Frost, W. B. Clancy, W. G. Fraser and E. E. Miller.

The Lockwood-Ash Motor Company, Jackson, Mich.—Capital stock, $5,000.

Davenport Motor Company, Davenport, Ia.—Capital stock, $10,000. President, Bernard Haupt; secretary and treasurer, Albert Sindt.

Motor Car Repair Company, New York.—Capital stock, $20,000. Directors, P. A. Prool, E. M. Dalley and L. C. Dalley, all of New York.

The Auto Pump Company, Buffalo, N. Y.—Capital stock, $10,000 ($3,500 paid in). Incorporators, Samuel E. Spencer, Lamont Shultes and Ralph B. Waite.

Cornish-Friedberg Motor Car Company, Chicago, Ill.—Capital stock, $5,000. Incorporators, Frederick W. Cornish, Charles Friedberg, Lewis W. Friedberg.

Mercedes Repair Company, New York.—Capital stock, $30,000; to repair automobiles, etc. Incorporators, H. Hitchenbach, A. C. Beckert, H. C. Keller, New York city.

Washington Electric Vehicle Transportation Company, registered office, 15 Exchange place, Jersey City, N. J., filed an amended charter increasing its capital to $4,000.

International Auto Company, El Paso, Tex.—Capital stock, $10,000. Incorporators, Julius A. Krakauer and Charles M. Barber, of El Paso, and Juan M. Salazar, of Chihuahua, Mexico.

The Welch-Estberg Company, Milwaukee, Wis.—An amendment changing its name to the Welch Brothers Motor Car Company, and increasing its capital stock from $50,000 to $75,000.

The Elton Automobile Company, Waterbury, Conn.—Capital stock, $10,000 (all paid in). Incorporators, Frederick H. Lewis, Elton P. Zimmer and George W. Lewis, all of Waterbury.

The L. P. Dorsett Company, Washington, D. C.—Capital stock, $25,000; to conduct a garage and deal in automobiles. Incorporators, Leonard P. Dorsett, Louise S. Dorsett and Arthur D. Carpenter.

Dauer Auto Company, Providence, R. I.—Capital stock, $5,000; to deal in automobiles. Incorporators, Edward Dauer and William Fletcher, of Providence, and Roland M. Ballou, of Woonsocket, R. I.

Automobile and Auto Supply Company, New Haven, Conn.—Capital stock, $20,000. Incorporators, W. T. Dill, Eli Mix, D. W. Baldwin, G. A. Maycock and G. W. Lewis, all of New Haven, and E. H. Peck, of New York.

The Pitman-Nelson Automobile Company, Berkeley, Cal.—Capital stock, $100,000; to manufacture automobiles. President, F. H. Pitman, of Berkeley; directors, H. P. Nelson, of Berkeley, and W. L. Norris, of Vallejo.

Metropolitan Automobile Company, Kittery, Me.—Capital stock, $25,000 (nothing paid in); to manufacture automobiles. Officers: President, Horace Mitchell, of Kittery; treasurer, S. J. Morrison, of Portsmouth, N. H.

The Bay Cities Automobile Company, of Oakland, Cal.—Capital stock, $25,000 ($15,000 subscribed); to buy, sell, rent, operate, repair and manufacture automobiles, motor cycles and carriages, and to conduct a general automobile livery and garage business. Directors, W. H. Chapman, Fred S. Jacks, O. B. McKay, E. N. Hartman and Alfred Groves.

Luverne Automobile Company, Luverne, Minn.—Capital stock, $50,000 ($25,000 paid in); to manufacture automobiles. Incorporators, A. D. La Due, Jay A. Kennicott, F. A. Leicher, E. L. Leicher, E. A. Brown, S. B. Nelson, S. C. Rea, William Jacobson, Jr.; C. O. Wright and J. W. Gerber. Officers: President, A. D. La Due; vice president, E. A. Brown; secretary, S. C. Rea; treasurer, Jay A. Kennicott.

Pope Automobile Company, of 817 Fourteenth Street N. W., Washington, D. C.—Capital stock, $25,000. Officers: Charles M. Campbell, president; Col. E. C. Wood, vice president; George W. White, treasurer; R. G. Donaldson, secretary, and C. Royce Hough, general manager. The board of directors will be formed of these officers and A. C. Moses, John H. Nolan, Dr. DeWitt C. Chadwick and David Moore. Incorporators, Charles M. Campbell, Col. E. C. Wood, George W. White, R. Golden Donaldson, David Moore, Dr. DeWitt C. Chadwick, John H. Nolan, Arthur C. Moses, H. L. Turner, E. K. Fox, R. T. Warwick, Francis H. Duehay, S. B. Spence, Dr. J. Thomas Kelly, Jr., and C. Royce Hough.

Trade Personals.

H. M. Hoblitt is representing the Aerocar Company at San Francisco, Cal.

A. S. Merrill is now in charge of the Chicago office of Pass & Seymour, Inc., Solvay, N. Y.

H. B. Lundberg has been appointed superintendent of the Michigan Screw Works, Lansing, Mich.

William Campbell has been appointed Michigan sales agent for the Maxwell-Briscoe-McLeod Company, of Detroit.

P. E. Judd will travel for Frank Mossberg Company, Attleboro, Mass. He was formerly with the Belcher-Loomis Company.

R. A. De Forest, formerly with the Packard Motor Company, has taken a position with the Standard Auto Company, of Detroit.

William M. Gardiner, formerly assistant manager of the White agency at San Francisco, has succeeded C. A. Hawkins as manager.

H. M. Leland, general manager, and E. E. Sweet, superintendent of the Cadillac Motor Car Company, have sailed for Europe. They expect to be abroad two months.

Vice President Thos. Henderson, of the Winton Company, is in London, attending the Olympia Show, where the company has an exhibit of Model M and Type XIV cars.

George H. Trout, formerly proprietor of the Western Automobile Company, St. Paul, Minn., has joined the sales force of the Electric Vehicle Company, Hartford, Conn.

M. J. Roseboro succeeds Harry Cunningham as manager of the Cleveland branch of the Ford Motor Company. Mr. Cunningham is the new manager of their Detroit branch.

Al Poole, who was Tracy's mechanician in the Vanderbilt Cup race, has gone to Chicago to demonstrate Isotta Fraschini and Simplex cars for the Hamilton Automobile Company, Western agents for Smith & Mabley, Inc.

Stanley Brooks, vice president of the Detroit Auto Equipment Company, has been appointed local manager of the branch of the Continental Caoutchouc Company, to succeed Rudolph Simonetta, who has been appointed special agent.

Trade Literature Received.

Boston Gear Works, Norfolk Downs, Mass.—Booklet, "Automobile Steering Gears."

Smith Automobile Company, Topeka, Kan.—Advance sheet of 1907 Great Smith car.

The Jones Speedometer, New York—Booklet, "The Speedometer—Gold Medal Award."

E. R. Thomas Motor Company, Buffalo, N. Y.—Booklet, "1907 Preliminary Announcement."

Hercules Auto Specialty Company, Los Angeles, Cal.—Circular, "Hercules Shock Absorbers."

The Joseph Dixon Crucible Company, Jersey City, N. J.—Booklet, "Graphite and Lubricant"

Hancock Manufacturing Company, 144 E. Erie Street, Chicago, Ill.—Booklet, "Facts About Oilers."

The H. H. Franklin Manufacturing Company, Syracuse, N. Y.—Catalogue, "Franklin Motor Cars, 1907."

The International Rubber Company, Milltown, N. J.—Circular, "International (Fox brand) Clincher Tires."

The R. H. Smith Mfg. Co., Springfield, Mass.—Booklets, "The Springfield Motometer" and "Facts About Automobile Speedometers."

The Waltham Manufacturing Company, Waltham, Mass.—Announcements of 1907 models of their touring cars and buckboards.

The Star Corundum Wheel Company, Ltd., Detroit, Mich.—Catalogue of emery and corundum wheels, grinding machinery and sharpening devices.

Rockwell Engineering Company, 26 Cortlandt Street, New York—Booklets and circulars regarding Rockwell furnaces for flue welding, annealing and hardening, metal melting, etc.

Patents Issued October 30, 1906.

834,283. Motor Vehicle.—Martin Fischer, Zurich, Switzerland. Filed March 1, 1906.

834,498. Engine Lubricating Device.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, Portland, Me., a corporation of Maine. Filed March 17, 1906.

834,499. Clutch Device.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, Portland, Me., a corporation of Maine. Filed April 2, 1906.

834,502. Garment for Automobile Operators.—Ernest Wenigmann, New York, N. Y. Filed April 27, 1906.

834,503. Wind Shield.—Arthur L. Banker, Pittsburg, Pa. Filed November 16, 1905.

834,504. Vehicle Tire Rim.—Arthur L. Banker, Pittsburg, Pa. Filed February 5, 1906.

834,562. Alarm Signal for Automobiles.—Martin A. Cook and Joseph Hafner, New York, N. Y. Filed September 5, 1905.

834,566. Gas Engine and Valve Mechanism Therefor.—Augusto Dina, West Hoboken, N. J., assignor to Alfred Adamson, Dobbs Ferry, N. Y. Filed August 18, 1904.

834,572. Acetylene Dash Lamp.—Will C. Greene, Watertown, N. Y. Filed April 14, 1906.

834,574. Driving Axle for Automobiles.—Clarence U. Haynes, Rome, N. Y. Filed October 23, 1905.

834,579. Nut Lock.—Robert J. Kideney, Buffalo, N. Y. Filed June 24, 1905.

834,592. Power Transmitting Mechanism.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, Portland, Me., a corporation of Maine. Filed December 7, 1905.

834,619. Differential Driving Gear.—Louis E. Hoffman, Cleveland, Ohio. Filed July 29, 1903.

834,730. Nut Lock.—Charles M. Jackson, Palmetto, Ga. Filed May 15, 1906.

834,857. Clutch.—Thomas H. Worrall, Laconia, N. H. Filed November 9, 1905.

Patents Issued November 6, 1906.

834,879. Motor Wheel for Vehicles.—Warren W. Annable, Grand Rapids, Mich., assignor of one-half to Benjamin S. Hanchett, Grand Rapids, Mich. Filed July 26, 1905.

834,908. Tool for Detaching and Resetting Tires.—Patrick L. Hussey, Cleveland, Ohio. Filed November 4, 1905.

834,909. Speed Indicator.—William H. Jones, Newton, Mass. Filed January 15, 1906.

834,922. Nut Lock.—William S. Mason, La Salle, Ill. Filed December 9, 1905.

834,963. Tire Cover.—Frederick C. Brock and Arthur M. Schaffer, Columbus, Ohio, assignors to the Vehicle Apron and Hood Company, Columbus, Ohio, a corporation of Ohio. Filed July 2, 1906.

835,004. Vehicle Step.—Stanley H. Wilson, Chicago Heights, Ill., assignor to Railway Appliances Company, Chicago, Ill., a corporation of Illinois. Filed February 13, 1905.

835,005. Wheel Tire.—Arthur S. Allen, Brookline, Mass. Filed March 6, 1905.

835,076. Cup and Ball Joint.—Jesse C. Martin, Jr., San Francisco, Cal. Filed October 26, 1904.

835,146. Dust Deflector.—Earl C. Walker, New Albany, Ind., and Era C. Jacobson, Louisville, Ky. Filed September 20, 1905.

835,158. Terminal Tip for Electric Conducting Wires.—Gustave L. Herz, New York, N. Y. Filed August 15, 1904.

835,210. Controlling Device for Speed Changing Mechanisms.—Bernhard Beskow, San Francisco, Cal. Filed October 3, 1905.

835,217. Device to Lock Nuts on Bolts.—Luther E. Darst, Louisiana, and William H. Harrelson, Cyrene, Mo. Filed September 7, 1905.

835,247. Shock Absorber.—Charles Morgan, South Orange, N. J. Filed January 11, 1906.

835,252. Driving Gear for Steering Wheels.—August F. Paselk, Detroit, Mich. Filed November 4, 1905.

835,355. Vehicle Seat.—John N. Froeber, Buffalo, N. Y. Filed November 24, 1905.

Gasoline Engine Crank Shafts.

By Warren Noble.

Crank shafts for gasoline engines may be either single or multiple, made from a single piece or built up, but by far the most common type in use on internal combustion engines, especially as employed for automobiles, is that made from a solid block of metal. As four cylinder engines are most common on automobiles, we shall investigate the features of design and manufacture which four cylinder shafts involve.

A four throw gasoline engine crank shaft may be of one of three types, according to the number of bearings. It may have two bearings, three bearings or five bearings. In the event of two bearings only being used, these are located at the ends of the shaft. Where three are used the third is placed at the centre of the shaft, between either pair of throws; while in the case of a five bearing shaft there is a bearing arranged between each throw section of the shaft, in addition to the pair of outlying ones.

Of the first type I only know one exponent, namely, the Rover Company, of England, who utilize it in their 12-14 horse power, four cylinder machine. To the second type, I should opine, at least 80 per cent. of the world's makers adhere; to the third the remainder lay claim. We will now investigate the merits of the various systems, with a view to determining their relative usefulness.

THE TWO BEARING TYPE.

This design was produced to supply the demand for a cheap four cylinder car that should be capable of cheap manufacture. The engine had four cylinders cast as a single piece together with the upper half of the crank chamber. This integral casting produced a very short engine, and although the cylinders were fairly large the overall length of the crank shaft between the bearings was only about 16 inches, in which space, of course, the four throws were arranged. The shaft itself was made exceptionally stiff, while the end bearings were of the annular ball type, being carried directly by the crank case extension of the cylinders. The crank pins were arranged to be used with ordinary plain bearings, and were as long as possible and still have room for a crank arm of sufficient stiffness to support the opposite members of the shaft. The engine, so far as I know, ran satisfactorily, as, indeed, in such a small size, there seems to be no reason why it should not. Binding of the shaft on the bearings would be unlikely, since annular single track ball bearings were used, these naturally giving a certain longitudinal freedom, which would do much to avoid ill effects from the bending strains set up during the revolution of the shaft. However, it is not difficult to see that such a construction would be out of the question for a larger engine, for were the shaft to be made sufficiently rigid to withstand the imposed strains, the weight involved would be prohibitive; while, on the other hand, unless the shaft had an unusually stiff section, the whips in it would completely destroy its usefulness. However, I am of the opinion that such a shaft has much to recommend it for cheap designs in which the overall length can be reduced to within 10 per cent. of four times the cylinder diameter; and since it facilitates the machining processes it is to be commended both as an original and a bold departure.

