recently at Worcester, Mass., by Walter E. Taft, inventor and promoter.

...COMMUNICATIONS...

POWER OPERATED GASOLINE PUMP.

ROCHESTER, N. H., March 25.

Editor HORSELESS AGE:

I may be getting monotonous, but I will write to you once more on the subject of pressure in gasoline tanks and power gasoline pumps. At first sight the principle of the power gasoline pump seems very enticing. But don't you think that such a pump is liable to be the source of lots of trouble? Any water or air pump working against pressure might leak to a certain extent and still do the work it was intended for satisfactorily, as a certain amount of water or air lost is of no import. When it comes to gasoline it is different; we cannot afford to lose it, even if the pump should keep the pressure at the required point, and instead of allowing air to leak an equivalent amount of gasoline would leak without detection, because, being mechanically operated, it must be out of observation. Of course I do not write this to make any unfavorable comment on the work of the firm that is putting on the market a light steam carriage with that device included. I have never seen this carriage, and I have every reason to believe that in putting this device on their carriages they have eliminated all chances of failure. My only reason in writing to-day is that since your issue of March 20 I have been the recipient of letters from many people that want to put my carriage gasoline pumps to work against air pressure, and also furnishing for the vehicle a larger gasoline tank. All I am going to say to this is that people having on their carriages a power air pump need not be too anxious to exchange it for a gasoline pump.

As for those who have gasoline tanks that do not carry a sufficient amount of fuel, I would advise them not to change their gasoline tank, but rather to have a supplementary tank built to be fitted in the dasher, or any other accessible place. This tank ought to be of about the same capacity as their regular tank, be able to stand the same pressure, and be placed on a higher level. This supplementary tank, under ordinary circumstances, would carry the gasoline at the atmospheric pressure. It would also be piped to the ordinary tank with two pipes, one to let the gasoline flow to the pressure tank and the other one to equalize the air pressure in both tanks. Now, with the upper tank full of gasoline at atmospheric pressure, if the operator wants to ascertain the amount of gasoline under pressure, the only thing he has to do is to close tight his upper gasoline tank and open the connections between the two tanks; then the gasoline will fill up the lower tank without any loss of pressure. On closing the connections between the two tanks and opening the upper one, it would be easy to find out the amount of gasoline. This last operation would result in the loss of a certain quantity of compressed air, but with a good mechanically operated air pump this would not be important. Of course, when the upper tank is nearly empty, in establishing the communication between the two there would be a loss of pressure, but that would not, under any circumstances, amount to half the original pressure.

No matter what the above suggestions may amount to, we can congratulate ourselves that the Messrs. Stanley have started making improvements on their steam carriage. It is to be hoped that they will not stop half way, but will give the public a carriage thoroughly improved, from the running gear to the water gauge. ERNEST DUVAL, M. D.

[The point our correspondent makes, that a leakage of gasoline at the pump would be very objectionable, is well taken, and its consideration leads to the conclusion that such pumps must be exceptionally well made. At the same time we do not think the difficulties in the way of constructing a satisfactory pump for this purpose are so very great, as the pressure to be worked against is quite moderate, and as the speed of the pump could easily be made very low. While it may be difficult to entirely prevent the leakage of gasoline, it ought to be possible to restrict it to such limits as to be of no consequence.—ED.]

IGNITION EXPERIENCE.

MARCH 25.

Editor HORSELESS AGE:

I have read "Doctor's" article about sparking troubles with a gasoline carriage. It has been my experience that the dry battery does not give out at once, as the "Doctor" states. I use common dry cells, six together, costing $1.50 for the set, and usually get three months' service, but, of course, I do not run every day. Toward the last I always notice that the spark is too weak to make an explosion every time. This is especially noticeable when the carriage is standing still and the motor is running at a slow speed. In fact, my first warning of a weak battery is when the motor misses an explosion on the slow speed. I have been out several times when I knew the cells were growing weary, and I have never been stalled, although I have had times when the explosions were intermittent, when I had let the battery run too long. I should not think that any owner of a carriage would get into serious trouble over weak batteries if he paid the least attention to the matter, for there is usually plenty of warning given.

I have had times when there was a good deal of odor, and some smoke, when the battery was weak, yet after running enough to get warmed up those annoyances generally disappear. In fact, I find that if the battery will keep the engine going half an hour, it will always last for any trip I want to take. R. D.

ENDURANCE TESTS.

Editor HORSELESS AGE:

I have noticed with great interest the accounts of "endurance tests" for automobiles, and especially the particulars of the coming Long Island run. What real good do such contests do so far as we users are concerned? Like a horse, an automobile can be fixed up to make a long run, and then go to pieces at the end. In my mind, a real test would be to run carriages, say, 25 miles a day for a week, and then let the condition of the machinery and running gear be taken into consideration when awarding the prizes. A carriage should certainly be able to go six days without visiting the machine shop if it is cleaned and oiled properly and loose bolts and screws set up as discovered. Such an experience would be about what the ordinary purchaser of a carriage will give his vehicle. R. D.

...OUR... FOREIGN EXCHANGES

ENGLISH TRIALS OF MOTOR VEHICLES FOR HEAVY TRAFFIC.

The 1901 trials of the Liverpool Self-Propelled Traffic Association will be held June 3 to 7. The object of the trials is to provide a means of making a preliminary test of types of heavy motor wagons suitable for haulage operations in Lancashire, prior to their being taken over by a Lancashire syndicate, which will be formed for the purpose of conducting road transport between Liverpool and manufacturing towns in Lancashire.

The program of the trials is as follows:

June 3. Hill climbing at Everton Brow; manœuvring at Princes Dock.

June 4. Liverpool to Manchester via Warrington.

June 5. Manchester to Liverpool via Bolton.

June 6. Liverpool to Blackburn via Chorley.

June 7. Blackburn to Liverpool via Preston.

The classification of vehicles eligible for competition is given in the following table:

Class.	Load.	Max. Tare.	Minimum Level Platform Area.	Minimum Width of Driving Tires.	Speed.
A	1½ tons.	2 tons.	45 sq. ft.	3 inches.	8 m. p. h.
B	5 "	3 "	75 "	5 "	5 "
C	5 " min.	No limit	95 "	6 "	5 "
D	4 " "	" "	No limit.	....	5 "

Among the regulations are the following:

"The vehicle shall be capable of going anywhere that a horse drawn vehicle carrying the same load is ordinarily required to go, and of being placed in the same positions and withdrawn therefrom without external assistance.

"The vehicle shall be capable of working into and out of an embayment of one and a half times its own length.

"The vehicle shall be capable of starting from rest on and mounting a gradient of 1 in 9 (sets).

"The capacity of any water tanks, whether the same be fitted for feed, cooling or other purposes, shall suffice for a run of 15 miles on the basis of the consumptions during the trial runs.

"Such portion of the platform of the vehicle as is designed to carry the load shall be level, and the height of the floor line, measured either when light or when laden, shall be not less than 3 feet 6 inches, and shall not exceed 4 feet 3 inches.

"The vehicle shall conform in all respects to the requirements of the Locomotives on Highways Act, 1896, and, in the case of its being oil propelled, of the 'Regulations as to Petroleum,' issued by the Home Secretary under section 5 of this act. In class C, intended for vehicles for export to the colonies and abroad, there is no tare limit, but the other regulations must be adhered to.

"All working parts shall be properly encased.

"The boiler, tanks, oil baths and connecting pipes shall be fitted with drain plugs at their lowest points.

"The cross section of any pipe connecting two tanks shall be not less than that of the pipe provided for filling the first tank of the two.

"Provision shall be made to lock the compensating gear."

Staff and appliances for working the vehicles must be furnished by the competitors. The association provides accommodation for the vehicles at Liverpool, Manchester and Blackburn. Complete particulars, together with tracings or blue prints of the general arrangement and principal parts, must be furnished with each vehicle entered. All vehicles must be stored over night in the depots provided by the association. At the conclusion of the trials any vehicle, or motor, or part shall be opened up, in confidence, for inspection by the judges, if required.

Entries will be received under cover of registered letter by the honorary secretary, Liverpool Self-Propelled Traffic Association, the Royal Institution, Colquit street, Liverpool, up to 12 noon, April 30, 1901. The entry fee per vehicle is £10. Twenty half plate photographs and 200 copies of a printed description of the vehicle must be furnished.

Diplomas will be awarded in all classes.

The following are the points which will be taken into consideration by the judges in making the awards:

(*a*) Cost.—Prime cost; economy of room; economy of working, including attendants.

(*b*) Control.—Stopping, starting, changing speed, steering and reversing, particularly under adverse conditions, such as on inclines, in confined spaces, or on greasy surfaces.

(*c*) Working.—Adhesion on greasy surfaces when light and when laden; noise, smell, visible vapor, dust or other nuisance when traveling; number of mechanical operations requiring attention from the driver; efficiency of brakes; time occupied in preparing the vehicle for service on the road; speed—within legal limits; ability to travel between the depots without taking or receiving supplies of fuel, oil, gas, electrical or chemical materials or electrical current, water, or of any agent employed for actuating the motor or assisting in its working; ability to travel between the depots without stopping to effect repairs, adjust parts, apply lubricants, or for any other purpose or cause not provided for in the itinerary; freedom from a breakdown of any nature.

(*d*) Construction.—Ratio of tare to weight of freight carried during the trials; percentage of total weight on driving wheels, when light and when laden; ratio of available platform area to extreme moving area in any horizontal plane; efficiency of wheels; nature and efficiency of gearing; strength of frame and working parts; quality of workmanship; efficiency of springs; freedom from complicated or over refined parts; facility with which repairs can be effected; capacity of bunkers or oil tanks.

(*e*) Steam Propelled Vehicles.—Provision to secure invisible exhaust; ample supply of steam; action of feed pumps or injector, and ease of control of water level; consumption of fuel and water per mile; leakage of steam or water; arrangements for stoking.

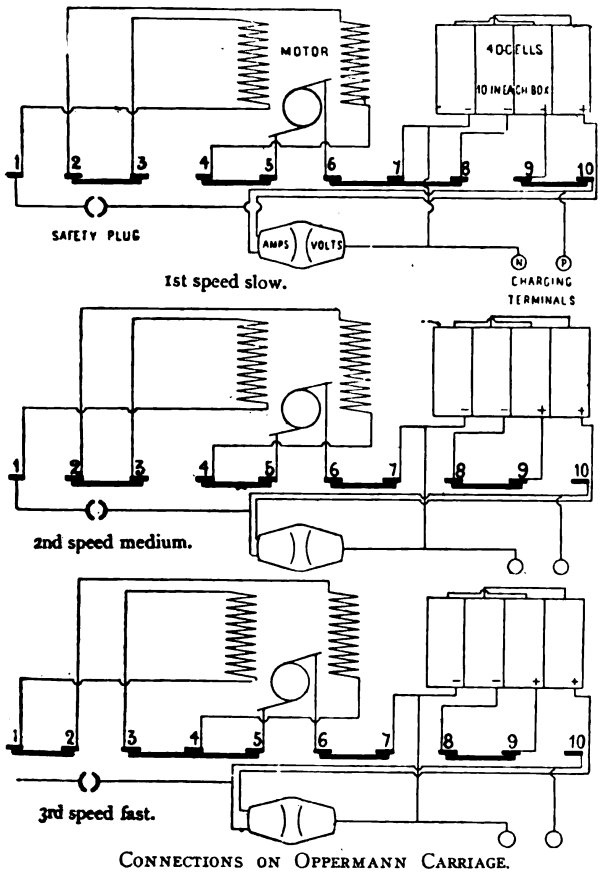
(*f*) Oil Propelled Vehicles.—Nature of variable speed arrangement, and smoothness with which changes of gear are effected; carburation; ignition; circulation of cooling water and quantity required; consumption of oil per mile; leakage of pipes or tanks.