THE THREE BEARING TYPE.

The three bearing type of crank shaft is by far the most common, since it is invariably used by those makers who cast their cylinders in pairs, in which engines, unless ball bearings are used, a five throw crank is impossible. There are few variations in the actual design of the three bearing shaft, the direct differences lying in the direction of the intermediate arms of the Z's and the the section thereof. Such shafts, as is usual in the case of all crank shafts, are made almost invariably with the main bearings of the same external diameter, and commonly with the crank pin bearings similar in size to the shaft bearings. However, in one English engine the forward bearing has the smallest diameter, while that nearest the flywheel is of an increased size, the intermediate bearing or bearings ranging in diameter between the maximum at the flywheel end and the minimum at the forward extremity.

THE FIVE BEARING TYPE.

This type of shaft, which is growing in favor and has been in the past almost universally used by those makers casting their cylinders separately, represents the best method of support of the four throw shaft, and it is a reasonable supposition that its resistance to torsion is greater than that of a three bearing shaft of the more common Z type. Not only is each throw completely supported per se, but the load on each bearing is materially reduced, the alignment is more perfect, and permanent set less likely than with the double Z type. The manufacture is, if anything, facilitated, though the weight of the shaft is slightly greater, as is also the weight of the crank case. However, there is no doubt that the shaft of the bearing between each throw is by far the best type to use when reasonably possible. While in the event of a built up shaft being employed it becomes a necessity, in order that the very necessary stiffness may be attained.

CALCULATION OF BEARING DIMENSIONS.

The more closely the variations in dimensions and lengths of the bearing surfaces of crank shafts on gasoline engines of repute are studied the more hopeless does the task of establishing a definite rule for the calculation of such bearing surfaces become, and at the present time, although it is possible to give everyday empirical formulæ for safe loads per unit of area, derived from a cursory inspection of average practice, there is little merit in so doing, since there is no doubt that the average practice quoted is the result of designers obtaining every available inch of bearing surface possible, both for the main bearings and for the crank pins, without unduly cutting into the web section. If this haphazard method is considered it will be seen that it is by no means an unreasonable one, for when all is said and done it follows the lead of the highest class of high speed engine work, namely, the securing of the maximum bearing surface in order that the load per unit of area of bearing surface may be reduced to the lowest possible figure. By so doing not only is the life of the bearing materially increased, but the lubrication problem becomes more easy of solution, an advantage of no mean magnitude. In the case of the use of ball bearings the loads have to be more nearly known for the proper proportioning of the bearing; but, as I will point out later, this choice of bearing is materially facilitated by certain inherent qualities of ball bearings that enhance their value for such work as crank shaft support to a remarkable degree.

MANUFACTURE OF CRANK SHAFTS.

The crank shaft presents greater difficulties to the shop than to the designer. The latter can lay down his requirements and be reasonably sure that his design will stand, provided the right metal is incorporated and that no flaws are introduced. He naturally bears in mind that all the fillets from pins to web and from the web to the main bearing must be ample and maintained throughout, and, following modern practice, avoids using an inclined web between the opposed crank pins of the three bearing Z type, thus eliminating a further source of trouble. However, if a solid shaft is to be used, very serious consideration is necessary on the part of the manufacturers in order that it shall be made in the best possible way and yet as cheaply as consistent with the necessary strength and accuracy.

One of the most common processes at the present time is to forge the shaft as a slab, swaged down at either end to form the shaft end portions; then to drill and saw out the webs and pins and rough finish in the lathe, before commencing the final delicate operation. Another growing practice is to have the shaft forged either by means of a drop hammer or by a hydraulic press, that bringing it as near as possible to unfinished dimensions, leaving, of course, a reasonable allowance for machining. As crank shafts are at the present time made from special steels, the forgings are not infrequently supplied by the steel makers, who leave anywhere from three-sixteenths to five-sixteenths machining allowance on them, but it is a doubtful point whether forgings made in dies make as good a shaft as is obtained by the sawing from slab process, although in both cases there is considerable uncertainty regarding the direction

of the grain of the steel, which introduces an undesirable factor into both methods of production. The bent shaft, wherein the four throws are made by bending a straight bar of metal, is almost unknown for gasoline engines, although it is obviously an ideal means of securing a uniform longitudinal direction of grain, which tends toward strength and reliability. Probably the fact that it is not used is due to the difficulty of securing the necessary bearing surface in the space at disposal without undercutting, at the same time allowing for a bend of reasonable radius.

However, to return to the commoner processes of manufacture, we will take these up from the time that the shaft comes from the dies and is rough turned, or in the case of the slab made shaft from the direct rough turning process. The material being either a medium grade carbon, a nickel, or a nickel-chrome steel, it is first thoroughly annealed in order to eliminate as far as possible internal strain. This annealing with the carbon steel shaft terminates the heat processes through which it has to pass, but in the case of a nickel-chrome steel shaft, after annealing it is oil treated; that is to say, its temperature is raised to a dull red heat, when it is immersed in oil, being later raised again to a temperature of 500° Fahr. by boiling in oil. This oil treatment increases the elastic limit of the steel considerably, and having gone through this process it is ready for finishing.

The finishing is done in some factories entirely in the lathe, in others partly in the lathe and partly in a grinding machine. In the latter event the turner reduces the shaft from its rough finished state to within .02 of finished size, after which the shaft goes through a special crank shaft grinding machine, of which there are a number on the market, where it is reduced to drawing dimensions. Where the crank is finished in a lathe great care is taken to see that the finishing cuts are the very lightest possible, so that springing shall be avoided to the utmost extent. As a rule the webs are completely finished by planing, shaping or milling (or a combination of two of these processes) before the finishing lathe work is commenced, and not infrequently completely finished before the intermediate oil treatment or annealing.

There are many diverse opinions with regard to ground finish for crank shaft bearings, and very many of the high class makers taboo grinding on their products in this direction, preferring the smooth lathe finish to one secured from an abrasive wheel. Some years ago the planishing process, which consisted in applying a roller to the surface of the shaft with considerable pressure, was popular. An exceedingly smooth and tough skin was certainly given to the work, but it was abandoned, owing to the spring which was introduced through the great pressure of the roller, causing inaccuracy. There are still some makers who long to use this process, owing to the very excellent results which shafts finished in this manner gave under continued use, despite its drawbacks, although it is tedious and hardly a manufacturing possibility. However, to return to the present day processes, I am somewhat inclined to think that the lathe finish is equally good, if not better, than the ground finish, provided that sufficient care is taken in the manufacture of the setting jigs, and that a sufficiently skillful workman is employed. Nevertheless the grinding process is rightly gaining ground, although there are difficulties introduced, and absolute accuracy is no more certain (except as regards outside dimensions) than in the lathe.

The general inaccurcies found in crank shafts of either the three or five bearing type are with regard to the true running of the intermediate bearing or bearings, and also in the angularity between opposed crank pins. It is exceedingly rare to find a shaft which, when placed between centres, will run within .004 inch of true, and not an infrequent thing to find that the pins are not diametrically opposite by anything between one and five degrees. This error in angularity is so small that I doubt whether it makes any real difference to the running of a motor, and although it has its source originally in errors in the setting jigs, it is one of the commonest errors to find. The five bearing shaft is generally easier to secure in absolute alignment, either from a lathe or grinding machine, owing to the fact that more steadiers may be used, and that there is less transverse spring to the piece.

I said just now that crank shafts were commonly made either from steels of the nickel-chrome or nickel order, or else of a medium carbon steel. Personally, I disagree strongly with the use of the nickel-chrome steels, for two reasons: Firstly, I deny the necessity for using a steel of so high an elastic limit for gasoline engine work, provided that the compression is properly proportioned; and, secondly, because the factory costs are approximately as 4 to 1, owing to both the high relative cost of the metal and the slowness in forging and machining. From my experience in the matter I think that a medium carbon steel is sufficiently good, provided that the design affords generous fillets between the webs and the pins and bearings, and general stiffness. With gasoline engines noted for repeated crank shaft fracture it is almost invariable to find either too great a compression or some faulty ignition arrangement, both of which points are obviously mistakes of the designer.

There are also a few makers who, using a carbon steel shaft, chase with great persistence after the properties secured by case hardening. I think that this is also an unnecessary process, even if not actually detrimental, for, knowing the exceeding unreliability of hardened work with regard to subsequent accuracy, it appears to me that the final grinding process is apt to leave alternating hard and soft spots when the shaft is brought to truth, owing to the fact that the stone finds it necessary to cut through the hard skin in places in order that the realignment may be secured.

In any case the majority of breakages of crank shafts may be traced to one of three causes—interruption of metallic grain, the lack of provision of suitable fillets, and, lastly, inaccuracy of the shaft about its true axis at one of the intermediate bearings. I have only once seen a crank shaft broken directly across the web, and in that case there was excellent reason for the breakage, in the shape of a forging flaw in the centre of the web section. In almost all cases of fracture it will be found that the breakage occurs close up to a web and generally extending into it, in which case it is not difficult to divine the cause as either inaccuracy of the bearing at that point or else too small fillet radius between the web and the fractured shaft or pin portion.

BUILT UP CRANK SHAFTS.

In gasoline engine history we have the record of the first built up crank shaft as used in the case of the original type of cycle motor, wherein two discs mounted on shafts carried the crank pin between them. This type of shaft gives most excellent satisfaction, and is most commonly made with shafts and pins tapered where they enter the discs. The construction provided originally for the incorporation of the flywheel with the crank shaft, and also for the complete enclosure of all moving parts; and since its inception this mode of construction has been used for multicylinder engines by various makers. One firm, White & Poppe, of Coventry, England, are using it at the present time with considerable success, as are also the De Dion firm of France, while practically all motorcycle engines use it. Generally speaking, however, the built up shaft fell into disuse and was neglected by designers until about eighteen months ago, when several experimenters, wishing to employ the then new successful type of annular ball bearing, revived it in order to utilize these bearings without having to adopt the enormous size necessary where it had to be located by threading over the webs. In this direction, and with this object in view, there has been considerable work done, and at the present time several such shafts are coming into prominence that have been described in THE HORSELESS AGE.

In the Moore shaft the crank pins and a pair of webs are made as integral pieces and the ball bearings are mounted between a pair of such members, which are held together by six bolts running longitudinally, this designer using plain bearings for his crank pins. One or two firms are using shafts built up on the disc principle to secure the same end, some of them using ball bearings on the crank pins and others only on the shaft. With the Noble shaft any number of cylinders may be provided for by the utilization of a standard piece of crank unit, consisting of the web, half of the crank pin and half of the main bear-

ing. On the main bearing portion of the crank unit there are cut six equally-spaced dogs, the face of one lying along the axial line joining the centre of the crank pin portion with the centre of the shaft portion. Both the shaft portion and the pin extension enter the inner housings of the ball bearings, or are located in hardened steel bushings, should plain bearings be desired. An improvement on it has been devised, which secures a yet lower manufacturing cost, although abandoning to a certain extent the assembling and dissembling properties which characterized the original invention.

The adoption of the built up crank shaft is only justified by two things: cheapness of manufacture and adaptability to the use of either hardened bearings (equally renewable with the brasses in which they run), or the necessity of using ball bearings of a reasonable size. On both these points they have tremendous advantage over the solid pattern, and since there is no doubt that they can be made equally satisfactory, as regards service, as the conventional type, there is little doubt that their use will become more general as time goes on. In the event of a breakage there is also the advantage that the broken unit may be replaced, a point acceptable from the user's point of view, whose repair bill would be materially decreased.

CRANK SHAFT BEARINGS.

Aside from ball bearings we have three classes of bearings for crank shafts—hardened steel (rare, except on very small motors), hard bronze (common), and anti-friction metals (growing in popularity). The hardened steel bearings call for both journal and bushing hard, and lubrication must at all times be certain or seizing is imminent. Hard bronze has been very largely used for crank shaft bushings, and certainly given good results, although lubrication must also be closely watched, and in the event of serious heating taking place the shaft will inevitably suffer. Where a babbitt or other anti-friction metal is employed there is the certainty, in the event of the lubrication ceasing, that the soft metal of the bearing, having a low melting point, will run without seizing taking place or damage to the shaft occurring, provided the motor is not kept in operation for any space of time after the bearing has melted. Moreover, renewal of the bearing only means the renovation or replacement of the soft metal and not the refitting of the supporting cage, whereas, if a bronze bearing is used, wear entails complete refitting of the whole range of bearings along the shaft. Further, lubrication is easier, since the anti-friction metals themselves aid this to a remarkable degree, while fitting is facilitated by their soft nature. It is a noticeable tendency of modern design that crank shaft and crank pin bearings are almost invariably of the anti-friction metal filled type, except where the progress has been yet greater and ball bearings are used in place of a surface bearing.

Notes on Wire Springs, With Table of Loads and Deflections.

By F. D. Howe.

Springs stand up and do their work under higher fibre stress than would be practicable in any other element of our machines, but there is a limit even for a spring, and when the load exceeds that limit, and the spring, after a short life of chronic overload, finally breaks, we make a few remarks about the unreliability of springs, and wind up another of one gauge larger wire and try it. Some day, when it becomes generally known that a broken spring means a black eye for the designer, the material or the maker, quite as much if not more than in a case of broken crank shaft, cylinder or other machine part, there will be demand enough for high grade material to induce manufacturers to give us wire of chrome-nickel or vanadium steels. Then those places where limitations of space make it impossible to get in a properly designed spring will not be so numerous, for the work which can be stored in a spring varies as the square of the fibre stress in the material.

Spring design in every case involves the determination of two factors: strength or weight carrying ability, and flexibility, and often, in case of compression springs, stability. So many variables enter into the problem that the selection of the best proportions to suit a given set of conditions is a somewhat tedious task unless the trail has been blazed by trial of various springs or previous calculations can be referred to. A table of loads and deflections for various springs, such as that given in Kent, is of great assistance in the work, but unfortunately Kent's table does not cover the range of sizes most used in automobile and similar work. The accompanying table is intended to fill the gap. It is based on the same stress of 60,000 pounds used in Kent's table, and the wire gauge used is Roebling's or Washburn-Moen, which is that used by some of the best spring makers.

With the materials ordinarily available 60,000 pounds is too high a working stress for a constantly working spring, but may be used where the work is intermittent. A set of valve springs in which the stress reaches 50,000 pounds has been in use for some time in an automobile engine without failing, but that is probably about as high a stress as is safe for such rapid and continuous work.

The weight of a square wire spring to absorb a given amount of work is 50 per cent. greater than that of a round wire one. It will carry a heavier load with given dimensions, but its flexibility will be much less.

Compression springs are bad enough, but the man who has to design an extension spring to go into a limited space has my sympathy. He is very apt to find that to get the required strength and flexibility within the limits of length and diameter available he needs so many coils that it is a physical impossibility to get them in. Like the Cheshire cat which Alice saw in Wonderland, the spring must evolve itself out of nothing as it expands, returning into nothingness, leaving only the "grin" of the end loops. The spring maker can help him somewhat by winding the spring with initial tension, but there is a limit to this aid, which often leaves him still short of the desired spring capacity. The only way out of the difficulty is to make more room or find a material which will bear a higher stress.

TABLE OF LOADS AND DEFLECTIONS FOR AUTOMOBILE AND SIMILAR WORK.

No. 28, .016"	D	.20	.25	.3125	.375	.4375	.500	.5625	.625	.75	.875	1.00
	W	.524	.41	.31	.27	.28	.20	.175	.16	.12	.11	.098
	F	.0758	.1562	.306	.564	.914	1.390	1.99	2.76	4.88	7.74	11.8
		.0632	.1302	.302	.470	.760	1.150	1.66	2.30	4.02	6.95	9.42
		.0542	.1117	.262	.402	.659	.986	1.44	1.97	3.45	5.52	8.07
No. 24, .0225"	D	.25	.3125	.375	.4375	.500	.5625	.625	.75	.875	.100	1.125
	W	1.19	.92	.76	.45	.56	.50	.45	.37	.31	.28	.24
	F	.0384	.0767	.1365	.2225	.388	.490	.682	1.468	1.962	2.91	4.16
		.0278	.0631	.1135	.1857	.282	.408	.569	.975	1.660	2.42	3.46
		.0238	.0541	.0974	.1590	.242	.350	.488	.835	1.395	2.08	2.97
No. 22, .028"	D	.25	.3125	.375	.4375	.50	.5625	.625	.75	.815	1.00	1.125
	W	2.35	1.84	1.49	1.26	1.095	.96	.865	.715	.61	.53	.47
	F	.01425	.0299	.0543	.0891	.1368	.198	.277	.489	.798	1.193	1.78
		.0119	.0250	.0458	.0742	.1140	.165	.231	.408	.660	.995	1.42
		.0102	.0214	.0388	.0637	.0977	.142	.198	.350	.565	.852	1.22
No. 20, .035"	D	.25	.3125	.375	.4375	.50	.5625	.625	.75	.875	1.00	1.125
	W	4.7	3.64	2.97	2.5	2.18	1.92	1.72	1.42	1.20	1.05	.93
	F	.00541	.0114	.0210	.0348	.0537	.0782	.1098	.195	.317	.480	.690
		.00451	.00952	.0175	.0290	.0447	.0651	.0914	.163	.264	.400	.575
		.00386	.00815	.0150	.0249	.0384	.0558	.0784	.1895	.226	.343	.493
No. 19, .041"	D	.25	.3125	.375	.4375	.50	.5625	.625	.75	.875	1.00	1.125
	W	7.875	6.05	4.98	4.15	3.58	3.16	2.82	2.32	1.975	1.74	1.54
	F	.00280	.00565	.01055	.01685	.0274	.0400	.0564	.1010	.1645	.250	.361
		.00234	.00471	.00890	.01060	.0228	.0334	.0410	.0842	.1370	.208	.305
		.00200	.00408	.00754	.00907	.0196	.0286	.0408	.0722	.1175	.177	.258
No. 18, .047"	D	.25	.3125	.375	.4375	.50	.625	.75	.875	1.00	1.125	1.25
	W	12.05	9.2	74.5	6.57	5.40	4.23	3.48	2.95	2.85	2.27	2.02
	F	.001388	.00352	.00585	.00988	.01585	.02205	.0476	.4943	.1475	.210	.290
		.001158	.00294	.00488	.00824	.01320	.01870	.0396	.0785	.1260	.175	.242
		.000990	.00251	.00418	.00706	.01131	.01575	.0340	.0673	.1055	.150	.207
No. 17, .054"	D	.25	.5125	.375	.5	.625	.75	.875	1.00	1.125	1.25	1.50
	W	18.9	14.3	11.5	8.30	6.47	5.32	4.5	3.91	3.45	3.10	2.56
	F	.000715	.00166	.00314	.00642	.0177	.0320	.0525	.0804	.1165	.1802	.275
		.000596	.00138	.00256	.00702	.0145	.0267	.04375	.0670	.0971	.1502	.223
		.000510	.00118	.00224	.00602	.0126	.0228	.0375	.0575	.0832	.1290	.196

TABLE OF LOADS AND DEFLECTIONS FOR AUTOMOBILE AND SIMILAR WORK—*Continued.*

No. 16, .063"	D	.25	.375	.50	.625	.75	.875	1.00	1.125	1.25	1.50	1.75
	W	31.5	18.8	13.8	10.5	8.57	7.36	6.23	5.04	4.96	4.10	3.50
	F	.000312	.00145	.00372	.00846	.0155	.0290	.0333	.0572	.0797	.1417	.228
		.000260	.00122	.00310	.00704	.0129	.0233	.0327	.0476	.0660	.1180	.190
		.000223	.00107	.00266	.00609	.0111	.0200	.0281	.0408	.0566	.1010	.168
No. 15, .072"	D	.375	5	.625	.75	.875	100	1.125	1.25	1.50	1.75	2.00
	W	29.0	20.5	15.85	12.92	10.9	9.46	8.35	7.45	6.15	5.25	4.53
	F	.000798	.00225	.00485	.00893	.01487	.02275	.0335	.0468	.0635	.1355	.245
		.000665	.00185	.00404	.00744	.01240	.01895	.0279	.0390	.0697	.1160	.204
		.000570	.00159	.00896	.00638	.01061	.01650	.0239	.0335	.0597	.0968	.175
No. 14, .08"	D	.375	.5	.625	.75	.875	1.00	1.125	1.25	1.50	1.75	2.00
	W	41	28.8	22.2	18.1	15.2	13.15	11.6	10.35	8.52	7.25	6.3
	F	.000501	.00149	.00411	.00687	.0098	.0152	.0223	.03125	.0656	.0908	.139
		.000418	.00123	.00342	.00572	.0082	.0127	.0186	.0260	.0548	.0757	.116
		.000358	.00106	.00293	.00490	.0070	.0108	.0159	.0223	.0471	.0650	.099
No. 13, .092"	D	.5	.625	.75	.875	1.00	1.25	1.50	1.75	2.00	2.50	2.50
	W	45.7	35	28.4	23.8	20.3	16.1	13.15	11.25	9.72	8.65	7.75
	F	.00076	.001688	.00319	.0054	.00865	.01775	.0319	.0510	.0790	.112	.157
		.000634	.001410	.00266	.0045	.00721	.01480	.0266	.0425	.0658	.080	.131
		.000543	.001210	.00228	.00386	.00618	.01270	.0228	.0364	.0564	.098	.112
No. 12, .105"	D	.625	.75	.875	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75
	W	52.5	42.25	35.4	30.4	2.38	19.5	16.6	14.4	12.7	11.4	10.3
	F	.000927	.001772	.00315	.00473	.00995	.0179	.0294	.0448	.0653	.0880	.123
		.000690	.001480	.00262	.00395	.00830	.0149	.0245	.0374	.0545	.0734	.102
		.000590	.001270	.00215	.00338	.00710	.0128	.0210	.0320	.0467	.0630	.088
No 11, .120"	D	.75	.875	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
	W	65	54	46	36	29	25	22	19	17	15.5	14
	F	.000937	.00161	.00256	.00541	.00985	.01624	.0249	.0362	.0505	.0682	.092
		.000804	.00134	.00219	.00464	.00845	.01392	.0213	.0311	.0433	.0568	.077
		.000670	.00114	.00182	.00386	.00704	.01160	.0178	.0259	.0361	.0486	.066
No. 10, .135"	D	.875	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25
	W	77	67	52	42.5	36	31	27	24	22	20	18.5
	F	.00097	.00162	.00332	.00614	.01015	.01565	.02285	.03195	.0428	.0570	.0730
		.00081	.00135	.00276	.00513	.00846	.01295	.01910	.02660	.0358	.0475	.0608
		.00069	.00116	.00237	.00438	.00725	.01110	.01662	.02290	.0306	.0407	.0522
No. 9, .148"	D	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50
	W	90	69.5	5.65	47.5	41.2	33	32.5	29.4	26.8	24.6	22.8
	F	.00103	.003195	.00412	.00682	.0094	.0157	.0216	.0288	.0376	.0496	.0626
		.000858	.001962	.00317	.00568	.00785	.0131	.0180	.0240	.0313	.0413	.0522
		.000737	.001682	.00274	.00487	.00671	.0112	.0154	.0206	.0269	.0354	.0447
No. 8, .162"	D	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50
	W	120	98.5	76	64	56.5	48.8	43.5	39	36	33	30.5
	F	.000684	.00150	.00238	.00665	.00718	.01055	.0147	.0202	.0264	.0342	.0437
		.000570	.00124	.00199	.00554	.00597	.00880	.0126	.0168	.0220	.0285	.0364
		.000488	.00107	.00170	.00475	.00513	.00754	.0105	.0144	.0188	.0244	.0312
No. 7, .177"	D	1.00	1.25	1.50	1.75	2.50	2.25	2.50	2.75	3.00	3.25	3.50
	W	159	122	99	83.5	72	63	56.4	51	46.5	42.5	39.5
	F	.00046	.000992	.001875	.00318	.00499	.00724	.00995	.0133	.0186	.0236	.0299
		.000382	.000828	.00156	.00265	.00416	.00603	.00830	.0115	.0154	.0196	.0249
		.000328	.000710	.00134	.00227	.00356	.00517	.00710	.0099	.0135	.0168	.0214
No. 6, .192"	D	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00
	W	158	128	107	925	81	72	65	59.5	55.5	50	44
	F	.000686	.00130	.00219	.00342	.00504	.00708	.00965	.0128	.0165	.0209	.0320
		.000572	.00108	.00185	.00284	.00420	.00590	.00802	.0107	.0138	.0174	.0266
		.000490	.00093	.00156	.00244	.00360	.00506	.00688	.0091	.0118	.0149	.0228
No. 5, .205"	D	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50
	W	155	131	113	99	88.5	80	70	67	61.5	53.5	47.3
	F	.000985	.00167	.00262	.000385	.00495	.00742	.00988	.0128	.0161	.0245	.0356
		.000820	.00139	.00218	.00321	.00412	.006175	.0082	.0160	.0134	.0222	.0298
		.000705	.00119	.001875	.00275	.00358	.0053	.00702	.0091	.0115	.0175	.0278
No. 4, .225"	D	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50
	W	210	175	150	132	118	106	97	89	82	71	63
	F	.000643	.00111	.00177	.00264	.00364	.00497	.00662	.00857	.0109	.0156	.0242
		.000536	.00096	.00147	.00220	.00303	.00412	.00552	.00715	.0091	.0130	.0202
		.000459	.00079	.00126	.001885	.00260	.00354	.00473	.00613	.0078	.0111	.0176
No. 3, .244"	D	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50
	W	250	225	195	170	152	136	125	114	105	88	80
	F	.000452	.000618	.000975	.00144	.00238	.00356	.00472	.00623	.00780	.01035	.0139
		.000376	.000515	.000813	.00120	.00198	.00297	.00391	.00510	.00650	.00864	.0116
		.000323	.000441	.000696	.00103	.00170	.00255	.00337	.00437	.00557	.00740	.0099
No. 2, .263"	D	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50
	W	345	290	250	215	192	175	156	146	134	115	100
	F	.000317	.000550	.000676	.00131	.00185	.00257	.00341	.00445	.00563	.00866	.0127
		.000264	.000458	.000730	.00109	.00154	.00214	.00274	.00371	.00469	.00720	.0106
		.000226	.000393	.000625	.00094	.00132	.00187	.00244	.00318	.00402	.00620	.0091
No. 1, .283"	D	1.75	2.00	2.25	2.50	2.75	3.50	3.25	3.50	4.00	4.50	5.00
	W	360	310	270	240	215	195	180	165	145	127	113
	F	.000394	.000661	.000946	.00134	.00187	.00249	.00324	.00412	.00636	.00930	.00154
		.000328	.000550	.000778	.00112	.00155	.00208	.00270	.00344	.00530	.00775	.00128
		.000281	.000472	.000675	.00096	.00133	.00178	.00231	.00294	.00455	.00665	.00110
No. 0, .307"	D	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50	5.00
	W	470	400	850	310	280	250	230	212	185	162	145
	F	.000370	.000436	.000658	.000945	.001305	.00179	.00239	.00298	.00452	.00662	.00925
		.000308	.000380	.000548	.000788	.00109	.00149	.00199	.00244	.00327	.00550	.00770
		.000257	.000326	.000470	.000675	.00093	.00128	.00171	.00209	.00323	.00472	.00660
No. 00, .331"	D	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50	5.00	5.50
	W	510	445	390	350	320	290	270	230	205	183	165
	F	.000347	.000467	.000677	.000986	.00126	.00164	.00211	.00327	.00496	.00673	.00901
		.000289	.000388	.000564	.000780	.00105	.00137	.00176	.00273	.00414	.00562	.00750
		.000248	.000334	.000483	.000670	.00090	.00117	.00151	.00234	.00372	.00481	.00643
No. 000, .362"	D	2.00	2.25	2.50	2.75	3.00	3.25	3.50	4.00	4.50	5.00	5.50
	W	700	610	540	480	435	400	365	315	280	250	225
	F	.000123	.000189	.000275	.000385	.000515	.000677	.000867	.00135	.00199	.00280	.00383
		.000102	.000158	.000229	.000320	.000730	.000563	.000722	.00113	.00166	.00234	.00319
		.000088	.000135	.000196	.000275	.000368	.000484	.000620	.000467	.00142	.00200	.00273

$$W = .3927\frac{S\,d^3}{D-d}\qquad F = 8\frac{P\,(D-d)^3}{E\,d^4}$$ For round steel.

$$W = .471\frac{S\,d^3}{D-d}\qquad F = 4.712\frac{P\,(D-d)^3}{E-d^4}$$ For square steel.