(*g*) Electrically Propelled Vehicles.—Battery power to travel 40 miles on one charge; nature of the arrangements for varying discharge rate; method of carrying the battery and replacing same; simplicity of controller; B. T. U. per mile.

THE OPPERMANN ELECTRIC VEHICLE.

A short description of the electric vehicle manufactured by Carl Oppermann, of Clerkenwell, England, appeared in Vol. 5, No. 11, of THE HORSELESS AGE. Since that time a number of improvements have been made, and the latest type of this carriage is described in the last number of the *Automotor Journal*, from which we reproduce the following:

"This vehicle is of English manufacture throughout, and it is finished and upholstered in a luxurious manner. The body is mounted on elliptical springs above a flexible underframe, which connects the front and rear axles, and which is provided with universal joints in such a way as to allow the wheels to suit themselves to any inequalities of the road surface. The wheels, which are 30 inches (rear) and 27 inches (front) in diameter, are of the tangent wire type, and are fitted with butt-ended spokes and steel hubs. Solid rubber



CONNECTIONS ON OPPERMANN CARRIAGE.

tires, 2 inches wide, are used, and the wheels run on roller bearings. The tires are secured to the rims by welded steel wires, and are further held in place at their sides by the rim itself. The front axle is a steel tube which carries a ball steering head at each end, and the steering gear is of the ordinary type, and is operated by a steering lever through a rack and a quadrant.

"The motor is mounted to swing about the live rear axle, and is also connected to the body of the vehicle. It is of the Oppermann series wound type and normally develops 3 horse power, although it is said to be capable of standing three times this load for a short time. Steel magnets and a slotted drum armature are used, and the motor is completely closed in; automatic lubrication is provided. The transmission gear consists of a hard steel worm which is carried on the end of the motor shaft, and which meshes with a phosphor bronze worm wheel on the differential gear. Both the differential gear wheels and the worm gearing are specially designed, and the latter is accurately cut by expensive machine tools which have been put down for the purpose. The pitch of the worm and its detailed construction are such that it can be driven without difficulty by the worm wheel, and thus the vehicle can drive the motor when descending hills.

"The battery employed is also manufactured by Mr. Oppermann, and it goes by the name of 'The Flambeau.' It is of the pasted type, with leaden grids of peculiar construction, and it is said to be cheap to make or to renew, besides being light. We are informed that the positive plates have been found to last for from six to nine months if fairly treated, and that the battery holds up very well on open circuit.

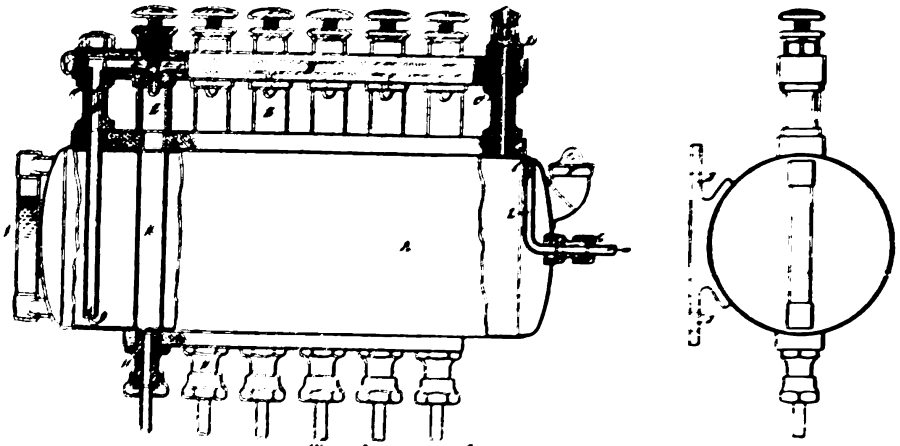
"Forty cells, divided into four boxes of ten cells each, are carried in the body of the vehicle. These cells contain eleven plates, 6 inches wide by 8½ inches high, and they measure 6¼x3x10½ inches high over all. Each cell weighs about 22 pounds. The capacity is given at 25 amperes for five hours or 50 amperes for two hours, which works out at about 11 and 9 watt hours per pound, respectively. The carriage can, it is said, run 40 to 50 miles on one charge on level roads, or about 25 to 30 miles in a hilly district.

"The controller provides for three speeds forward (5, 9, or 12 miles an hour), and also enables a reverse motion and an electric brake effect to be obtained. The connections made by the controller are shown in Fig. 2, where it will be seen that the first speed position places the cells in two parallels (40 volts) and the field magnet coils in series, the second position switches over the complete battery into series (80 volts) and retains the field coils in series, and the third position puts the field coils in parallel while leaving the cells in series. A reverse is obtained by changing over the armature leads. Both band brakes and tire brakes are fitted to the rear wheels; the former are operated by a foot pedal, and it is these which are usually employed under ordinary circumstances, since they are readily brought into play, and are very powerful; the tire brakes are connected to a hand lever.

"The vehicle is arranged for two persons, but provision is also made for the attachment of another seat at the back. The carraige work is well finished, and has a very neat appearance; it is fitted with a leather hood and with enameled leather wings and dash. The total weight is 18 cwt., the overall length 8 feet, width 5 feet 4 inches, and the track is 4 feet 4 inches. The length of wheel base is 5 feet 6 inches and the height to the top of hood is 8 feet."

THE DUBRULLE MULTIPLE OILER.

A new multiple oiler in which the feed is effected by the exhaust pressure of the engine has recently been brought out in France. It is illustrated in the accompanying drawing. The apparatus consists of a metallic recipient A, serving as an oil reservoir, and a distributing pipe B by which the oil is led to all the sight-feed tubes with which the device is provided. C is a column serving to maintain the distributing pipe in place, and also containing a valve D by which any excess of pressure is relieved. E is the glass tube through which the feed of the oil can be observed. E^1 E^2 are the



THE DUBRULLE LUBRICATOR.

needle valves by means of which the feed may be adjusted. F is a screw cap for the opening through which the reservoir is filled. G is a pipe union by which the pipe through which the exhaust gases arrive is connected to the reservoir. H H are unions for coupling the oil pipes leading to the lubricated surfaces to the reservoir. I is a glass gauge, indicating the height of the oil in the reservoir. J J are lugs for attaching the oiler to the vehicle. K K are tubes passing through the reservoir and connecting the sight feed tubes with the pipe unions H. L is a pipe by which the exhaust gases are led to the highest point of the oil reservoir, which is provided with a calibrated opening, calculated to avoid a sudden rise in pressure when the exhaust valve opens.

The oiler operates as follows: When the motor is in operation a part of the exhaust gases passes through the tube to the oil reservoir and exerts a pressure on the surface of the oil. The oil having no other way to get out of the reservoir, it will ascend the tube depending from the column C, pass up through the column itself and through the distributing pipe, where it is distributed by the various needle valves; it then passes through the sight feed tubes and through small brass or copper tubes to the parts to be lubricated.

In case the motor stops the gas pressure ceases, and the action of the oiler stops immediately. *From La Locomotion Automobile.*

METROPOLITAN MOTOR OMNIBUSES.

Southwest London is to have a public motor vehicle service. The Southwestern Motor Car Company, Ltd., has been formed to provide a service of motor omnibuses between Streatham, Upper Tooting and Clapham Junction, a district which is now said to be without adequate means of communication. On March 16 an inaugural run was made over the route with seven vehicles, carrying each ten persons. A. J. Balfour, the English Parliamentarian who has lately been advocating the use of automobiles as a solution of the London "housing question," had been invited to attend the run, but sent in a letter, stating that his Parliamentary duties prevented him from participating.

The idea of the enterprise is due to W. F. French, an American, who is secretary of and the largest shareholder in the company. In addressing those who took part in the run, at the lunch, Mr. French said that he had had considerable experience in locomotive work, and it was his intention to run the service on similar lines. There would be a certain number of breakdowns, no doubt, but the proverbial stitch in time would save many of these. They would endeavor to run on schedule time as soon as they got their full complement of vehicles. They proposed to run four vehicles and keep one as a reserve; perhaps they would have to keep two. In locomotive shops they always reckoned to have the same number of engines standing as were running, and though the company could not afford to do that, they would, he hoped, be able to keep schedule time. It was the intention of the company also to job vehicles for business services, as they felt sure that their value for advertising purposes, as well as for quick dispatch, would insure a large demand. He had had several inquiries already for vehicles for jobbing purposes. They also intended to run automobiles for private purposes, as they could give customers a run of 25 miles into the most beautiful parts of Surrey on a Wednesday or Saturday afternoon, and bring them back again, at a charge of 3s. 6d. to 4s. a head, and with great profit to the concern. If they could run these vehicles faster than the horse bus they would command all the patronage they could take, and if they found that the fares they were now prepared to accept did not pay, they would raise them, and so command the cream of the traffic even then. He believed they were fully justified in their new undertaking.

The omnibuses will complete the entire distance of the route in twenty-five minutes, about half the time now required by the horse omnibuses. They will be run open in good weather and closed in bad weather with light wooden tops, readily detached, and will have windows of celluloid instead of glass.

GERMAN ELIMINATING RACE FOR GORDON BENNETT RACE.

The *Auto-Velo* states that the five German vehicles intended for competition in the eliminating race for the Gordon Bennett race are as follows:

1. A 50 horse power Benz to be driven by Eugen.

2. A 70 horse power Canello-Dürkopp to be driven by M. Cannellopoulos.

3. A 35 horse power Mercédes (Mercédes being the racing name of M. Jellineck, who has purchased all the racing carriages to be constructed by the Cannstatt Daimler Company

during 1901) to be driven by M. Tischbein, director of the Cannstatt Daimler Company.

4. A 35 horse power Mercédes to be driven by the well-known French driver, Albert Lemaitre.

5. A 35 horse power Mercédes to be driven by M. Loraine Barrow.

The Mercédes carriage weighs 23½ cwts. The motor has four cylinders of 4.7 inches bore and 5.1 inches stroke, and gives about 38 horse power. The sizes of the four wheels are almost equal. The third speed is calculated to give 56 and the fourth speed 74½ miles per hour.

The Canello vehicle is said to have eight cylinders.

The eliminating race will be held on May 12, from Mannheim to Phorzheim and return, a distance of 105 miles, under the supervision of the Rheinisher Automobile Club.

Colonel Crompton has been elected president of Section G of the British Association for the Advancement of Science (Mechanical Engineering section). His presidential address for the meeting to be held in Glasgow early in September will deal with "The Development of Automobilism."

The endurance test of the Automobile Club of America is referred to by the English public press as an "endurance race"; that of the Automobile Club of Great Britain as a "motor excursion." This seems to be another case where distance alters the aspect of things.

Dr. Auer von Wellsbach, of Vienna, the inventor of the incandescent gas light, is reported to have invented a new electric accumulator in which materials other than those commonly employed are made use of and which has an increased capacity.

Cudell & Co., in Aix-la-Chapelle, who exploit the De Dion patents in Germany, have declared a dividend of 4 per cent. The outlook for the ensuing year is reported favorable.

On Wednesday, March 6, there was a discussion before the Automobile Club, of Great Britain, on "Some Motor Experiences." *Automobile Club Notes,* in announcing the event, states that "the idea is not to discuss hairbreadth escapes, but rather to take up the various experiences that different members have had with regard to the management and control of their own carriages under ordinary running, or under conditions of accident and failure, and expedients resorted to in order to overcome temporary difficulties."

An English firm of pen manufacturers, Ormiston & Glass, have had in use for some time two gasoline motor vans, and have recently ordered a third from the Motor Manufacturing Company.

Electric trolley pacing tandems are to be introduced on the Friedenau cycle track in Berlin..