D = outside diameter of spring.
W = load carried in pounds.
F = deflection of one coil.
d = diameter of wire.
S = fibre stress of material.
E = torsional modulus of elasticity.

Loads given in table are based upon 60,000 pounds stress. For continuous work use lower stress. For brass wire use 10,000 to 20,000 pounds. For square steel multiply W by 1.2. F is calculated upon modulus of torsional elasticity of 10, 12 and 14 millions, and is the deflection of one coil under 1 pound load. For brass wire use double the figures given for 12 million modulus. For square steel multiply F by .59.

English Imports and Exports.

The Board of Trade reports for the first nine months of the present year have recently been issued and give an idea of the tendency of British foreign automobile commerce. It would almost appear that the high water level had been reached in the number of cars imported, as in 1904 and 1905 there were 4,338 cars imported each year, after deducting re-exports, while up to the beginning of October of this year the total was only 4,355, an infinitesimal increase, considering the greater popularity of the motor car. The value of foreign cars brought into the country this year is, in round figures, nearly $300,000 less than for the corresponding period in 1905.

A somewhat different condition is found to exist, however, with relation to the parts imports. Thus, in 1904, the value of parts imported during the first nine months was only $1,247,975, as against $2,994,895 in 1905 and $6,800,860 this year.

Some progress is also being made in the exportation of cars. Against 633 British cars exported between January 1 and September 30, 1905, there were 819 in the same period this year, and the value of British parts in the corresponding periods was $401,575 and $1,077,225 respectively. The average value of foreign cars, as shown by these returns, was as follows: 1904, $1,900; 1905, $2,165; and 1906, $2,080, while the British car averaged $1,795, $1,685, and $1,800 for similar periods.

Summarizing the figures, the total value of imports was $17,108,150 up to September 30, and exports of British cars and parts in the same year, $2,551,330—a gross total of nearly twenty million dollars. Great as this total is, however, it is only about one-half of the total represented by the motor car business in the British Isles.

The Olympia Show—Six Cylinder Cars Predominate Among New Models.

By our English Correspondent.

The Society of Motor Manufacturers and Traders is to be congratulated on the decision come to early this year, to devote the forthcoming show entirely to pleasure vehicles and accessories thereof, relegating commercial vehicles and motor boats to another show to be held in the same building next March. This present show promises to be the most successful ever held in England, for in every respect—number of exhibits, space occupied, new cars to be seen, beauty of carriage work, number of visitors certain to be present—all records will be beaten. The 1906 exhibition will go down to posterity as the six-cylinder show, for from quite one-third of the exhibitors there is definite information that such cars or engines will be seen, and advice coming along from day to day indicates that probably half will stage something of the kind. Interest naturally centres around these, therefore we take them first.

As the originators of the six cylinder type, pride of place must be accorded to the Napier cars, and when Montague Napier surveys the hall on the opening day he will find ample proof of the threadbare adage that imitation is the sincerest flattery. For some time past the Napier factory at Action has had all the 1,200 employees working entirely on the production of 40 horse power and 60 horse power chassis, and the four cylinder is temporarily in the background. A polished chassis in the 60 horse power size will be staged, and the details remain much as they have been the past year. The lubricating arrangements on the Napier are particularly effective, and for 1907, where purchasers want dual ignition, two absolutely distinct magneto and accumulator systems will be provided, with two sets of ignition plugs and separate wiring.

The Hotchkiss is a new adherent to the six cylinder ranks, its distinguishing characteristic being the carrying of the crank shaft in ball bearings. The Mors hope to have a 50 horse power of this type on view. Long expected, the Minerva six cylinder will at last materialize, and will be found to embody all the features which have proved successful in the four cylinder, 22 horse power. The Minerva firm has always relied upon thermo-siphon circulation for water cooling, and this practice will be followed in the new 40 horse power. The makers of the Belsize 45 horse power also believe in natural water circulation, but they were earlier in adopting it for six cylinder cars, as the first of this type turned out from their works at the end of May last was so arranged.

Messrs. White & Pope have been making six cylinder engines for some eighteen months, and several will be found scattered about the hall on various firms' cars, the Climax particularly favoring this engine. J. W. Brooke & Co., of Lowestoft, have plumped entirely for six cylinders, as they will show all their cars thus powered, and, unlike the majority of manufacturers, they are content with moderate engine dimensions, 25 horse power being the rated power at normal engine speed. It can be noted here, with satisfaction, that while hitherto only possible to be obtained on the most costly vehicles, there is a gradual tendency to bring six cylinders within the range of those not caring to spend so much money. The Climax is an instance of this, for they offer a chassis of 20-28 horse power at just half the price of the Napier 40 horse power.

The most astounding surprise for visitors will be provided by James & Browne. This firm have been the most consistent advocates of horizontal engines ever since they built their first two cylinder, 9 horse power car in 1901, and have probably sold as many or more than any other firm in England.

Horizontal engine makers have usually felt their way with the vertical type by constructing at first, say, a small single cylinder; but James & Browne will make two sizes of six cylinder cars in 1907. Time will prevent the completion of both chassis, but the 45-50 horse power is having the finishing touches made, and will certainly be seen. This vehicle will be up to date in every detail, including metal to metal clutch, selective change gear, chain drive and ball bearings to most of the power shafts.

Another remarkable departure will be that of the Speedwell. This company have hitherto devoted their attention almost entirely to small engine power, and they have never made a secret of the fact that the cars they sold were constructed in France in accordance with their own drawings and specifications. The new six cylinder, 40 horse power Speedwell will be constructed throughout at their works in London, and will have such a number of original points which are absolute departures that their stand will form one of the centres of attraction during the week. The manufacturers of the Clement, in France, have been doing little with the six cylinder introduced at the commencement of the season, the sale of the four cylinder cars taxing all their energies; but factory extensions will enable them to cater properly in this direction for the coming year. They will employ an extremely clever multiple disc clutch of their own construction, pump lubrication, the Krebs carburetor (hitherto only used by Panhard), and chain drive. Then, again, the Orleans, who have for twelve months been perfecting their designs and following the example of the majority of firms, will also show a 35 horse power, with something very special in the way of the carburetor and steering geer.

During the 1905 show one of the great surprises was sprung upon the public by the brothers Lanchester, who, without any preliminary flourish of trumpets, definitely dropped their most beautifully balanced horizontal engine, and brought out a four cylinder vertical. This year they have another surprise in store in the shape of a six cylinder vertical engine so placed on the chassis that the dashboard will be on the extreme front of the frame and the engine will be in a casing between the driver and front passenger. The springs, body suspension, change gear, water cooling and carburetor on this car are all Lanchester ideas and quite unlike anything else, for they never copy.

An old established firm hailing from Wolverhampton will come into line with the rest of the crowd, and the Star Engineering Company will have nothing to be ashamed of in comparison with those who have had some start of them, and in one or two features there will be constructive methods worth careful scrutiny; a very successful endeavor has been made to give the fullest space behind the dashboard to passenger accommodation, and yet the total length of wheel base will be much under that usually deemed essential with this type of engine. The Star gear box on this car will be something very special, for, in addition to the usual full size cover, the box will be split horizontally, so that the upper half can be entirely removed without disturbing the bearings, while either gear shaft can be taken out irrespective of the other, leaving the box still attached to the frame. Another progressive company in Wolverhampton, the manufacturers of the "Silent Sunbeam," have been quietly elaborating their plans, and will have ready one of the very finest moderate power six cylinder cars in the show, which will have the feature found of such proved merit on these cars, viz., oil tight and dust proof chain cases to the side driving chains.

A SIX CYLINDER DARRACQ.

In the course of my journeyings among the makers and agents for the purposes of this article I came across an item of very interesting news, which is now made public for the first time—the Darracq company will make a six cylinder model, the whole output being contracted for by Messrs. Wright & Walker, the London selling agents for Darracq cars; no details are yet available of constructive details or power, but it is hoped to have the first one at Olympia. Quite a novel cylinder arrangement and distribution of pipes are the outstanding features of the Brown six cylinder 40 horse power; a cursory view gives the impression that the cylinders are cast in pairs, but they are actually separate castings, placed two and two in this fashion so as to obtain very long bearing spaces between the crank throws. Another novelty on the "Brown six" will be the finned casting for the exhaust expansion box and the fitting of two separate spraying and mixing chambers onto the common float chamber of the carburetor. The clutch actuating mechanism is also original.

The new "Thornycroft six" promises to

be something very special, indeed, and will have separate cylinders, high tension magneto, multiple disc clutch, extremely short gear shafts and propeller shaft transmission to the live axle; with cylinders 4¼ inch bore by 5 inch stroke it will be rated at 36 horse power, at 1,000 r. p. m. The new French "Bayard six" may possibly be on view, but as the agency negotiations are not yet completed, there may be insufficient time to properly exhibit. However, two other French certainties are the Gladiator and the Vinot; the former has been very greatly improved as compared with the first one that was brought to London during the last show but was not taken into the exhibition.

Those who have a fancy for elaborately finished show chassis will find something to linger over in the shape of the Ariel that will be staged in an ingenious setting of mirrors, whereby every corner will be exposed without visitors having to twist themselves into uncomfortable positions. This does not by any means exhaust the list, but sufficient has been written to prove that the statement at the commencement that sixes would predominate is in no way an exaggeration.

LIGHT "V" TYPE ENGINES.

It is interesting to observe how the firms popularly associated with horizontal engines have recently struck out on perfectly original lines, and the Adams-Hewitt is another instance of this fact, for they will show an eight cylinder "V" engine of 32 horse power, based upon the French Antoinette marine engine, but so altered in details as to make it an entirely new type. No carburetor, as usually understood by this word, is employed, for the gasoline is practically pumped right into the engine by a minute gear driven pump. This engine, with its aluminum alloy cylinder heads, exterior and interior turned cylinders, spun brass water jackets and very light valves, pistons and crank shafts, is about the lightest that has ever been constructed by any maker, it being claimed that an engine can be turned out complete not exceeding a weight of 2½ pounds per horse power developed. M. Santos Dumont had one of this type of engine on his aeroplane when he won the Archdeacon prize in Paris for the first successful mechanically aided flight.

DETAIL CHANGES.

The coming show will mark an enormous stride in the utilization of ball bearings, and no first class car will be reckoned as right up to date unless the gear shafts, countershafts for chain drive and differential shafts on propeller shaft drive, and road wheels are so fitted. So far only the Hotchkiss people have had the courage of their convictions and run their crank shaft in ball bearings; rumors are current of two or three English firms experimenting in this direction and two will bring engines for exhibition if they can complete them before the doors open. Quite a large number of makers will have balls to the steering heads, water cooling fan shafts, water pump shaft and magneto shaft. Ball bearing contact makers seem to be neglected, but the predicted invasion of the American parts makers will doubtless bring along the needful improvements. The Metallurgique (a Belgian production), following the Duryea lead, will have the steering centres canted so as to point to the place of contact between the tire and road surface.

AMERICAN CARS.

American cars are slowly feeling their way into the British market, the latest being the four cylinder 16 horse power Ford, advertised at a remarkable price. The new high powered Winton, the four cylinder vertical Cadillac, and the Reo, will all be seen, and will certainly deserve more than passing notice. The rapidly growing nature of the Scottish motor industry will be illustrated by a splendid display from the huge Argyll works, and representative machines from the New Arrol-Johnston, Albion, Kelvin, Bergius, and one or two others. So far as concerns the general trend of design nothing can be said until all the exhibits have been critically reviewed, but Panhard and Levassor certainly sum up the position, for their chassis will be found to have even fewer parts than those sold this season, and despite all contrary assertions this firm is a big power and their designs usually give hints to some one or the other at every show.

It was supposed that the body builders had about reached perfection in design and finish last year, but from what I have seen during the last few weeks in the various carriage building factories they have all endeavored to surpass themselves, and the principal coach builders of Great Britain have combined to produce at the show the most magnificent display of the kind that is humanly possible. The tire section, instead of a wearisome repetition of the same pattern of outer cover, will be alone worth a visit with the multiplicity of detachable rims, flanges and patented means of quickly repairing punctures. The tall talk lately indulged in by French motor journals as to their makers reserving new patterns for the Paris Salon in December is mere froth and verbiage, for, without exception, every French maker of cars or accessories who wants a bit of the British trade will undoubtedly raise heaven and earth to be seen at Olympia.

The Six Cylinder Controversy.

Frank P. Illsley, Chicago agent for Stevens-Duryea cars, has issued a reply to the statement regarding six cylinder cars recently given to the press by Mr. Waldon, of the Packard Company. Mr. Illsley states that he has driven a six cylinder car 5,000 miles this year, and has had five years' experience of four cylinder cars, and his belief in the superiority of or the public demand for six cylinder machines is reflected by the fact that his order for 1907 calls for seven six cylinder cars to each four cylinder. He also points, in substantiation of his claim of superiority of the six cylinder car, to the fact that such firms as Mercedes, Panhard, Hotchkiss, Napier, Clement, etc., are all either manufacturing or have built a six cylinder car. "Most of the six cylinder cars so far put out," he says, "are anything but successful, because the makers began their manufacture before having tried them out with sufficient care."

New Method of Training Drivers.

The problem of schooling novice drivers is by no means an easy one in a large city where "quiet, unfrequented places" to practice in are far off. The Institute of Chauffeurs, a London school, has hit upon a plan of practical teaching, whereby this difficulty is avoided and all danger to both the public and the pupil is eliminated.

Briefly, the car on which the pupil learns by the new method is mounted on a frame, including rollers, with which the driving wheels are in contact. Two dials are placed in front of the car, and are arranged in such a position that the pupil can see them clearly from his seat. In keeping his eyes constantly on the dial to follow the directions which the constantly shifting hands point out, the beginner learns from the outset to fix his gaze steadily ahead of him so as to closely follow all that is happening about him. All the functions of control must be performed by the sense of touch, for in all matters of driving, the vision must be unremittingly concentrated on what is happening on the highway. Of course, as the pupil knows his car is stationary and cannot possibly run into anybody, no matter what mistake he makes he experiences not the least degree of nervousness when handling it. Therefore, after a few hours of this stationary practice, he is ready to try the open road without danger to himself or the public.

The method makes teaching as easy as learning. The instructor stands by the car with three levers at his disposal, manipulating them in whatever fashion the fancy takes him. One lever works a hand on a dial, which is divided into sections illustrative of incidents commonly encountered in general driving, such as "Dangerous crossing," "Slow for traffic," and the like.

Deterioration in Storage Batteries.

In a recent paper on storage batteries Sherard Cowper-Coles stated that in his opinion the deterioration in the negative active matter was due to the fact that sulphate of lead is soluble in strong sulphuric acid. He showed that the concentrated acid within the plate is the medium for the continual transference of matter from the interior of the plate to nearer the surface, thus clogging up the pores and preventing the access of electrolyte to the interior, and he gave it as his opinion that it was of importance that long attenuated pores in the plate must be done away with in some way.

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The Six Cylinder Question.

In the present issue will be found a good deal of matter regarding six cylinder cars. The controversy with respect to the relative merits of four and six cylinder motors has waged in this country since the beginning of the present season, when two well known manufacturers gave publicity to their reasons, respectively, for manufacturing and for not manufacturing six cylinder cars, and has been renewed recently when the sales manager of another prominent firm, upon returning from Europe, issued a statement that the business done in six cylinder cars in England was not what it was generally supposed to be, and that his firm would not take up six cylinders.

The six cylinder car has now been before the industry and the public for two full seasons, and no doubt every manufacturer of high grade cars has this season considered thoroughly the advisability of taking up this type. The reasons for and against the adoption of the six cylinder motor could hardly be stated more concisely than in the article by Louis Lacoin, a leading French technical writer, which is reproduced elsewhere in this issue. The six cylinder motor has some definite mechanical advantages which cannot be realized by any other cylinder number (except multiples of six, which for other reasons are out of the question). From a strictly practical standpoint, however, most engineers would consider these advantages too dearly bought. For a motor omnibus, for instance, no designer is likely to adopt the six cylinder motor, although the public certainly demands and appreciates comfortable riding qualities—the only point in which the six cylinder motor ultimately offers an advantage. However, in the high grade pleasure vehicle branch, or, more correctly, in the vehicle de luxe, the high cost at which this increase in comfort must be bought makes it in one sense even more desirable, as it insures that this advantage will not soon be enjoyed by the general automobile using public, and therefore gives the six cylinder car a touch of special luxuriousness and superiority. The six cylinder car will undoubtedly appeal to the wealthiest classes, who are willing to pay very liberally for what they buy, and this is a strong inducement to take up its manufacture; but there is the other important question of how large the demand for this type will become.

So far as announcements of new models have been made it appears that only a few American manufacturers have taken on this type this season, and in these instances more as a side line than as their regular product. At the London show the six cylinder is evidently much in evidence, but no doubt at least some of the exhibitors stage six cylinder models something like a show window attraction—to draw visitors to their stands, and thus secure attention for their regular stock vehicles.

Those who wish to study the mechanical points on which the advantages of the six cylinder engine depend are advised to study the article of M. Lacoin. For the benefit of the non-mechanical reader, two points should, however, be further explained. The curves representing vibration in the two types, respectively, refer only to vibration due to the reciprocating motion. The vibration due to torque reaction is much more nearly the same in the two types of motors. The proper method of comparison would evidently be to plot and contrast the total resulting vibrations, but unfortunately this is very difficult to arrive at mathematically. Also, there seems to be little purpose in comparing the uniformity of the torques impressed on the crank shafts of the two types of engines respectively, as the torque which is impressed on the transmission (and which should, of course, be as uniform as possible) is very much modified by the flywheel. In fact, for normal speeds of operation al-

most any desired degree of uniformity of torque can be obtained with either type of engine by using suitable flywheels.

Positive Driving of Auxiliaries.

One of the directions in which improvement may be noted, season by season, is in the provisions for mounting and positively driving the engine auxiliaries—the circulating pump, the cooling fan, the lubricator and the magneto. A few years ago it was common to find the circulating pump mounted almost anywhere upon the chassis and driven by a belt or by a chain; now it is almost universal practice to make the pump integral with the engine, designed as a part of it and positively geared to it. It has also become very general practice to cast the engine base with a bracket for the mounting of the magneto, and to make provision for the necessary driving gearing.

Modern motor cars carry so small a volume of cooling water that the thermal capacity of the system is very much less than it was in the days of the bulky coil radiator and capacious water tank. The result is that the radiator is worked very hard, and anything which impairs its heat dissipating activity becomes the cause of a serious loss of water. It has hitherto been the general custom to drive the radiator cooling fan by means of a belt, but belts are very prone to stretch and lose their driving power. This stretching is gradual and often leads to serious slippage of the fan, and a very marked impairment of action of the cooling system before the fact is noticed. There are indications that the belt, as a driving mechanism for the fan, is becoming obsolescent, and is to be discarded for this office, as it has been in pump driving. A number of 1907 cars are announced to be provided with gear driven fans. This is no new idea, it having been tried upon certain air cooled cars some time ago, but it is evidently being realized now as it was not then, that if a fan is positively gear driven it must be provided with a safety device which will allow it to slip somewhat when the engine is started suddenly or reverses its direction accidentally. Otherwise the fan mechanism is likely to be overstrained. The use of gears for fan driving, if properly carried out, will eliminate one more cause of uncertain operation in vehicle motors.

Lubricators have, in the past, almost always been driven by small round belts, which in time were likely to stretch and slip badly, if not fail to operate at all. Quite a number of the new cars make use of oil pumps which, if not actually a part of the motor itself and geared to it, are mounted upon the dash and driven by gears rather than by a belt. In short, it looks as though the days of the leather belt, with its very uncertain mechanical properties, was nearly over, so far as its use in connection with automobile motors is concerned. The use of small gears of the spur, spiral and level types, both metal and composite, is evidently greatly upon the increase, and the utmost pains are taken to enclose and lubricate them. Increased positiveness of action, greater freedom from the necessity of vexatious adjustments and a motive power equipment complete in itself are among the advantages gained by these recent changes in practice.

The Pedestrian's Rights.

It is a well established rule of law, or, more properly speaking, legal maxim, that every person is required to so use his own property as not to endanger or injure the person or property of another. Each individual under the common law of England and America is entitled to the full enjoyment of that negative right—the right of freedom from injury—inviolability of the person from physical damage. The criminal law makes it a crime for a person to inflict intentionally upon another bodily harm. Not only is an intentional assault criminal but the law gives the injured a right of action for the recovery of pecuniary damages for the wrong. And it may be said that what is here stated in reference to the pedestrian's rights applies to vehicular users of the highway. We will define the position of the automobilist in reference to the principles of law stated above.

The arrest of automobilists for having run into someone is of very common occurrence, and civil actions are instituted almost daily because of injuries occurring in this way. Such a collision must be due to either one of four causes, viz.: (1) negligence of the automobilist, (2) negligence of the injured party, (3) negligence of both parties, and (4) what might be termed a negligent or reckless assault by the motor car driver. It is the last situation which is of vital interest today. Recklessness and negligence without regard for human safety or life constitute criminal assault when another is injured merely, while the charge of manslaughter may be maintained when death results from the injury.

Let us take under consideration cases of criminal assault. It has been held that where the owner of a horse and carriage drove with immoderate speed and knocked down a woman in the street a person riding with the owner at his invitation, and assenting to such immoderate driving, was liable criminally to charges of assault and battery. It also has been held that it is a criminal assault to attempt to run against the wagon of another person on the highway, although there is no actual collision. From these cases and many others which could be cited it will be seen that the automobilist is apt to render himself liable for criminal assault if he is not careful in operating his machine, and drives by or into others on the highway in a careless manner amounting to an intent to proceed, no matter what the consequences.

The motorist is in his car and feels comparatively safe, so far as the pedestrian is concerned. The law may make him criminally and civilly liable, but he is protected more or less from physical injury, and he knows it. When he is dashing around a sharp curve, for example, or when he drives at a fast rate through a thickly settled community, the sense of security which he has is apt to make him disregard the insecurity of others on the highway who are less protected. This is the root and bottom of speed mania.

The rights of the pedestrian on the highways are more intangible than real in their enjoyment and enforcement. This applies also where the pedestrian's rights come in conflict with all vehicular traffic, especially in the large cities. You know how it is when you are attempting to cross streets at crossings where your rights are equal with street cars and other vehicles. You are crowded back, you are compelled to run, and if you are on the ground first, unless you are very energetic in protecting yourself from injury, the drivers of vehicles will not even retard their speed, but will deliberately drive upon you. The public thoroughfares are made and maintained for the use of vehicles and pedestrians equally and alike, but the rights of the pedestrian to use the streets and highways and of inviolability from physical injury are not respected in the least by those using vehicles, and very little protected by the agents of the law.

NEW VEHICLES AND PARTS

Marmon 1907 Models.

For the season of 1907 Nordyke & Marmon Company, of Indianapolis, Ind., will manufacture two models of touring cars. One of these, known as Model C-7, is a continuation of this year's touring car and is identical with it, except that the wheel base has been increased from 90 to 96 inches and a few slight changes have been made in the planetary change speed gear. A complete description of this car appeared in our issue of September 27, 1905. The distinctly new Marmon production is their Model F, which differs from preceding models chiefly in having a selective sliding pinion change gear, though there are numerous other minor changes which will be noted in the course of the description.

The double three point suspension, which has always been a prominent feature of Marmon cars, is, of course, retained, and the only notable change is the substitution of scroll head, full elliptic springs for the ordinary form.

Nordyke & Marmon have always been one of the most extensive users of aluminum in automobile work, and this new model shows no deviation from their former practice, for the majority of the castings are of this metal, including the body and dash. Reasons for this extensive and successful use are found in the fact that they make their own castings and can watch the entire process carefully.

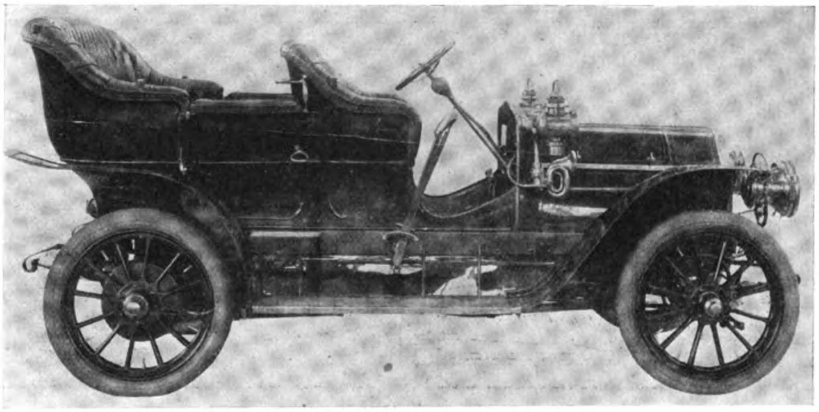
THE MOTOR.

The same type of air cooled motor, with four cylinders set at 45 degrees with the vertical, is retained. The valves are in the head and are operated from a single cam shaft. Except for the increase in size from 4⅝x4½ inches to 5x4½ inches, the design has been but little changed. The pistons are made with capped heads and six eccentric rings one-eighth inch wide are used.

The crank shaft, which is of chrome nickel steel, runs in bushings of a special babbitt, while the connecting rod is babbitt bushed at the crank end and phosphor bronze bushed at the piston end. The cooling surface has, of course, been increased to correspond with the increase in bore, and the fan is larger. The driving gear for the cam shaft is of fibre, with a bronze centre, to eliminate noise. Several changes have been made in the oiling system, though the main features remain the same; the oil pump has been moved toward the middle of the motor and the strainer is very easily removable. A relief valve has been added and there is a pressure gauge on the footboard. The oil is still fed into the hollow crank shaft and through small radial holes to pins and bearings; also to the piston pins through tubes along the rods. Jump spark ignition is used, with Connecticut coil and Heinze timer.

CLUTCH AND CHANGE SPEED GEAR.

Fig. 1 shows the clutch and change gear in section. It will be noted that the clutch is fully enclosed in an extension of the change gear case.



MARMON MODEL F.

The clutch consists of two cast iron plates with cork inserts; one of these plates is integral with the flywheel, and the other, Q, slides on studs S screwed into the flywheel, acting on a disc N of saw steel, riveted to a hub M which slides on pins L which are secured to the flanged end of shaft K. Springs P press the plates together. To release the clutch, lever Z draws collar U to the rear by links V, which separate plate Q from the flywheel. Springs O move disc N against flange K by pulling on dogs R. Thus all three plates are fully separated and it is impossible for the clutch to drag. Disc N is thin, so the clutch has a comparatively small moment of inertia. When the engine is running idle shaft K runs in an H-B ball bearing carried in thimble J. All adjustments are easily made through hand hole X.