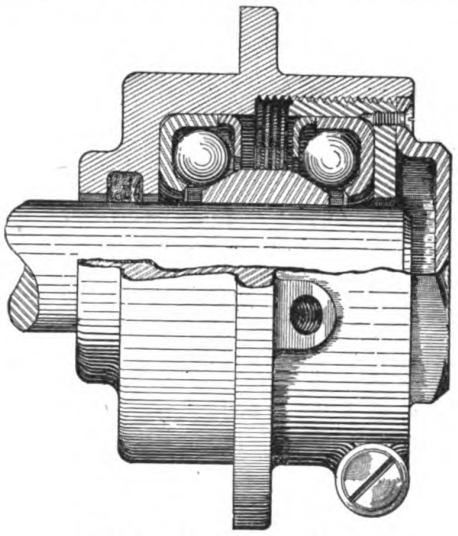
Regarding the electric controller described in our patent department last week, the inventor, Carl F. Lundeberg, informs us that the contacts consist of cut off pieces of rectangular bars of brass or copper, are reversible and require neither turning, grinding, scraping nor fitting, the finger contacts being self-adjustable. With the exception of baseplate and brackets all castings are avoided, the parts being punched out of sheet metal.

"DIAMOND" CHAINS.

The Automobile and Cycle Parts Company, Cleveland, Ohio, in its Indianapolis chain factory, is turning out a number of different designs of chains for automobiles. These include block, roller and twin roller chains of 1 and 1¼ inch pitch. The twin roller chain is said to be particularly adapted to light steam vehicles; it has a tensile strength of 2,500 pounds, polished straw-tempered rollers, hardened steel bushings, hardened rivets and full polished, blue tempered sides with chamfered edges. A heavier chain is the "detachable," of 1¼ inch pitch, which has a tensile strength of 6,500 pounds. This, too, has hardened rollers, pins and sides. One of the latest improvements in block chains is a simple connecting link superseding the old bolt and nut connecting link. To disconnect this one it is merely necessary to slacken the chain, grasp on either side of the link and draw forward, using the thumb as a fulcrum, and removing the side plate with the index finger. In connecting the chain the link is forced on with the thumb and moves into position with a snap.

A NEW BALL BEARING.

We present herewith an illustration of a self-aligning ball bearing for automobiles, which is being placed upon the market by the American Ball Bearing Company, Cleveland, Ohio. The bearing has a spherical seat and will consequently prevent any binding which might otherwise result from slight deformations of the bearing supporting frame. The races for the balls are ground in the bearing, and the cones are said to be accurately ground to gauge. Dust excluding washers are also provided. These bearings are made in various sizes with two and four rows of balls. They are intended for revolving rear axles and the rated safe carrying capacity ranges from 450 pounds to 1,800 pounds.



THE BAKER VEHICLE BEARING.

WORKING DRAWINGS OF A LIGHT GASOLINE CARRIAGE.

PART IV.

Fig. 21 shows two views of one of the crank chamber covers, while Fig. 22 is a vertical section on the line A B of Fig. 21, showing the method of lubricating the crank shaft journals. The two covers are identical, with the exception of the boss *c*, which is cast on the cover on the valve gear side of motor only. The boss is for a stud to be screwed into, on which the sleeve carrying the valve gear wheel, exhaust valve cam, and ignition gear revolves, the design here being similar to the corresponding portions of the cycle motor (see HORSELESS AGE of January 17, 1900). There is nothing in the construction of the pattern calling for much skill; the central hole is to be cored through; otherwise it is the same as its casting, plus shrinkage and machining allowances. The boss *c* can be secured with a single screw and one cover cast with it on and one with it off. Cast the boss solid, or difficulty may be experienced in getting the tapped hole the correct distance from the centre. A hard phosphor bronze bush forms the bearing for the crank shaft, and in order to keep the motor as simple as possible I have not shown any adjustment

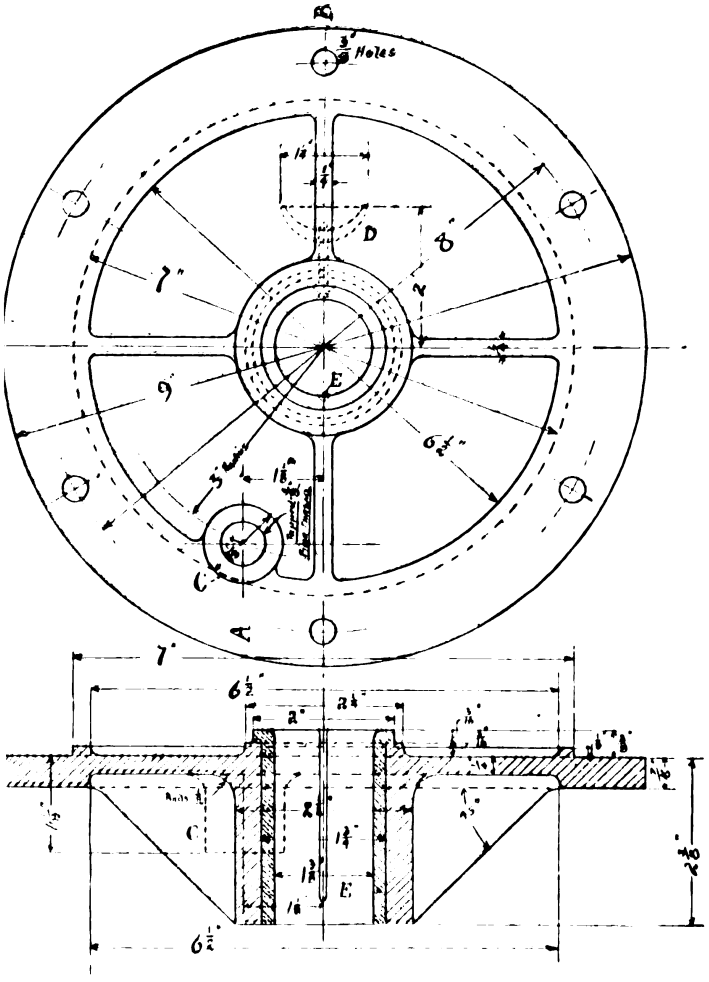


FIG. 21.

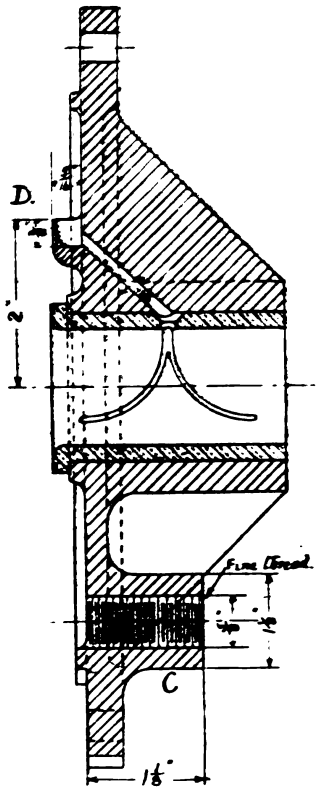


FIG. 22.

for wear, a new bush being the remedy when worn. Lest any of my readers may anticipate having to make frequent renewals, I will give an instance which should convince them that their fears are groundless. One of the best known, best made and most expensive motors in this country has the crank chamber made in two parts bolted together, the joint being on the crank shaft centre line.

A plan view of this joint shows it to be circular, with one bearing at each end of a diameter. The upper and lower parts of this crank chamber are turned to fit accurately, and then ground together to make it an oil tight joint. Therefore, to let the bearings together when worn would entail turning the joint afresh and regrinding—a job which very few, if any, motor carriage owners would undertake. Even if returned to the makers the expense would be sufficient to cover the cost of quite a dozen pairs of new bushes. This shows that the makers do not anticipate much wear to take place, and, as

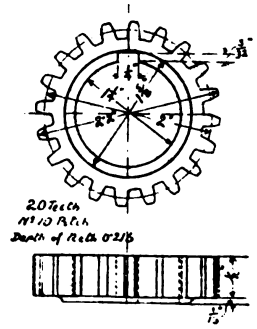


FIG. 23.

a matter of fact, I know several instances where this particular make of motor has been in constant use for periods varying from one to two years without the crank shaft brasses being let together or renewed. The secret of success, I take it, is to be found in constant and thorough lubrication. This is provided for in our motor in the manner shown in Fig. 22. A small recess, D, is provided on the inner side of the crank chamber covers, from which a hole leads down to the bearing, so that some of the oil splashed about by the crank in revolving is caught in these recesses and fed to the bearings. These recesses, which appear dotted in Fig. 21 also, can either be cored out or cast solid, and drilled and chipped out afterward. The latter plan saves a little in core box making, but adds to the labor in fitting up. Oil grooves are cut in the bushes to distribute the lubricant well over the journals, and another shallow groove should be cut along the bottom of each bearing, commencing about ¼ inch from its outer end, and leading back into the crank chamber so that the oil may return by it. This groove is not shown in Fig. 22, but appears in Fig. 21 at E.

Turn that part of the covers which fits into and against the crank chamber first, boring the central boss for the bushing at the same setting. The ⅛ inch spigot should fit the crank chamber snugly, but not a driving fit. The casting can next be mounted on a mandrel, and the edge and front turned as far as the ribs permit to form a true face for the nuts to bear on. While on the mandrel the outer edge of the bearing boss can be faced off to the correct length. Notice particularly that the facing against which the collar of the phosphor bronze bush bears must be exactly the right distance from the facing which goes against the crank chamber, in order that the inner end of bush may be ⅜ inch inside this facing. This is of importance to prevent either binding or end play of the crank shaft. The bronze bush should be turned to such a fit as to require lightly driving with a mallet to get it into position. It is prevented from turning by a small set screw, say ⅛ inch, through the side of the boss. Drill a tapping hole right through the boss C, and having faced its outer end to the correct length, tap it carefully to ⅝ inch diameter by 16 threads per inch, keeping the hole perfectly parallel to the crank shaft bearing. The position of this hole, as given in Fig. 21 (on a radius of 3 inches from crank-shaft centre and 1⅛ inch from vertical central line), is very important, as the correct gearing of the wheel and pinion, as well as the proper action of the exhaust cam on its roller, depends on this position being maintained.

The six ⅜-inch clearing holes can now be drilled in the positions given in Fig. 21, and having placed the covers in their places on the crank chamber, the position of the holes can be marked off on the latter. A better way, perhaps, would be to put the covers in place one at a time, and drill ⅜ inch tapping holes through cover and case at the same time, enlarging the holes in the cover to clear the ⅜-inch studs. Whichever way be adopted the covers must be placed so that the oil pockets are at the top. A point to make especial note of is that the centres of the bosses on the crank chamber (C, Figs. 18, 19, 20) and on the cover (C, Figs. 21, 22) must be 3 1-16 inch apart exactly. Fit studs tightly into the crank chamber, and this part may be considered complete. The dimensions of these studs may be obtained from Fig. 18.

The pinion for the valve gear is shown in Fig. 23. The material it is made from may be hard gun metal or mild steel. In either case the teeth must be cut from the solid, and the pinion turned bright all over. There is a shoulder on one side, 1⅝ inch diameter by 1-16 inch high. This side goes next the crank chamber when the pinion is keyed on to the crank shaft. For this pinion and the wheel it drives I have adopted the diametral pitch as being more convenient than the circular pitch; it also enables one to buy cutters, which will, if properly used, insure the teeth being exactly the correct shape and size. The pinion is to have 20 teeth of No. 10 pitch. The blank must be turned exactly 2.2 inch diameter. Then if the cutter be run in to a depth of 0.216 inch at each cut, the pinion will be found to have teeth of the proper shape and size.

The wheel which is driven by the pinion is to be made of vulcanized fibre to the dimensions given in Fig. 24. It

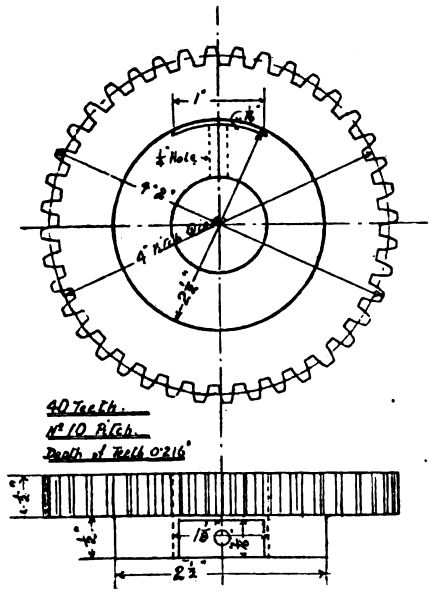


FIG. 24.

will be seen that on the face of the wheel there is a disk 2½ inches diameter and ½ inch thick. This disk is for the ignition cam. As shown, both wheel and disk are made in one piece; but if desired they can be made separately, in which case I should turn the wheel blank with a projecting boss 1⅝ inch diameter by ½ inch high, and bore the disk to fit fairly tightly on to this boss, which will thus centre the disk accurately. The wheel is to have 40 teeth No. 10 pitch, the outside diameter will, therefore, be 4.2 inch. The depth the cutter is run in will, of course, be the same as for the pinion—i. e., 0.216 inch. On the edge of the disk will be noticed a small recess 1 inch long. Into this recess a piece of 1-16 inch brass is to be fitted, the ends being dovetailed into the recess to assist in holding it. A ¼-inch screw, with countersunk head, passes through the brass plate and the disk, and screws tightly into the exhaust valve cam sleeve. This screw, therefore, in addition to fastening the brass plate, also serves to secure the wheel on to the cam sleeve. The cam sleeve, Fig. 25, is best made from tool steel, so that it can be hardened to prevent excessive wear on the exhaust cam. To form the cam, a collar is turned on the sleeve, as shown by the dotted circle in Fig. 25, and the excess of metal shaped or filed off afterward. The shape of the cam itself can be taken from the end elevation (Fig. 25). The base of the cam occupies exactly one-fourth of the circumference of the roller path (as indicated

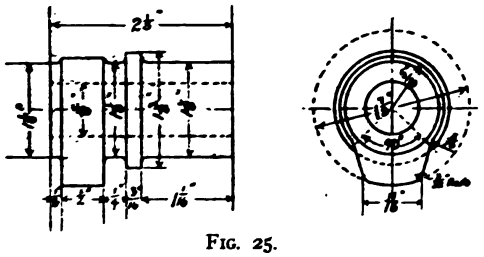


FIG. 25.

by the 90°, Fig. 25). Thus the exhaust valve will be open during one stroke of the piston. When erecting the motor it may be found that the valve is open for too long a time, in which case the outline of the cam can be modified, as, if anything, the cam is designed somewhat too full. This has been done purposely to allow of the exact timing of the exhaust. The valve gear wheel and disk are to be driven on to the cam sleeve up to the 1⅜-inch diameter shoulder, the wheel being next this shoulder. There will then be 1-16 inch of the cam sleeve projecting from the face of the disk. On this a brass washer ⅜ inch wide and 1-16 inch thick is placed and screwed to the disk by small brass wood screws. Do not drill and tap the hole in the sleeve for the ¼-inch screw at this stage; it is best left until the final assembling of the motor, so that the exhaust and ignition cams can be arranged in their correct relative positions.

Fig. 26 is the stud on which the cam sleeve (Fig. 25) revolves. It also carries the ignition timing gear. It should be turned from tool steel and hardened, or from mild steel well case hardened. Observe the hole drilled up the centre and the four smaller ones drilled radially to meet it. This is for lubricating purposes. The stud is to be screwed tightly into the boss C in the crank chamber cover (Figs. 21 and 22). A small set screw through the side of the boss with its point bearing into a recess on the stud will prevent it slacking back. The end of the central oil hole is to be plugged and a hole drilled at an angle, as shown, so that it points upward when the motor is assembled. The plug may either be screwed or soldered in. When the motor is working oil will find its way down the central hole and out on to the bearing through one or more of the small radial holes, and be distributed over the bearing surface by the oil grooves, shown dotted in Fig. 26. Note on the portion figured ½ inch diameter a small pin soldered into a hole, and standing up about 1-16 inch above the shaft. This is to prevent rotation of a brass washer 1-16 inch thick and 1⅛ inch diameter, which goes between the end of the cam sleeve and the ignition timing arm. Two nuts are to be fitted to the 7-16-inch thread, each 5-16 inch thick.

The ignition timing arm is to be made preferably of vulcanized fibre, which is stronger than vulcanite and quite as

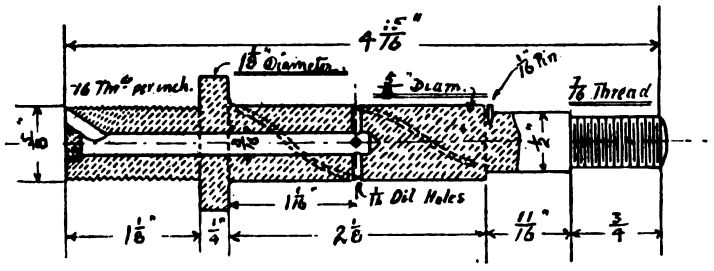


FIG. 26.

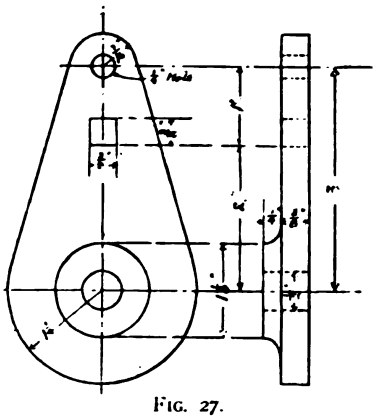


FIG. 27.

good an insulator. Its shape and all dimensions may be obtained from Fig. 27. A piece of fibre of suitable size and thickness is taken and sawed out roughly to shape. It is next chucked in the lathe, and one side faced down, leaving the boss standing up at one end as shown in the drawing. At the same chucking, the central hole should be bored out—a good fit to the end of the stud, Fig. 26, and a circle lightly described, to which the curve at the lower end may be shaped. The piece may now be taken from the lathe, and the edges finished off nice and square to the given shape and dimensions. A template, cut in thick paper or thin card, will facilitate this operation. The square hole cut through the plate is for the square neck of the brush holder, Fig. 28, to fit

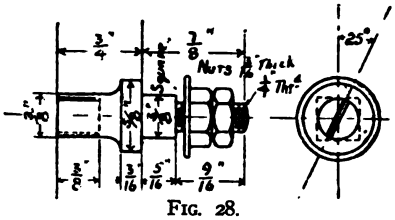


FIG. 28.

tightly into. This brush holder is made from a short length of drawn brass rod. All dimensions can be obtained from the drawing, the only point calling for special attention being the saw cut made in one end. This must be made at the angle given, and in the same position with regard to the vertical centre line; that is, when looking at the end of the brush holder (not the screwed end), the top of the saw cut should incline to the right hand. Into this saw cut the brush, consisting of a piece of thin spring steel, is to be soldered, and a small rivet put through the lot. The length of this spring can be best obtained by temporarily putting the gear together. Having the fibre gear wheel and disk in position on the cam sleeve, slip this on to the stud, Fig. 26. Next to

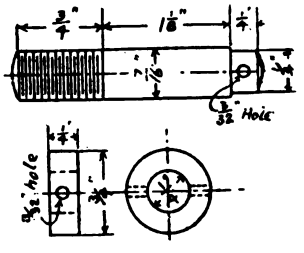


FIG. 29.

the disk comes the 1⅛-inch washer on the ½-inch diameter part of stud. Against this washer, and on the same part of stud, comes the raised boss on the ignition timing arm, Fig. 27. The contact spring should be cut off at such a length that it makes a good contact with the face of the disk, its end projecting ⅜ inch beyond the point of contact. When viewed from the face of ignition timing arm, on which is the raised boss, the lower end of the spring should be to the *left* of the central hole. To form a wearing surface on the contact spring, a piece of brass 1-16 inch thick and ¾ inch long should be riveted and soldered at its lower extremity. Of course, the rivets should be countersunk flush with the surface of the brass. It will be seen that the ignition gear consists really of a single segment commutator (the fibre disk and brass plate), a brush, brush holder and brush rocker of somewhat similar design to that adopted for small dynamos and motors. Each time that the brass segment comes into contact with the brush a current will flow through the primary winding of the induction coil, and by moving the timing arm through a given arc in the proper direction the moment at which ignition takes place in the cylinder can be adjusted to a nicety. Into the boss C on the crank chamber (Fig. 18) is to be screwed the stud shown in Fig. 29. This stud is to carry the bell crank lever (Fig. 30). The stud is made of

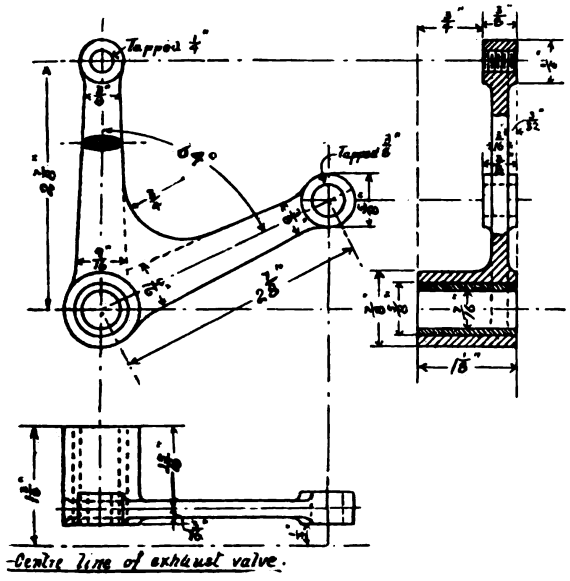


FIG. 30.

mild steel case hardened, being prevented from working loose by a set screw through the side of the boss bearing on the thread, as described above for the cam sleeve stud. The bell crank lever is prevented from coming off the stud by a collar, retained in place by a small split pin, the collar being of the dimensions given in Fig. 29. The bell crank lever (Fig. 30) is a malleable iron casting, the pattern being the same as its casting. The large boss can be cored out 7-16 inch diameter, the two smaller ones being cast solid. Allowance for machining must be made on both sides of all three bosses. When the casting is obtained, grip the large boss in a jaw chuck and bore it out for the reception of the bronze bush. The bush should be at hand ready turned, so that it can be driven into place without removing the bell crank lever from the chuck, and then bored out a nice working fit to its stud, Fig. 29. Next bridge the hole just bored in the bush with a piece of hard wood, find the centre and proceed to mark off the centres of the other two bosses. Drill these out, tapping sizes, and face them with a pin drill on each side. One face of all three bosses can be machined while the piece is still chucked in the lathe, if a light cut be taken; or having bored the large boss, it can be driven on a mandrel and both sides of all three bosses faced by a tool held in the slide rest. This last method is perhaps the best, as it insures the faces of all the bosses being parallel with each other. Into the boss, which is tapped ⅜ inch, the pin (Fig. 31) A is screwed and locked by means of the nut shown. The head of the pin can be slotted to assist in screwing it in. The pin is hardened and tempered if of tool steel, or case hardened if mild steel. This pin forms the bearing pivot for the roller (Fig. 31) B, which runs on the exhaust cam. The roller must be of tool steel, hardened and tempered to a dark straw color. The pin C, Fig. 31, is screwed into the boss of the bell crank lever, which is tapped ¼ inch to receive it, and locked by means of the nut. This pin, also of hardened steel, takes the end of the rod which pushes the stem of the exhaust valve every second revolution.