Shaft K is connected to the change gear shaft by clamp coupling I. The change gear is shown in the high speed position, gear C being meshed with internal clutch B, and countershaft driving gear G being slid out of mesh, so no gears are running idle.

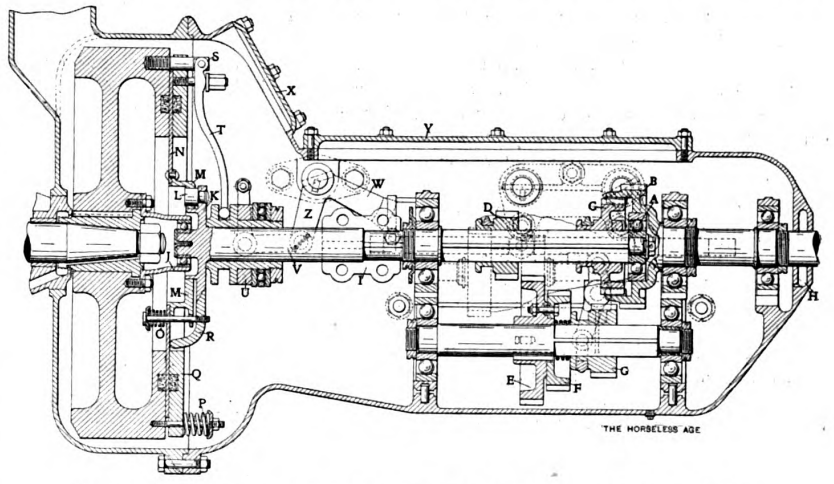


FIG. 1.—LONGITUDINAL SECTION THROUGH CLUTCH AND CHANGE GEAR.

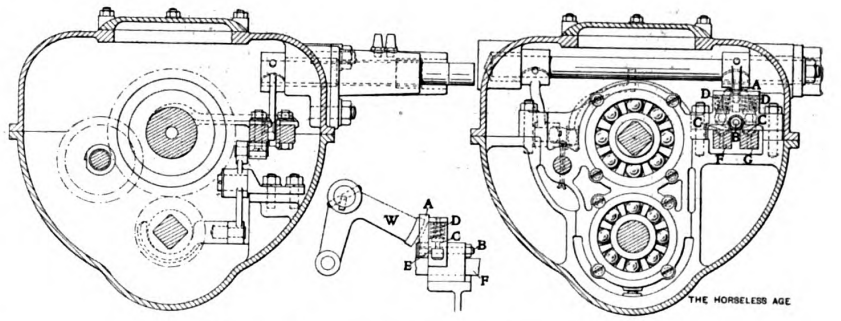


FIG. 2.—SECTIONS OF CHANGE SPEED GEAR.

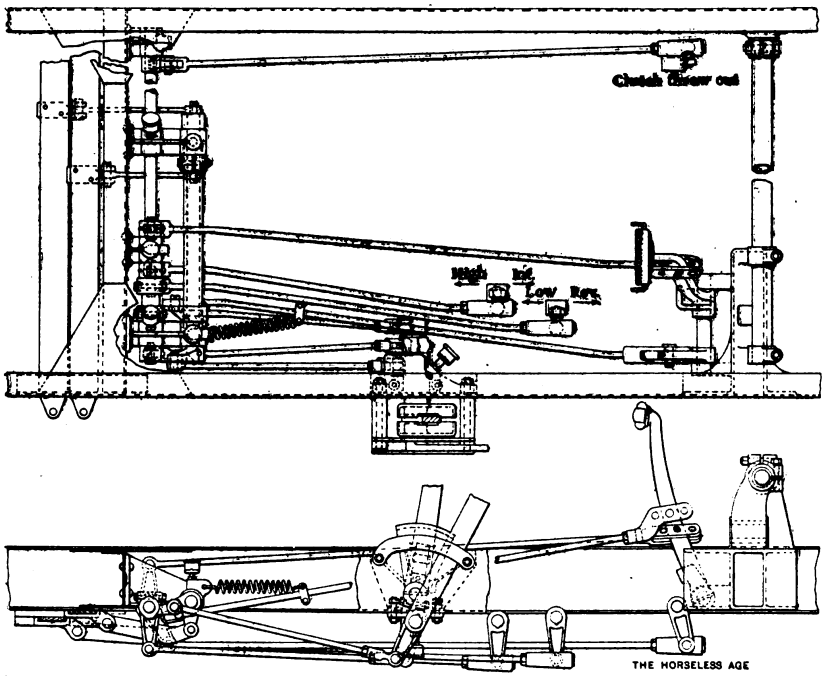


FIG. 3.—CONTROL SYSTEM.

When C is slid forward gear G is meshed by the helical spring surrounding its shaft. C and F in mesh give the second speed, D and E the first speed, while for the reverse D is slid forward into mesh with a gear on a side shaft shown by dotted lines. The gears are shifted by levers with rollers on their ends, which work in notches in square sliding rods F and G (Fig. 2), which carry forks engaging in grooves in the gear hubs. These shifting rods are interlocked with the clutch in the following manner: Arm W (see Figs. 1 and 2) is keyed and pinned to the clutch operating shaft. When the clutch is engaged it rests in a slot in A and prevents A from swinging about its shaft B. Disengaging the clutch removes W from the slot in A. Either F or G may now be operated, and moving either raises the conical pointed plug C against the pressure of spring D and tips A sidewise because of pins E resting in the grooves in CC.

All gears are of chrome nickel steel, hardened, 6 pitch and 1 to 1⅛ inch face. The shafts run on H-B bearings, secured by nuts locked by a wire in a groove around the nut, its end fitting in holes in the shaft. This form of nut lock is used throughout the car. Points of particular interest are the use of an H-B bearing at A in the divided shaft, and the fact that in the motor, clutch and change gear there are only two bearings which could possibly drip oil, the front bearing of the motor and the rear bearing of the change gear at H (Fig. 1). Both these are safeguarded and provided with oil returns.

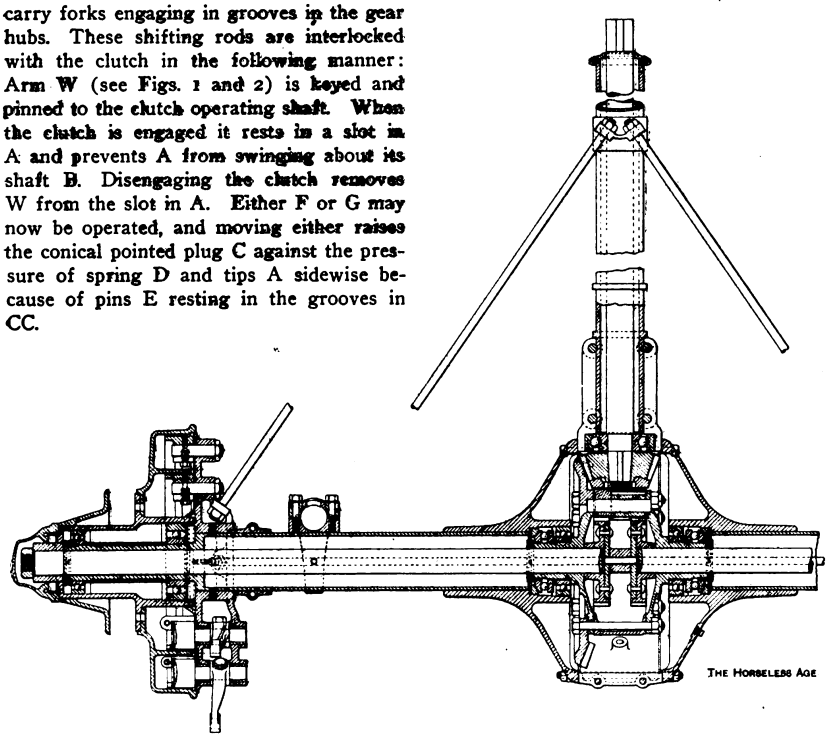


FIG. 4.—BEVEL GEAR DRIVE AND REAR AXLE.

AXLES.

The rear axle is an entirely new design, though the same principles have been retained. H-B bearings are used in place of Hyatt roller, and the driving shaft has no bearing at its front end, being coupled to the change gear shaft. The wheels run on bearings mounted on a reduced diameter of the tubes, as in 1906 models; the diagonal braces, truss and four piece gear housing are retained; also ball and socket joint struts to both front and rear axles.

The rear axle shafts are flanged at their inner ends and riveted to the differential gears. They are separated by a bronze cylinder held central by a steel pin. Their outer ends are squared to the driving dogs.

Both sets of brakes act on the rear hubs and consist of bronze shoes, cam expanded into cast iron drums. The operating levers are mounted between two bronze bushed bearings, which is a thoroughly mechanical feature. These brakes are equalized by long bars sliding in slots under the frame, and the adjustments are at the end of these bars, which the rear rods pass through; and nuts, with spherical bottoms on the rods, act in cupped seats in the equalizer bars.

The front axle is an I section steel forging, with reversed Elliott type pivot, the pins being fast in the axle and the ball thrust on top being covered by a tight dust cap.

STEERING AND CONTROL.

A new and very substantial steering gear has been designed. It is of the screw and nut type, comprising a steel screw with "Acme" thread, a steel nut with babbitt lining A and rib B, having a finished groove, in which tongue C works. Forked lever D connects to trunnions on the nut by slotted links E. Both shafts are fitted with Timken bearings, adjustable by means of nuts K and J.

Finger levers above the wheel control the spark and throttle by bevel gears F and G, which mesh with bevels having notched sectors, on which plugs H and I act, to hold the levers in position. The throttle is also controlled by a foot accelerator button, spring returned.

The left foot pedal operates the clutch with which the pedal brake is interlocked.

The gears are shifted by a hand lever, which picks up one of two short levers that are linked to a lever on a cross shaft toward the rear, and these latter levers are connected by ball and socket joints to levers on the two shifter shafts of the change gear.

It should be noted that the frame is chrome nickel steel.

The wheels are 34x4 inch, the wheel base is 104 inches and the gauge is 56 inches.

The fenders are of sheet steel, fitted with aprons, and the front fenders do not flare, as it has been found that under some conditions flaring fenders throw the mud outward and the wind then blows it upon the occupants. The shapes of bonnet and dash have been changed, and hinged doors have been added in the top of the bonnet.

The body is a new design, but the general outline is similar to previous models. The front seat is now divided only by an arm. Robe rails and similar conveniences are fitted and the body is ironed for a top.

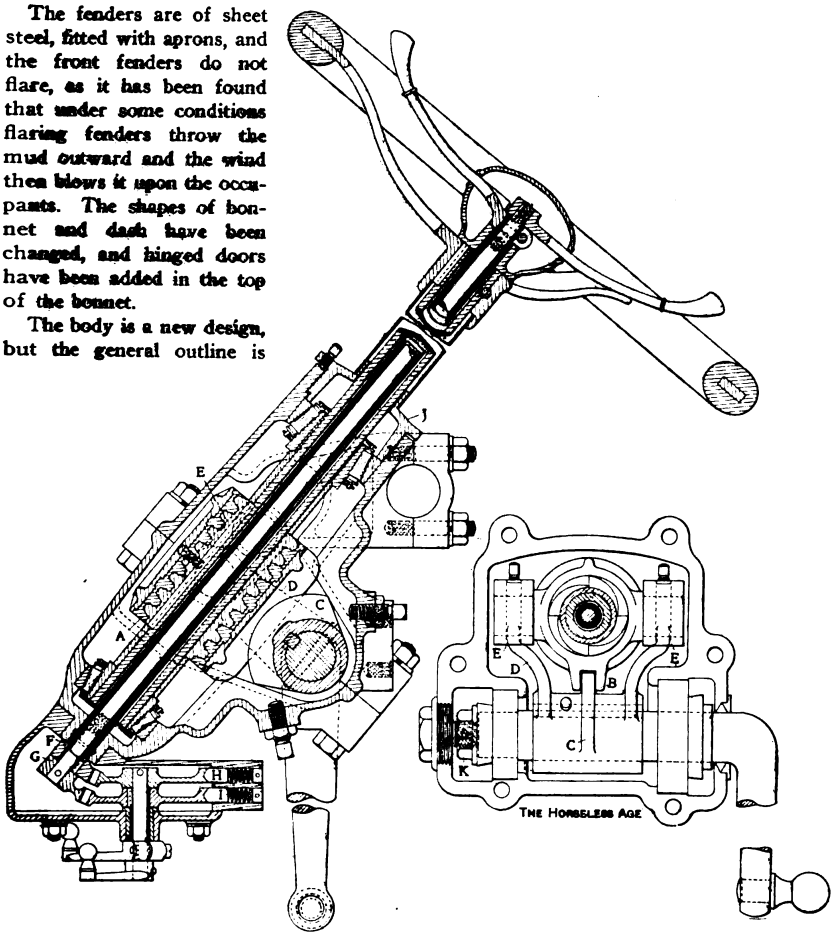


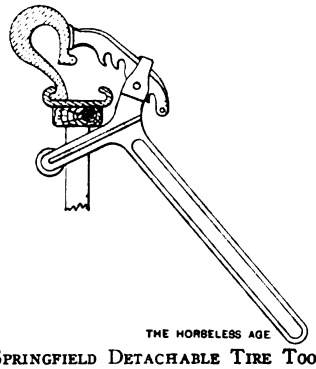
FIG. 5.—STEERING GEAR AND ENGINE CONTROL LEVERS.

Arctic Non-Freezing Solution.

The Auto Chemical and Manufacturing Company of 1773 Broadway, New York city, are marketing a non-freezing solution which they guarantee not to freeze at 40° below zero. It is also claimed to be non-corrosive and non-crystallizing, and to have a boiling point very much higher than water, so that it is not rapidly lost by evaporation. It is sold in 5 gallon cans ready for use, and is recommended, besides its use in cooling systems, for use in acetylene lamps.