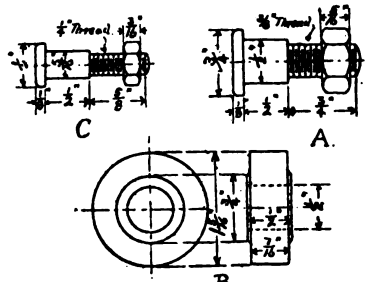


FIG. 31.

To transmit the movement of the bell crank lever to the exhaust valve, the push rod Fig. 32 pivoted to the lever by the pin C, Fig. 31, is employed. It is made of mild steel, and the ends should be case hardened to prevent excessive wear. The cup shaped recess at one end is to take the end of the exhaust valve stem. In order to prevent the push rod and the exhaust valve stem from parting company, they are coupled together by a light spring, Fig. 33, the ends of which are hooked into holes provided in the two pieces. The spring thus draws the parts together. The exhaust valve itself is of

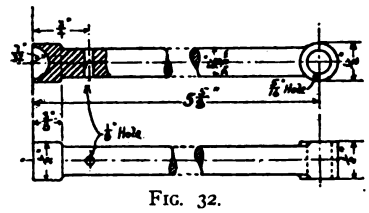


FIG. 32.

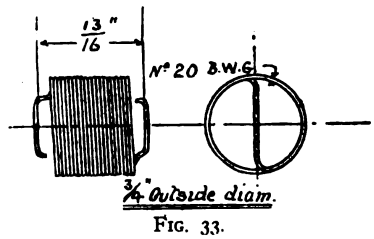


FIG. 33.

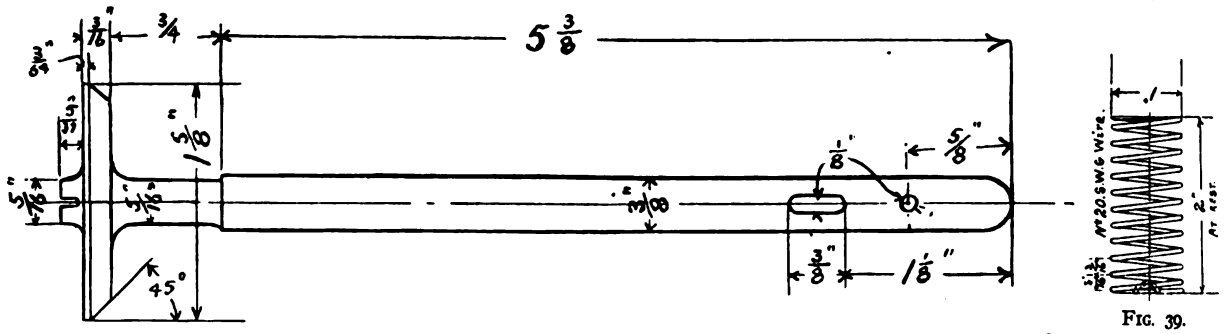


FIG. 34.

FIG. 39.

mild steel turned to the dimensions given in Fig. 34. The slot shown in the small projection on the valve head is to take a screwdriver to enable the valve to be ground to its seat in the valve box. The stem should be a fairly free fit in the guide provided for it in the valve box, but there should not be much play—only just a trifle. The valve is held to its seat by the helical spring, Fig. 35. One end of this is formed into a hook which engages in the slot shown in the stem of the exhaust valve, thus dispensing with the usual collar and cotter pin. The spring should be strong enough to make the valve return smartly to its seat after being raised.

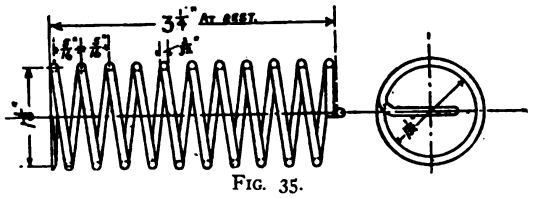


FIG. 35.

Fig. 36 shows the casting for the inlet valve cover and seat. It is to be cast in gun metal or in malleable cast iron. A core box for the interior will be required. Fig. 37, which is a plan view, gives the shape and size of the oval flange which fits on to the facing on the valve box. To machine the casting after it has been lined out, I should first face the oval facing for the inlet pipe (Fig. 36), either by filing or shaping. Drill the two 5-16-inch holes, and bolt the casting to an angle bracket on the lathe face plate by means of bolts through these holes, with the valve seat outward. It will now be a simple matter to turn the valve seat and the spigot which enters the valve box. The under side of the oval flange is faced off, and the 3-16-inch hole for valve stem drilled at the same chucking. It is of the utmost importance that this 3-16-inch hole should be quite concentric with the valve seat and perfectly straight; otherwise the valve cannot be made to close properly. Notice that the actual seat for the valve is made flat, as being less likely

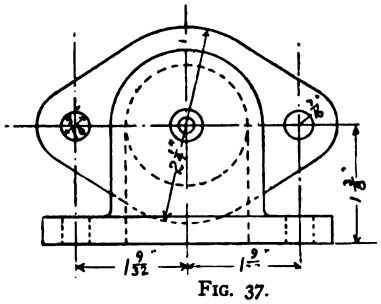


FIG. 37.

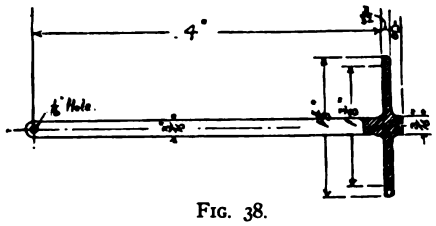


FIG. 38.

to stick than if made conical like the exhaust valve. This latter being mechanically operated, there is no objection to a slight tendency for it to stick in its seat. The inlet valve, Fig. 38, is turned from mild steel, the under side of the head being recessed, as shown, 1-32 inch in depth. This is done to prevent a shoulder being formed by continued grinding of the valve to its seat. The fit of the stem in its guide should be free, but the very slightest amount of play being allowed. The spring to hold it to its seat is shown in Fig. 39. It is provided with a hook at one end, which engages in a hole in the extremity of the valve stem, as described above, for the exhaust valve. A weight of 6 ounces placed on the end of the valve stem should be sufficient to just commence to open the valve. It is desirable to limit the amount of lift of these automatically worked valves, as if allowed to open too far they are sluggish in closing, and interfere with the proper action of the engine, especially at high speeds. This is readily accomplished by slipping a piece of thin brass tubing of suitable length over the valve stem between the upper end of the valve stem guide and the hook of the spring. The correct amount of lift to give to our valve to insure the full area of the valve being effective will be 5-16 inch.

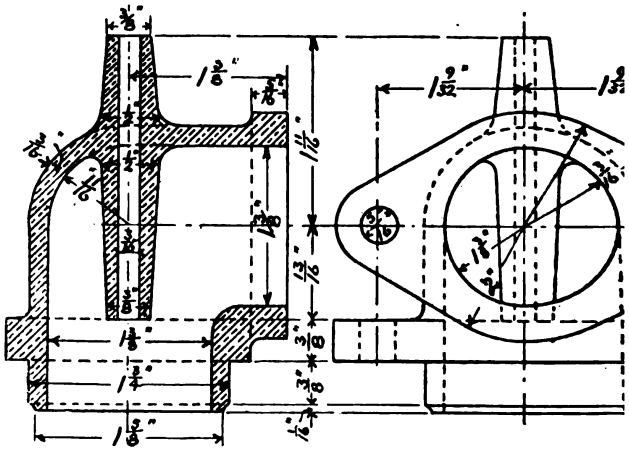


FIG. 36

AUTOMOBILE STORAGE AND REPAIR STATIONS IN NEW YORK.

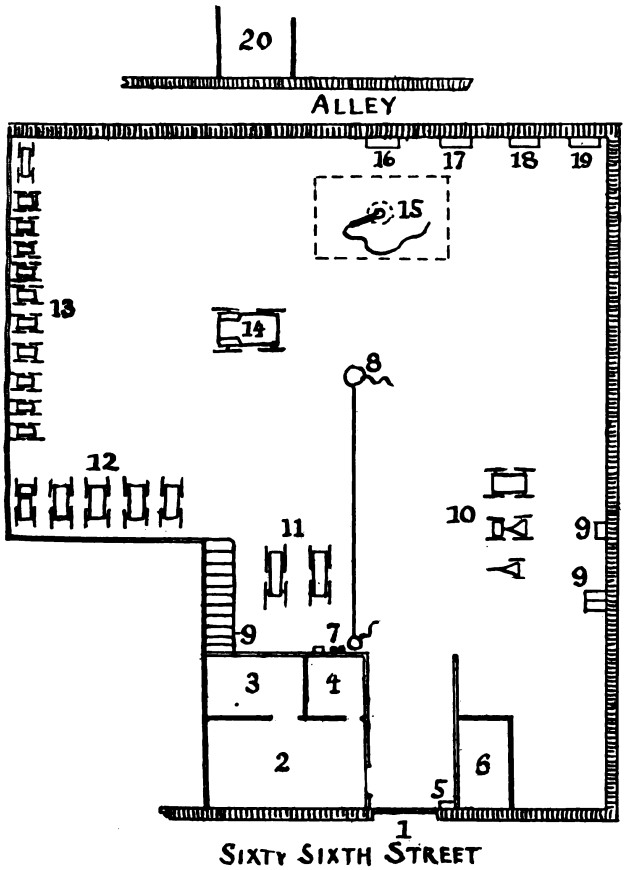
II.

The oldest of the automobile storage establishments in New York and the depository for many different types of mechanical vehicles—in or out of commission—is that occupied by the Automobile Storage and Repair Company on part of the ground floor of the St. Nicholas Rink Building on Sixty-sixth street, near Broadway, under the management of W. H. Barrett. The range of business includes: 1. Storing, caretaking and supplying air for tires and air tanks. 2. Repairing. 3. Selling gasoline, lubricating oil and electric current, but the location under a rink where a great many people congregate renders it necessary to supply the gasoline and oil outside of the building. 4. Renting office room and display space to two manufacturing companies.

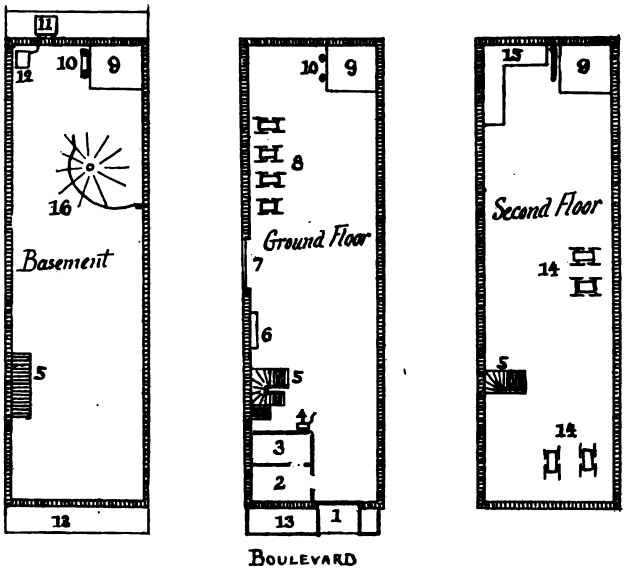
The company also maintains a separate station for supplying gasoline, oil and current at Clairmont, this being a convenient point to reach for automobilists living in Westchester County.

The arrangement of the establishment, which has a frontage of 60 feet by 100 feet in depth, may be explained with reference to the figures on the accompanying ground plan diagram, as follows:

1. Entrance.



PLAN OF THE AUTOMOBILE STORAGE AND REPAIR COMPANY'S ESTABLISHMENT.



PLAN OF THE DEPOT OF HOMAN & SCHULZ.

2 and 3. Offices for Automobile Company of America and the De Dion-Bouton Motorette Company.

4. Manager's office.

5. Three vaporizing devices for facilitating the lighting of gasoline torches.

6. Reception room for women.

7. Electrically driven air compressor pumps and 100-pound pressure air tank, with pipe conduit under ceiling leading to

8. One of the supporting iron columns of the building, where the air may also be tapped.

9. Lockers for the convenience of patrons.

10 and 11. Sales display by two manufacturers.