The Springfield Detachable Tire Tool.

The Shawver Company, Springfield, O., have brought out a tool designed to be used in connection with the pry blades or tools furnished by the tire manufacturers for removing the common clincher tires. All tires after they have been on the rim a short time adhere to it either through paint or corrosion of the metal, which makes them difficult to remove. This the Springfield detachable tire tool is designed to remedy. The parts of this tool which come in contact with the tire are broad and conform to the shape of the tire, thus making it impossible to injure the tires. It is also claimed to be impossible to mar or deface the wheel, as the part of the tool which comes in contact with the spoke is a wood rool and immediately adjusts itself to the correct position for easily lifting the tire. The tool is made in only one size, suitable for three to five inch tires, and weighs only 1¼ pounds.



SPRINGFIELD DETACHABLE TIRE TOOL.

The City Machine Company, Detroit, Mich., will soon build a two story factory on the site of their present building. This concern will manufacture all of the wheels for the Cadillac Motor Car Company the coming year.

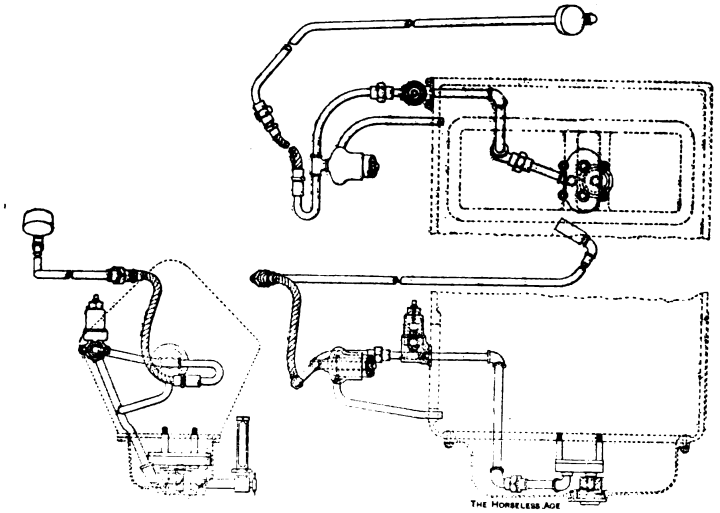


FIG. 6.—ENGINE OILING SYSTEM.

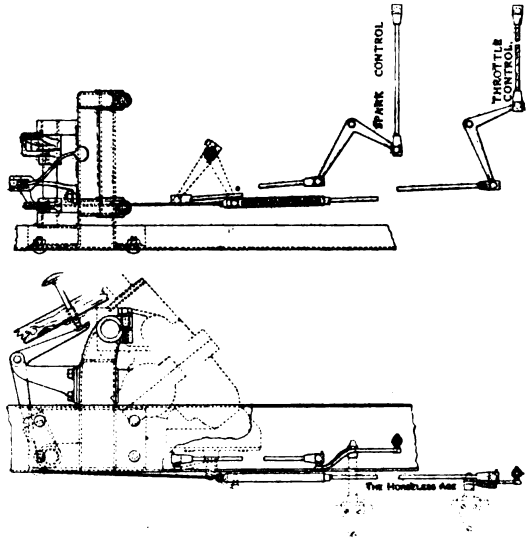
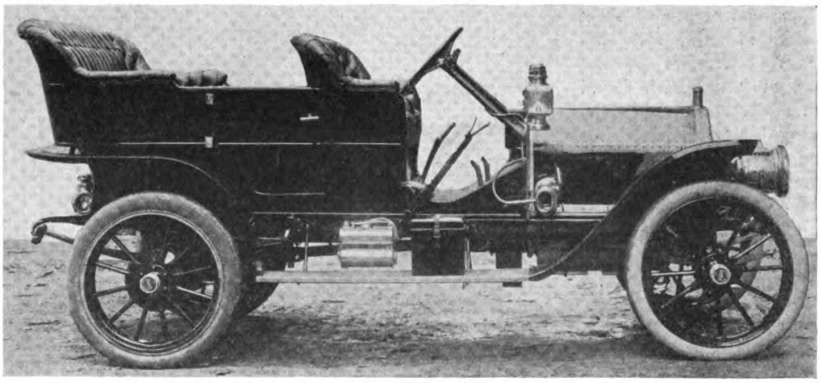


FIG. 7.—BRAKE AND TRANSMISSION CONTROL.

Wayne 1907 Models.

During the season of 1907 the Wayne Automobile Company, of Detroit, Mich., will offer to the trade three models. Two of these, Models R and K, will be continuations of 1906 designs. Their specifications are as follows: Model R is a seven passenger touring car, with a wheel base of 117 inches, 34x4½ inch wheels, shaft drive, and three speeds and reverse sliding change gear. It is driven by a four cylinder, 5½x5 inch motor rated at 50 horse power. The car weighs 2,800 pounds. Model K is a five passenger touring car with three speeds and reverse sliding gear, shaft drive, and a four cylinder 4¾x5 inch motor rated at 35 horse power. It has 32x4 inch wheels, a wheel base of 102 inches, and weighs 2,100 pounds.

In Model N, their third type of car, the Wayne Company are offering a distinctly new design, whose most striking characteristic is its simplicity.



WAYNE MODEL N.

THE MOTOR.

The Model N four cylinder vertical motor has a bore of 4⅝ and a stroke of 5¼ inches. It is rated at 30 to 35 horse power. The cylinders are cast in pairs, have domed heads and the valves all on the left side. Ample water space is provided, and numerous openings insure that the core sand may be thoroughly cleaned from this jacket space. Each cylinder casting is secured to the crank case by six large studs. The cylinder centre lines are offset three-quarters of an inch.

The crank case is aluminum, and is split horizontally. On the upper portion are four legs which are bolted to the frame sides and support the motor. The lower part simply serves as an oil pan. Liberal hand holes are provided in both sides of the case, and afford easy access to the crank pin bearings, and also good light to work by.

The crank is drop forged; it is of the three bearing type, and runs in bearings of Parsons white brass. The connecting rods are I section drop forgings, bushed with white brass at the crank ends, and measure 12 inches from centre to centre. Contrary to usual practice, the solid, hardened piston pins are held fast in the rods by screws which pass almost tangent to their surface, but cut into same sufficiently to keep them from turning or moving endwise. The pistons are long, flat topped, and are fitted with three diagonally split rings above the pin. They are bushed with phosphor bronze at the wrist pin bearings. The cam shaft is driven by enclosed gears at the front of the motor, and the hardened cams act on rollers at the bottom of ordinary straight plungers. Nickel steel valves are used, with long springs of unusually large diameter. The inlet and exhaust manifolds are both held by two yokes secured by two studs each. The inlet pipe passes between the tops of the cylinders, and the carburetor is placed low down on the right side, making short and direct control connections.

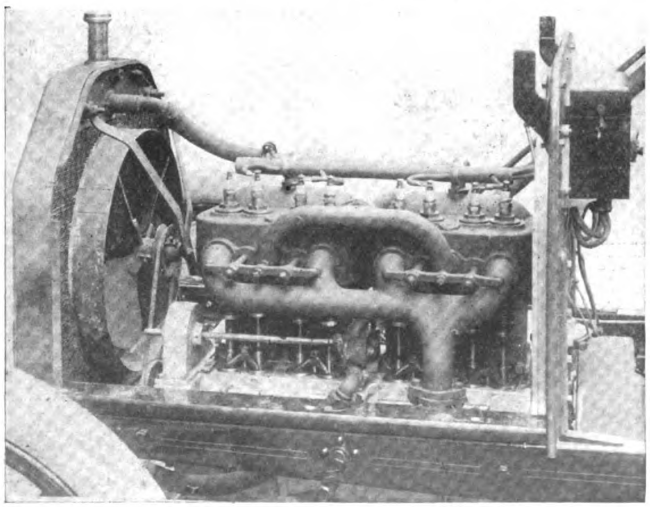
Water is circulated by a gear pump located in the centre on the left side and gear driven from the cam shaft. From the pump the water passes through a metal tube between the middle cylinders to the centre of the inlet connection, which is at the bottom of the jackets on the right. From these points the momentum of the water naturally causes it to flow between the cylinders to the further side of the valve chambers, from which it passes around the valves to the outlet on top, and thence to the vertical tube radiator. Air circulation through the radiator is aided by a four blade sheet metal fan driven by a round belt.

Jump spark ignition is used. The plugs are located in the screw caps over the inlet valves, and the roller contact timer is mounted on a vertical shaft, being gear driven from the rear of the cam shaft. Current is supplied by a storage battery carried on the footboard. Force feed lubrication is supplied to the bearings, and the pistons are oiled by splash from the crank case.

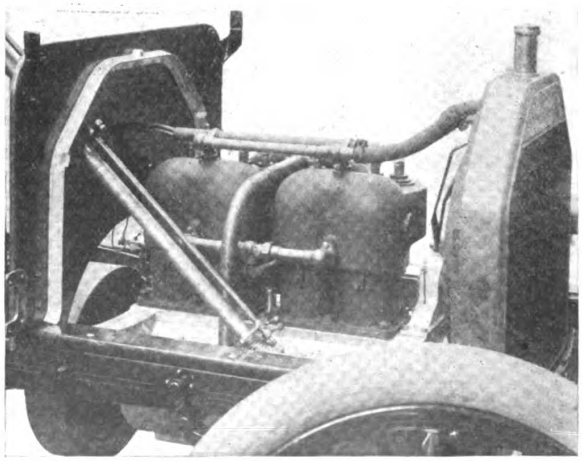
The flywheel is bolted to an unusually large flange integral with the crank shaft, and has a drum cast on its rear side which contains the expanding clutch.

THE CLUTCH.

Within the drum just mentioned is another of smaller diameter, made of cast aluminum, and secured to a flange on the



LEFT SIDE OF MOTOR.



RIGHT SIDE OF ENGINE.

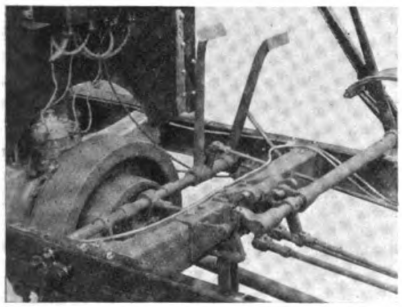
The spark plugs over the exhaust valves will not be used in stock cars.

coupling which connects to the driving shaft. To this drum is fastened one end of a sheet steel band faced with leather, while the other end is secured to a lever pivoted on the drum. A light helical spring acts to expand the band into the drum on the flywheel, and the direction of rotation of the latter causes the band to grip more and more firmly. To release the clutch, a wedge is pushed against a roller on the lever and contracts the band. This clutch is simple, has a large wearing surface and very little inertia.

DRIVING SHAFT AND CHANGE SPEED GEAR.

At the forward end of the driving shaft are two trunnions on which are mounted rectangular blocks which slide in the slotted forked end of the piece on which the clutch is mounted. At the rear, and just in front of the change gear case, is a Blood Brothers universal joint, secured by keys and nuts to the tapered ends of the shafts.

The change gear is contained in a compartment of the same case which encloses the bevel driving gears. It gives three forward and a reverse speeds on the selective system. The direct drive shaft is square and carries two sliding sets. The secondary shaft is underneath, and the reverse pinion is on a side shaft toward the rear. The gears are moved on the shaft by drop forged forks screwed to the rods in the top of the case, to allow of bringing the gears into perfect mesh, and are located in position by spring pressed plungers working in slots in these rods.



CLUTCH AND CONTROL.

The entire front end of the case is removable, and the gear is assembled through this opening. All the bushings are white brass, and only the driving shaft bearing goes through the case. The gears are six pitch, 1 inch face, and of Midvale steel; the shafts are of the same material.

AXLES.

The driving pinion has a Timken roller bearing at its large end, and a white brass bearing at its rear end. The rear axle shafts are of 1⅜ inch diameter, of hammered steel, and run on Hyatt roller bearings. Gear thrust and wheel thrust are taken up on ball bearings. The rear wheels are secured by keys and retaining nuts to the tapered ends of the axle shafts. The front axle is tubular, of the Elliott type.

FRAME AND SPRINGS.

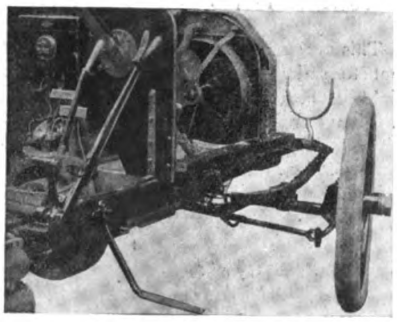
The frame is of pressed steel, with straight side members and a drop cross member in front which supports the radiator. The rear cross member is secured to the sides by arms from the spring brackets, and by gussets. Toward the middle of the frame is another cross channel to which are secured the brackets for the gear shift and clutch interlock devices. The springs are semi-elliptic, the front being 2 inches and the rear 2¼ inches wide. The rear springs are outside the frame and are linked only at their rear ends. Their seats are free on the axle tube, and the braking and driving torque is taken by a tubular torsion rod which has its front end linked to the frame.

WHEELS, BRAKES, CONTROL, ETC.

The rear wheels are 34 by 4 inch wood artillery, with cast steel hubs and flanges, and pressed steel brake drums. The front wheels are 34x3½ inch and run on three point bearings of special design. Very neat aluminum hub caps are fitted.