12, 13 and 14. Vehicles stored by owners for use or sale (14 is a large Haynes-Apperson gasoline 'bus).

15. Carriage washstand; cemented floor with central drain; swiveled water pipe, with hose, in ceiling.

16, 17, 18 and 19. Electric charging boards; four.

20. Repair shop in adjoining building across alleyway.

III.

One of the most recent additions to the storage and repair stations of New York city is due to the enterprise of Homan & Schulz, bicycle and automobile dealers. At a distance of about four blocks from their bicycle store they have for this purpose erected a two story and basement building on a 25 foot frontage, near the intersection of the Broadway boulevard and 100th street. The scant width of the lot, which compels the distribution of the business on three floors, should make their plan interesting to others contemplating the automobile storage business in central localities where frontage is high priced.

The business includes, 1, storage, caretaking and air supply; 2, repairing; 3, sale of gasoline, lubricating oil and electric current; 4, agencies for the sale of the "locomobile" steam vehicles and the Woods electric vehicles, and the owners also wish to represent a gasoline vehicle manufacture. The building is lighted above the ground from windows in front, rear and all of one side, the basement from front and rear areaway windows. The approach from the street over the curb is somewhat abrupt—the curb being high—and this point perhaps deserves mention because permission to remedy this defect depends upon the city authorities, and in similar

cases elsewhere it may be advisable to secure the permission in advance of other arrangements. In a street crowded with traffic the approach should be very gradual to enable automobolists to turn in without slowing down expressly to avoid a jolt.

The arrangements—barely completed—may be described with reference to the accompanying diagrams as follows:

1. Entrance.
2. Office and reception room.
3. Reception room for women.
4. Air tank.
5. Stairs.
6. Charging board.
7. Exit to adjacent ground, which may be used for trying vehicles.
8. Vehicles stored by owners and users; entire opposite wall space available for same purpose.
9. Hoist, as yet operated with hand power pulley arrangement.
10 and 11. Gasoline tank, placed in rear areaway to satisfy insurance requirements and piped to tank 12, provided with a self-measuring device, by which all handling and pouring of the gasoline are avoided.
13. Front areaway.
14. Display of vehicles on sale by agency.
15. Repair bench and small tools (machine tools at present in owners' other shop).
16. Carriage washstand, with central drain, hydrant with hose attachment.

THE FEDERAL MOTOR VEHICLE COMPANY'S CARRIAGE.

The Federal Motor Vehicle Company, of Brooklyn, N. Y., have just completed and are now testing a steam runabout, which shows several new and desirable features. The carriage, which we illustrate, was designed and built by their engineer, C. L. King.

The entire body is of metal, the frames being rigidly made of angle iron, in order to withstand hard usage, and the plates and panels of sheet steel. The engine and boiler are both placed in the rear of the seat, in order to afford ease and convenience in oiling and overhauling the engine, firing the boiler, etc. The engine of the double compound type, with cylinders 2½x5x4 inches, is capable of developing 10 indicated horse power at 800 revolutions, and has heavy, plain bearings throughout. It is controlled by a single motion lever at the side of the seat, which is a combined throttle and reverse lever. By means of a by-pass valve, also operated from the seat, steam can be admitted from the boiler directly into the low pressure cylinder, for the purpose of starting up or of getting the maximum power of the engine whenever an emergency requires it.

The usual link motion reversing gear is not used, the reverse being effected by a simple train of four spur gears, which are always in mesh. One of these gears is attached to the crank shaft, one to the eccentric shaft and the other two are idlers held in mesh by straps so as to complete the train. By means of the reversing lever and the straps, the relative position of the idler gears is changed, thus partly rotating the eccentric shaft and reversing the motion oof the engine.

The boiler is of the ordinary fire tube type, 16x15 inches, with a 3-16 inch steel shell, having 329 copper tubes,

FEDERAL MOTOR COMPANY'S STEAM CARRIAGE.

and has been tested to 600 pounds cold water pressure. It has an evaporating surface of 53 square feet and will develop about 6 horse power at 140 pounds pressure, the safety valve being set at 200 pounds. The pressure gauges are sunk into the floor for protection; and to decrease the chances of accident the gauge glass is placed inside the carriage body, being equipped with checks that automatically close in case it breaks.

The boiler feed is maintained automatically by a feed water regulator of their own design. This device is placed at the level of the water in the boiler and is mechanically operated by a slow moving cam, driven from the crank shaft. At each movement of the device the pressure in the feed water pipe is equalized with that of the boiler, and whenever the water in the boiler is below the proper level the regulator feeds water by gravity into the boiler. When the water in the boiler reaches the proper level the regulator stops feeding, as there is then no tendency for the water to flow from the regulator into the boiler. The feed water passes through a heater, between the tank and the regulator, where it is heated to about 200 degrees by the exhaust steam from the engine.

The fuel used is kerosene oil, vaporized and burned in a burner of their own design, which is said to work very satisfactorily, getting up 150 pounds of steam in about ten minutes with everything cold, requiring no torch for starting and only 20 pounds air pressure on the fuel tank.

The fuel tank, containing 13 gallons (sufficient for about 100 miles), is concealed under the footboard, and the water tank, containing 30 gallons (sufficient for about 30 to 40 miles), is placed under the seat. Over this tank and under the seat is an empty space, 36x20x14 inches, that can be used to carry any kind of baggage or tools.

The running gear is of the customary type—tubular construction, wire wheels, pneumatic tires, etc. The usual arrangement of driving by a chain and sprocket on the differential is employed, the rear axle being trussed to make it additionally stiff. A positive double acting cam lever brake is provided, which acts upon the differential.

The company have in course of construction a running gear made up of angle iron, which can be repaired by any mechanic; with this gear there will be wooden wheels, solid rubber tires and large, plain bearings. They state that light construction has not been attempted at any point, but their aim has been to combine in their carriage simplicity, strength, ease of operation, the minimum amount of care and least cost for repairs.

PARIS AUTOMOBILISM ACCORDING TO AN AMERICAN.

An American automobilist, J. Ransom Bridge, president of the Massachusetts Automobile Club, has been in Paris for some time, and naturally has observed some facts in connection with the use of automobiles there. We condense the following from a letter dated March 4, written by him to L. E. Knott, secretary of the club:

A Parisian manufacturer of steam carriages is spending considerable money advertising that he is building a steam automobile for the King of England. But up to date nearly everything in the motor line, here in Paris, is of the gasoline type, and I was told, before leaving America, that the restrictions on the use of steam as a motive power for automobiles were practically prohibitory in France. This is a mistake. The steam carriage has arrived late, but it is here, and has a clear field to win on its merits. Of course, the manufacturers of gasoline motors shrug their shoulders when asked about a "voiture à vapeur," and are likely to advise walking in preference to riding over a steam boiler. But a visit to the factory of the leading firm in Paris that is building steam carriages discloses the fact that the large plant of the firm is running full time and has orders booked so far ahead that they will not agree to deliver a carriage under five months from date of order. A careful examination of their 5 horse power "voiture" shows that they are building a machine which has many improvements over the American steam runabout, such as we have been driving in Boston.

[Then follows a description of the Serpollet carriage, to which the above refers, and an enumeration of its advantages. The Serpollet system has been fully described in THE HORSELESS AGE, and we need not reproduce this part of the letter. Mr. Bridge undoubtedly took a liking to the Serpollet carriage, as is shown by the next paragraph.—ED.]

The Frenchman is asking more than twice the American price for his automobile, and then, in addition, if one wishes to bring his carriage to the United States, there is the duty of 45 per cent. on the cost price. As a consequence one is tempted to wait and see if competition among the American manufacturers will not force them to adopt the devices which, at present, make the French machine so desirable.

The style of automobile which apparently is growing in favor and finding the most purchasers is the five or six horse power vehicle, with small wheels and low body. But here, as elsewhere, automobile evolution is most rapid. A last year's machine is a sort of ancient history. What the automobile of the future may be it of course is impossible to predict, except that it will not only be a cheaper machine but more economical to run.

The "chauffeur" seems to own the Paris streets. He races his machine through the crowded thoroughfares at a rate of speed that in Boston would be quite sure to result in his arrest. As a consequence there are many accidents, and one rarely takes up a daily paper without finding an item of this nature, and sometimes written in a manner that seems the reverse of serious.

But France is leading the world in the automobile industry, and the Frenchman would suffer much before he would interfere with anything tending to the glorification of "la patrie," particularly so long as rich Americans are bidding against each other for the finest product of the French manufacturers in the way of racing machines.

MACADAMITE—A NEW ALLOY.

A new aluminum alloy of the above name is soon to be placed upon the market by the Macadamite Company, of New York. The standard composition for castings contains 70 per cent. by weight of aluminum, 26 per cent. of zinc and 4 per cent. of copper. It has a specific gravity of 3.31 and the tensile strength is claimed to be from 40,000 to 60,000 pounds per square inch. It is non-corrosive and takes a high polish. Very fine and sharp threads can be cut on it. It is claimed that the component metals are very closely alloyed and that there is no segregation of these. It can be soldered without a flux by means of a patented soldering composition of zinc, cadmium and mercury. The melting point of the alloy is 979° Fahr. Its lightness, combined with strength, will undoubtedly render this new alloy of much value in automobile construction. Castings will be made only, and by a new process which is said to make it possible to cast pieces of extreme lightness and fine forms. The alloy is made in a mold of metal—a bronze of a considerably higher fusing point than the alloy—under pressure, and without shrinkage. The mold might, of course, be sunk in steel like dies for drop forging, but the method to be employed consists in making a pattern of the casting to be made and to make the metal mold from this. Castings made by this process have very sharp outlines; and the firm proposes to make gear wheels and other parts of automobiles which will not require machine finishing. The company is incorporated in Delaware, and the home office is in New York, 177 Broadway. It expects to be ready to accept orders in ninety days.

SOMETHING ABOUT ALUMINUM.

Can aluminum be polished and lacquered? This is a question of some interest to automobile manufacturers who use the light metal in their work. A process recommended by Nauhardt is as follows: Dissolve 100 parts by weight of shellac in 300 parts by weight of saturated ammonia solution in an enameled vessel. Heat in a water bath for an hour and let cool. Before applying it to the aluminum the surface of the metal must be cleaned with potash and well dried. After applying the lacquer the metal must be heated in an oven, in which a temperature of about 570° Fahr. is maintained for about two hours.

The difficulty with which aluminum is soldered is one of the obstacles to the use of that metal in many lines of work. Considerable experimental work has been done in late years in search for suitable solders and fluxes for aluminum. One authority states that an alloy of 30 parts of zinc, 5 parts of bismuth and 65 parts of tin forms a satisfactory solder when used with the ordinary zinc chloride flux.

WEIGHT CLASSIFICATION ADOPTED IN ENDURANCE TEST.

The technical committee of the Automobile Club of America has accepted the recommendation of the National Association of Automobile Manufacturers that a weight classification be adopted in the New York-Buffalo endurance test, and has about decided to divide the competing vehicles into four classes, viz.: Three for four-wheel vehicles, divided as follows: Under 1,000 pounds, under 2,000 pounds, 2,000 pounds and over, and a fourth for quadricycles, tricycles and bicycles. The basis for judging the relative merit of the machines will be an average speed between controls.

The limit of speed, in conformity with the club's speed bill, has been fixed at 15 miles an hour and an average speed of 12 to 15 miles an hour between controls will entitle a machine to a first-class certificate. There will be two runs of about 40 miles each day, one in the forenoon and the other in the afternoon. Officials at the controls will take down the records of the vehicles.

MINOR MENTION

The Baltimore Automobile Club enjoyed a run to Frederick, Md., on March 24.

The Seamless Tubes Company, Detroit, Mich., are entering the automobile field.

Cincinnati automobilists are said to be planning for a boulevard from Cincinnati to Cleveland.

A corporation is reported forming at Ionia, Mich., to build automobiles after the designs of A. C. Crell.

The Detroit Automobile Company has been resurrected and has four vehicles nearly ready for the market.

The Automobile Club of America will hold its annual dinner at the Waldorf-Astoria on the evening of April 18.

The two automobile clubs of Philadelphia will open the season with a parade on April 13, weather permitting.

The capital stock of the Maryland Automobile Manufacturing Company has been increased from $25,000 to $50,000.

The Lead Cabs in Detroit have been limited to 6 miles an hour by the City Council. In Chicago and Boston they do not go at all.

Harry O. Koller, 34 South Fifth street, Reading, Pa., has secured the Winton agency for Berks, Lebanon, Schuylkill and Montgomery counties.

The Nuremburg Motor Vehicle Factory, Nuremburg, Germany, has built an experimental motor sleigh which is reported to be quite successful.

The Butler Company, Butler, Pa., are experimenting with gasoline vehicles, employing the motors of the Motor Vehicle Power Company, Philadelphia, Pa.

H. Bartol Brazier, 1803 Pine street, Philadelphia, has been overhauling the Panhard-Levassor of Howard C. Heinz, Pittsburg, Pa., for the summer season.

The American Electric Vehicle Company, of Newark, N. J., capital stock $5,000,000, has been authorized to transact business in Illinois, with a State capital of $4,000.

The Ohio Automobile Company, Warren, Ohio, manufacturers of the "Packard" gasoline carriages, are reported to have booked one order for $40,000 worth of "Packards."

We have received from the Verett Engine Company, Little Rock, Ark., a circular calling attention to the Verett "shaft engine," a rotary recommended for automobiles.

Hills Loco Brake Company, Bridgeport, Conn., is putting on the market an improved double acting brake which can be fitted to any of the light steam cariages with a standard running gear

Henry Nachtwey, Shawano, Wis., contemplates putting on twelve passenger gasoline motor 'buses between that town and Green Bay, 40 miles distant, enabling him to make the round trip in one day.

A company with $100,000 capital has been organized at San José, Cal., to build automobiles, under the patents of Charles E. Christman, Los Gatos, Cal. California oak will be used for the bodies.

The Belle Isle Park Commissioners, Detroit, Mich., have refused a franchise to the local branch of the Riker Automobile Company, to operate electric vehicles in the park, on the ground that they would frighten horses.

The Sheperd Engineering and Automobile Company is a new corporation under New Jersey laws, with an authorized capital of $600,000, which is licensed to manufacture and deal in "all kinds of machinery, including automobiles."

The American Traction Company has been formed at Elizabeth, N. J., to operate automobiles. The capital stock is $250,000, and the incorporators are Herbert Knight, of Newark, and D. J. Newland and Frederick A. Raymond, of New York city.

The Druid Hill Park commissioners, Baltimore, Md., have not yet granted a license to any automobile company to operate motor vehicles in their domain. The bidders are Snowdeal & Co. and the Schaum Automobile and Motor Manufacturing Company.

The destruction by fire of the Olds Motor Works, Detroit, Mich., has not so seriously crippled the concern as at first supposed. In a circular just sent out the company state that all their automobile drawings and patterns were saved, and that by the last of April they hope to reach a capacity of ten machines a day. They propose to manufacture 1,000 "Oldsmobiles" before snow flies again. They deny that the fire was caused by gasoline, as none was stored in the building.

A bill was recently introduced in the Indiana Legislature providing for the most stringent regulation of horseless vehicles upon the highways, placing them alongside of the traction engine, &c., but by reason of the opposition of the automobile men and the further reason that the Indiana Supreme Court had held that in this progressive age vehicles propelled by electricity or other power had equal rights with other vehicles drawn by horses on the public highway, and such a law would be declared invalid, the bill was killed.

There is increasing interest in Indiana on the subject of good roads, as indicated by the enactment of a law by the recent Legislature which makes the board of commissioners a board of directors, to have charge of the repair and maintenance of free gravel, macadam and fill turnpike roads. An improved labor system has been adopted, and if carried out the new law will stimulate road building and keep in excellent repair the miles and miles of good roads already built. This law is largely the result of the labors of the members of the Indiana Automobile Club.

The American Bridge Company report their foreign trade as developing very rapidly. Within the past few days they have received a contract for 20,000 tons of bridges for the Guayaquil and Quito Railroad Company, in Ecuador, South America; a large group of buildings for a Mexican mining company, several large contracts for manufacturing buildings to be shipped to Australia, and a large railroad bridge to go to the Sandwich Islands. It is also announced that their tender for a large foreign contract, exceeding in size any they have taken, has been accepted, and that one of their engineers has sailed to consummate the arrangements.

CLUB SPEED BILL AMENDED.

The substitute speed bill of the Automobile Club of America, which passed the New York Assembly last week Tuesday, has been amended in the Senate committee, at the solicitation of the New York Park Department, to allow park officials the privilege of limiting the speed of automobiles, as of other vehicles, within their domains, but not to discriminate against steam and gasoline vehicles. The bill will pass either as amended or in its original form.

MOTOR VEHICLE PATENTS ∴ ∴ OF THE WORLD ∴ ∴

UNITED STATES PATENTS.

670,024. Process of Making Active Material for Accumulator Plates.—Ernst W. Jungner, of Stockholm, Sweden, March 19, 1901. Application filed May 12, 1900.

670,080. Device for Utilizing Engine Exhaust for Heating Purposes.—Eleazar Kempshall, of Newton, Mass., March 19, 1901. Application filed March 23, 1900.

670,179. Motor Driving Mechanism.—Henry J. Lawson, of London, England, March 19, 1901. Application filed November 7, 1900.

670,010. Motor Bicycle.—E. Y. White, of San Antonio, Tex., March 19, 1901. Application filed August 13, 1900.

The object of the invention is to produce a bicycle having a pedal driving gear and a power motor in which the motor, pedal gear and a saddle are all supported on a spring which permits yielding independently of the yielding of the pneumatic hubs or wheel tires where such are employed.

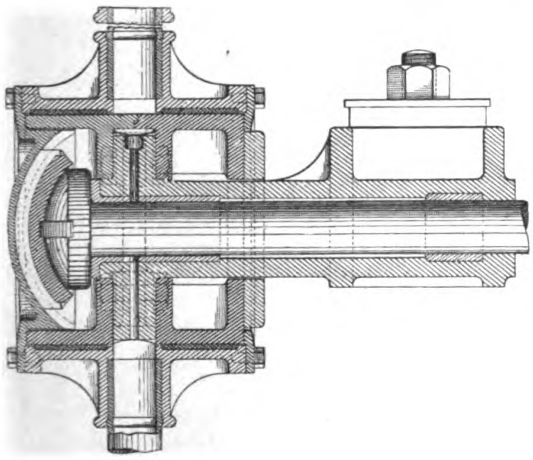
To this end the saddle supporting tube is mounted slidingly in the fitting uniting the rear forks and the upper frame tube and is connected to the motor. The crank case of the latter is placed inside a large case with arched slots in its sides which form guides for slides on the engine shaft. A coil spring holds the motor and seat post up and they are depressed by the weight of the rider.

670,060. Gasoline Motor.—H. M. Quick, of Paterson, N. J., March 19, 1901. Application filed August 27, 1900.

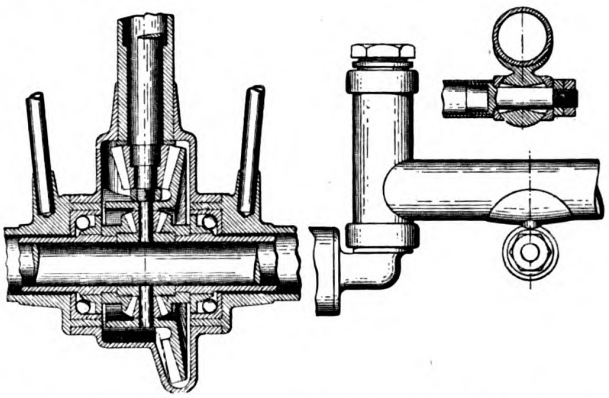
Employs a rotary disk valve, the disk bearing against the inside surface of the cylinder head. An opening in the disk registers successively with the intake and exhaust ports, and the disk also actuates the electric igniter.

670,085. Driving and Steering Gear for Motor Vehicles.—Harry A. Spiller, of Boston, Mass., March 19, 1901. Application filed May 12, 1900.

A combined driving and steering axle which swivels around an axis in the plane of the wheel. The driving axle is journaled in bearings in a long sleeve to which the vehicle springs are fastened. The sleeve has two vertical pins or trunnions near its end which are the swivel pins of the steering arrangement. On these trunnions is placed a wheel mounting in two halves divided by a vertical plane, as shown in the drawing. The driving shaft fastens by means of a universal joint to the cap of the wheel hub. The wheel hub has a babbitt lining forming a bearing surface for the wheel mount.



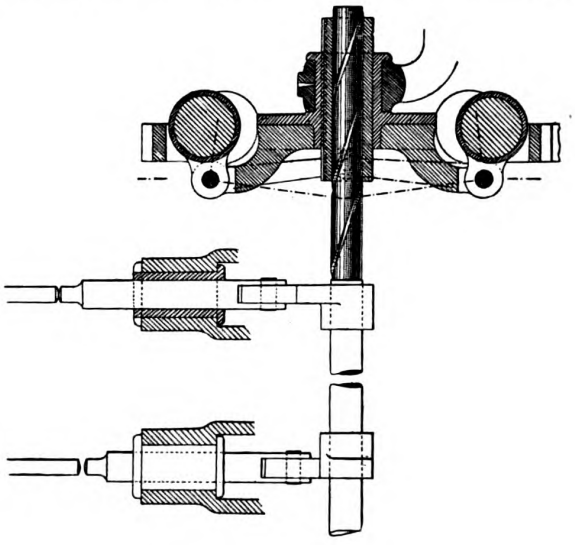
670,121. Running Gear for Automobiles.—William Van Wagoner, of Syracuse, N. Y., March 19, 1901. Application filed April 2, 1900.



The patent covers the running gear of the "Century" carriage, illustrated in our issue of March 20. Two longitudinal reach bars connect the rear axle casing and the front axle. To the axle casing these bars, which in practice are tubular, are fastened by brazing, and to the front axle by means of a universal joint as shown in one of the drawings. There are also two tubular angle braces which connect to the rear axle, housing near the centre and unite with the reach bars in front.

670,138. Speed Regulator for Explosive Engines.—E. L. P. Mors, of Paris, France, March 19, 1901. Application filed March 6, 1900.

The invention relates to a governor for explosive engines, particularly for those used on vehicles, and has for its object



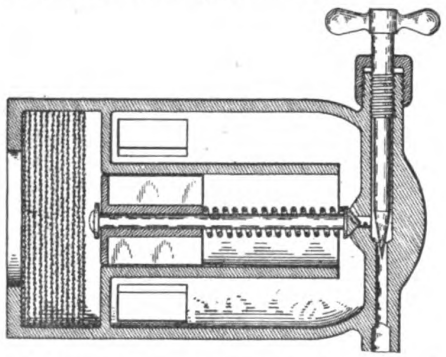
means for advancing or retracting the position of the cams and the cam shaft for operating the valves in relation to the position of the piston in the explosive chamber. The cam shaft is provided with a spiral groove. Over the cam shaft at one end passes a sleeve, and over this the hub of the gear wheel by which the cam shaft is driven. The sleeve is displaced in the direction of the shaft by means of a centrifugal ball governor. Pins extend through the sleeve and into the spiral groove on the cam shaft, and when the sleeve is moved by the centrifugal force of the balls the cam shaft will be given a rotary motion in excess of what it would receive otherwise. The exhaust valve will then close early, and the extra amount of burnt gases remaining in the cylinder will prevent a full charge being drawn in the next time, which will decrease the speed.

670,311. Explosive Engine.—Eugéne Courvoisier, of Bienne, Switzerland, March 19, 1901. Application filed June 10, 1899.

The inventor proposes to use oxygen mixed with air to effect the combustion in the engine, and by increasing the proportion of oxygen to air, to increase the power of the engine. The invention consists in the provision of means whereby the supply of oxygen may be regulated.

670,921. Carburetor.—Ransom E. Olds, of Detroit, Mich., March 26, 1901. Application filed July 23, 1900.

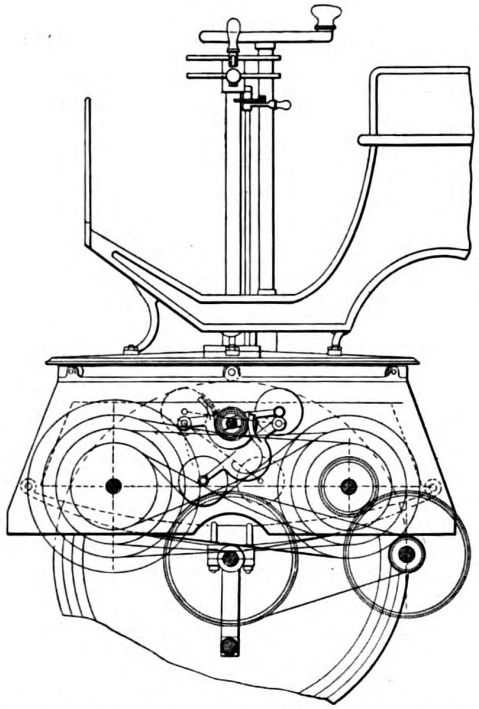
The carburetor consists of a casing into which the air enters through openings cut into its side wall. The inner space of the casing is practically divided into three compartments by vertical and horizontal partition walls. The gasoline



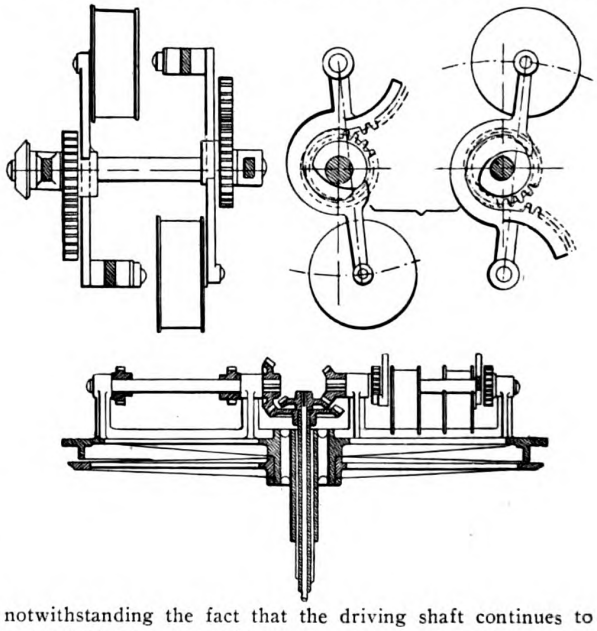
enters at the bottom through a needle valve. The air entering through the openings on the side has to pass down through the outer concentric space and up through the central space; it opens the automatic valve and passes through the layers of gauze in the upper part of the casing, where the vaporization is completed.

670,746. Motor Road Vehicle.—Joseph Vollmer, of Berlin, Germany, March 26, 1901. Application filed April 15, 1901.

The patent refers to a mechanical fore-carriage to which any ordinary vehicle can be attached. To this end the front section of the ordinary vehicle is removed and an axle arrangement carrying the driving gear adapted is substituted therefor when desired. The latter construction comprises the following elements: First, a movable axle which has the twofold advantage and object of diminishing as much as possible the sliding motion necessary for the rotation of the axle and of rendering the transmission of the motive force upon the axle independent of the various speeds of rotation of the wheel, and this without the use of intermediate gear, which it has been necessary to employ hitherto; second, a coupling



mechanism which effects the engagement of the several mechanisms from the driver's seat, notwithstanding their rotation during turning, as the latter operation is effected by the rotation of the forward section of the vehicle and the engine box as an entirety, and, third, gearing by means of which the driven shaft of the vehicle may be caused to rotate in either direction,



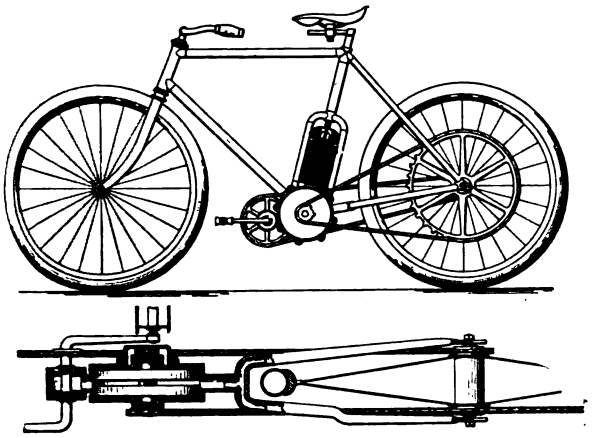
notwithstanding the fact that the driving shaft continues to rotate in the same direction.

The shafts by which the controlling operations are effected are arranged concentrically in the vertical axis of the turning

fore-carriage. The change of speed is effected by belts which are tightened by means of jockey pulleys. Three forward speeds and one reverse are provided and these are obtained by means of two levers. The vertical shafts of the controlling apparatus gear with two horizontal ones in the machinery casing. These shafts carry combined gear sectors and locking cams by which the jockey pulleys are operated. The method of operating these pulleys and of locking them in position when out of contact with the belt is the chief novelty of the system.

670,590. Motor Cycle.—George M. Holley, of Bradford, Pa., March 26, 1901. Application filed October 19, 1900.

The crank case of the engine is built into the frame of the bicycle, the seat post tube being bifurcated at its lower end



and fastening to the crank chamber. The crank axle is placed ahead of the engine. Both the pedal actuated crank and the engine crank shaft are connected to the rear wheel of the cycle by means of driving chains. The patent covers particularly the frame construction.

670,405. Motor Vehicle.—Rudolph M. Hunter, of Philadelphia, Pa., March 26, 1901. Application filed January 25, 1901.

Instead of two steering wheels, as ordinarily, the vehicle is provided with a steering truck, comprising main wheels and steering wheels.

670,474. Storage Battery.—Justus B. Entz, of Philadelphia, Pa., March 26, 1901. Application filed July 9, 1900.

The patent covers a battery in which is used a laminated combined separator and support of hard rubber, etc., provided internally with a series of openings constituting wells for the electrolyte and externally upon its faces with a series of projections to hold in place the active material which is pasted to the separator plate. The electrodes are thin sheets of lead placed between two of the separators. The outside negative is made to form the jar of the cells.

670,475. Storage Battery.—Justus B. Entz, of Philadelphia, Pa., March 26, 1901. Application filed July 9, 1900.

670,453. Steel Casting.—Andres G. Lundin, Boston, Mass., March 26, 1901. Filed January 19, 1899.

Steel castings containing .18 per cent. to .3 per cent. of silicon, .1 per cent. to .4 per cent. of manganese and 3 per cent. or less of aluminum.

670,539. Pressure Regulator.—James B. Erwin, of Milwaukee, Wis., March 26, 1901. Application filed October 23, 1899.

670,550. Duplex Gas Engine.—William O. Worth, of Chicago, Ill., March 26, 1901. Application filed June 13, 1899.

670,776. Running Gear for Automobiles.—Lucius T. Gibbs, of Brooklyn, N. Y., March 26, 1901. Application filed May 25, 1900.

670,803. Gas Engine.—Thomas McMahon, of Philadelphia, Pa., March 26, 1901. Application filed April 28, 1900.

The drawings show a two cylinder or double engine, the cylinders being placed at some distance axially, but the two pistons are working on the same crank on pins set at 90°. The cylinders are air cooled, the flanges being covered by a corrugated jacket through which air is forced by the pumping action of the crank chamber. They have front exhaust ports. Ball valves are used for the intake.

670,648. Element for Secondary Batteries.—J. F. Storey, of Philadelphia, Pa., March 26, 1901. Application filed June 25, 1900.

The battery electrode is formed of a coil of flat tape, mounted in a rectangular frame.

670,664. Wheel for Horseless Carriages.—John Caulfield, of Brooklyn, N. Y., March 26, 1901. Application filed October 10, 1900.

Book Reviews.

"La Carozza—Nella Storia Della Locomozione" (The Coach—The History of Locomotion). By Luigi Belloni. Fratelli Bocca, Milan, publishers.

The author of this work, a carriage manufacturer of Milan, gives in its pages a history of locomotion from the earliest times up to the present. Up to the beginning of the last century the horse and the coach were practically the only means of locomotion, in European countries at least, but during the last hundred years locomotion has made extraordinary progress, and as a consequence of the advent of steam and electricity has undergone fundamental transformations of great influence upon the intellectual and material development of nations. The progress made between 1800 and 1900 is more phenomenal than that of the eighteen preceding centuries combined.

The first illustration of the work shows a camel carrying a rider, and it seems to be the impression of the author that the "ship of the desert" was the earliest means of improved locomotion in the service of man. Next comes the horse; not as a traction animal, however, but as a beast of burden, two horses, one behind the other, carrying between them a canopy covered cab, occupied by a number of passengers. When first depicted as a traction animal the horse draws a sort of sledge, and finally the wheeled vehicle is introduced. It is the opinion of the author that the roller, which is still used for moving extremely heavy objects, was the forerunner of the wheel. (The primitive roller was probably a log of timber.)

The first vehicles of which we have any historical records are those of the ancient Egyptians, who have portrayed their conveyances in bas reliefs on the walls of their temples. Another era is marked by the chariots of the Roman Empire. After this follows a long period of silence, and it is only in the sixteenth century that further progress in means of locomotion is recorded. Numerous illustrations are given of vehicles produced in the three following centuries, mostly of the richly carved specimens belonging to royalty or ecclesiastics,

of which many are found in the museums of Italy and France.

In the nineteenth century great progress was made in the construction of horse drawn vehicles, while at the same time the means of locomotion rapidly multiplied. In a chapter on "The Great Innovations" the author deals with all the conceivable means of locomotion, from roller skates to flying machines, and devotes a liberal amount of space to the automobile. While some of the most improved types of European machines are illustrated, the automobile development in America is made to appear in a peculiar light. Two illustrations are given of American creations (of fancy), one of a St. Louis inventor's idea (of 1896), depicting a machine with two large driving wheels and four miniature steering wheels, and the other one of a vehicle of ordinary proportions, drawn by a dummy man animated by an electric motor, with which the inventor proposed to go from New York to San Francisco.

The author's attitude toward the newer means of locomotion, which compete, to some extent at least, with the horse drawn vehicle, is extremely liberal, but at the conclusion of the last chapter he makes what appears to be a plea for the horse. He says: In a country ruled by tradition, temperament and æsthetic and artistic instincts, like ours, a love of the beautiful will always remain, and it is hard to see how anyone's enthusiasm can be aroused by the return, in a nearly uniform file, of automobiles from a contest. At the same time gentlemen of wealth will always find satisfaction in driving a spanking four-in-hand from the high seat of a mail coach, and popular sensibility will always be susceptible to the festive and picturesque returns from the race, such as are offered, for instance, by our industrious Milan.

To substantiate these last assertions the author offers two illustrations, the first, a very familiar one, of a number of electric vehicles of a Chicago firm, drawn up in single file to be photographed for advertising purposes, and the other one representing one of the picturesque returns from this race.