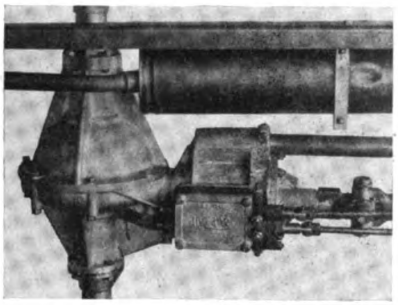
Both sets of brakes act on the rear wheels. The internal are toggle expanded and are connected through a short equalizer to the right pedal. The band brakes are Raymond, and are operated through a rocker shaft which is inside the divided tube which carries the foot brake equalizer; a lever in the centre of this shaft is connected to a lever on the hand lever shaft near its inner end. On the very end of this shaft is a forked lever with a roller which acts on a cam of such shape that it throws out the clutch and then allows the emergency brake to be applied as hard as desired, without additional movement of the clutch. Both sets of brakes are faced with Gandy belting, and the expanding brake has shields to keep out dirt.

From the forward ends of the gear shifting rods connection is made to the vertical arms of two bell cranks, whose forked horizontal arms engage with a pin in the eye of a lever on the inner end of the tube whose outer end carries the gear shifting hand lever. This hand lever moves over a gridiron quadrant to pick up and operate either bell crank, according to the speed required. The outer slot forward gives the high speed, back the intermediate; the inner slot forward gives the low, back the reverse.



DASHBOARD, RADIATOR AND FAN.

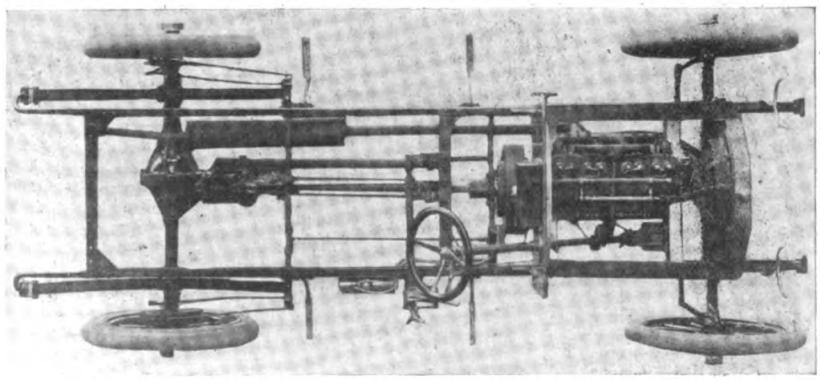
Steering is by a hand wheel on a sharply inclined post passing through the dash and connected across the car to the left knuckle. Spark and throttle are controlled by levers on the right, just under the wheel.



SLIDING CHANGE GEAR AND BEVEL DRIVING GEARS IN ONE CASE.

The fenders are provided with aprons for protecting the body, and have a strip along their outer edges for catching mud and securing additional stiffness.

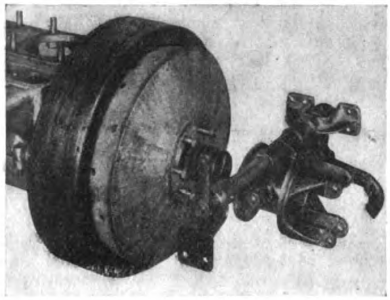
A straight dash is used, fastened to the frame by brackets, and a coil is the only attachment. The body is finely finished and upholstered and comfortably seats five people, and the car having a wheel base of only 106 inches is convenient to handle even in the city.



PLAN VIEW OF CHASSIS.

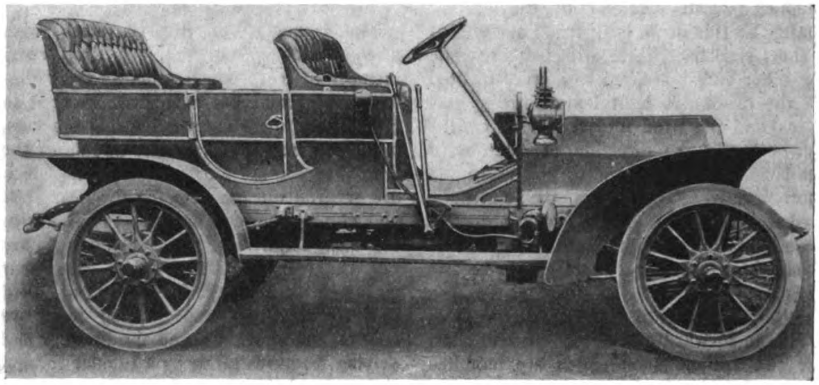
Aerocar Model D (1907 Light Touring Car).

This new Aerocar model is being brought out to satisfy the popular demand for a light, substantial, medium powered and medium priced car for general touring and city use. All the main constructional features of their 1906 Model A have been retained, so this description will be largely confined to detail improvements. Besides those changes noted here, there are numerous other small improvements mainly in finish, methods of fitting and tuning up, which, while they are beyond the range of a technical description, tend to improve the quality of the car. For a more complete idea of the mechanical construction the reader is referred to the description of Model A on page 724 of Volume 17. The new model is hung somewhat lower, and on account of its smaller wheels and a lower and more rakish body design it looks much smaller than it really is.

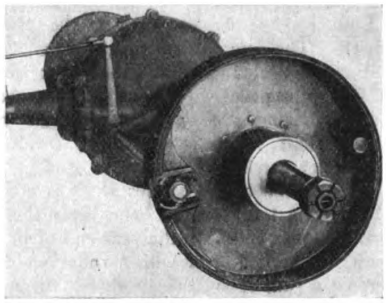


CLUTCH. AEROCAR MODEL D.

The four cylinder vertical 4x4 inch air cooled motor is retained, but the oiling has been somewhat changed since the former description. The piston is relieved for a portion of its length where the pin passes through, and the bearing surface below has two shallow oil grooves, besides the ring, for distributing the oil. These changes have made the engine speedier and more quiet. A Lavigne oiler is now used, being placed beside the motor and belt driven from the cam shaft. A Schebler carburetor is fitted instead of the Universal employed on former models.

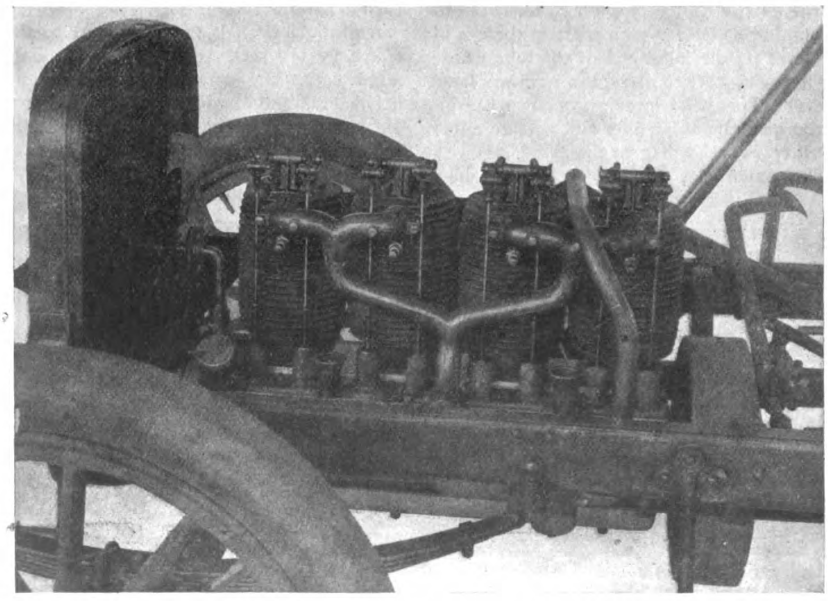


AEROCAR 1907 MODEL D.



REAR BRAKE. AEROCAR MODEL D.

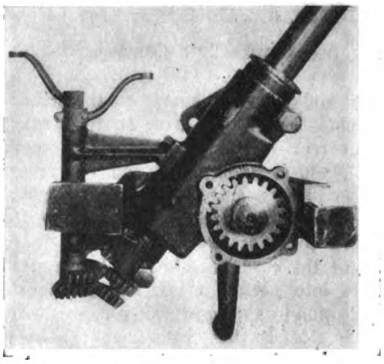
The clutch remains the same, but a special anhydrous leather facing is employed.



INLET SIDE OF MOTOR. AEROCAR MODEL D.

Change gear, driving shaft and front and rear axles remain mechanically similar to those employed on former models, the only differences being changes of size and gear ratios to conform to the new design. No change has been found desirable in the braking system, except in the pedal. This, together with the clutch pedal, is so hung as to be very close to the footboard in its rear position, and to follow the direction of the footboard in its forward movement, giving an exceptionally easy foot position and action,

A pressed steel frame similar to that on former models is used. It has straight side members, 1½ inches wide by 4 inches deep, of a gauge to correspond with the comparatively light weight of the car. The springs are semi-elliptic, the front ones being 41 inches long; the rear 48 inches, and all having eight leaves.



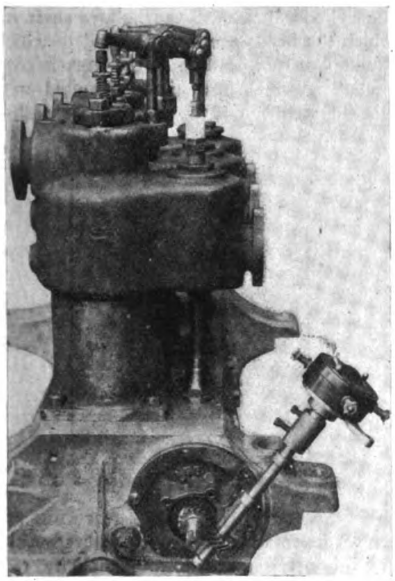
STEERING GEAR. AEROCAR MODEL D.

Thirty-two inch artillery type wheels having twelve spokes are used. The wheel base is 104 inches and the tread is standard. A straight mahogany dash is used and the coil is the only attachment. Gasoline is carried in a 17 gallon tank under the seat and this tank is divided into four compartments to prevent the fuel from splashing. The body is very roomy and finish and upholstery are first class. The car is stated to weigh 2,000 pounds.

In addition to their air cooled cars the Aerocar Company are developing a large touring car driven by a water cooled motor.

Mitchell Cars for 1907.

Three models of pleasure cars will be manufactured during 1907 by the Mitchell Motor Car Company, Racine, Wis.—Model D, a five passenger touring car, which is a continuation of the 1906 model D-4; Model F, a somewhat larger five passenger touring car, and Model E, a two passenger runabout which succeeds their 1906 Model C-4. Brief specifications of these models are as follows: Model D—Motor, four cylinder, vertical, 4¼x5 inch, 24-30 horse power; wheel base, 100 inches; tread, 56 inches; wheels, 32x4 inch; weight, 2,200 pounds. Model F—Motor, 4½x5 inch, 30-35 horse power, four cylinder vertical; wheel base, 108 inches; tread, 56 inches; wheels, 32x4 inch; weight, 2,200 pounds. Model E—Motor, 3¾x4 inch, 16-18 horse power, four cylinder vertical; wheel base, 90 inches; tread, 56 inches; wheels, 30x3½ inch; weight, 1,600 pounds.



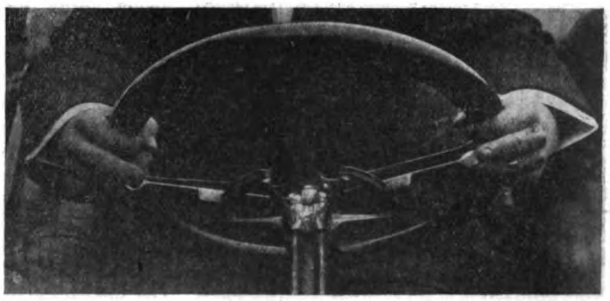
MITCHELL MOTOR.

The mechanical features of these models are very similar, so, while the following description applies particularly to Model E, it will serve in a great measure for the other models.

THE MOTOR.

The cylinders are cast separately, with the exhaust valve openings in the top and inlet valve chambers on the side; they have projecting rings on the bottom flange for locating their position on the crank case. Each cylinder is secured by four cap screws. The crank case is split horizontally along the centre of the shaft. The upper portion is of aluminum, with four arms for supporting it from the sub-frame; the lower part is of cast iron to stiffen the entire structure. Hand holes in the right side of the upper portion have sheet metal covers. The bearing caps are of cast iron, and the bushings are of babbitt, poured in place.

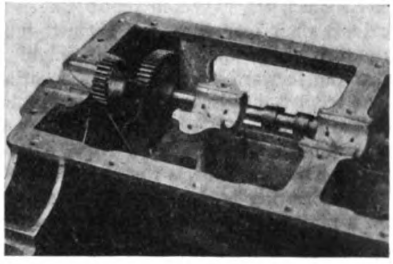
The valves are single piece forgings. The exhaust valves are central in the cylinders, carried in cages, and are opened downward by walking beams. The inlet valves at the side are lifted direct by push rods working in bronze guides. Both sets of valves are operated from a single shaft to which the hardened tool steel cams are pinned. These cams act directly on the somewhat rounded ends of the push rods. The cam shaft driving gears are at the front, and are fully enclosed. The crank shaft is drop forged and has five ground bearings of liberal size. I section forged connecting rods are used with hinged caps. Phosphor bronze is used for bushing the upper end, and Phoenix babbitt for the crank pin. The pistons are long, with flat tops, and are fitted with four step-joint rings. The hollow, hardened wrist pins are held by a single set screw. The liners are of steel. Ignition is jump spark. The plugs are located in the screw caps over the inlet valves. The timer is driven from the cam shaft by spiral gears, as shown in the illustration. A Splitdorff coil is used. Water is circulated by a gear pump coupled direct to the front end of the cam shaft. The water enters low down on the right side and leaves the cylinders above the exhaust ports. A Whitlock cellular radiator is used. The six blade fan is driven from the crank shaft by a round belt. Lubricant is supplied by a McCord oiler, belt driven from the crank shaft. The flywheel is secured by two Woodruff keys to the tapered end of the crank shaft, and is retained by a locked nut.



MITCHELL SPARK AND THROTTLE LEVERS.

CLUTCH AND CHANGE GEAR.

The clutch is of the leather faced conical type, 14 inches in diameter, the surface making a 10 degree angle with the axis. When disengaged it runs on an extension of the crank shaft.

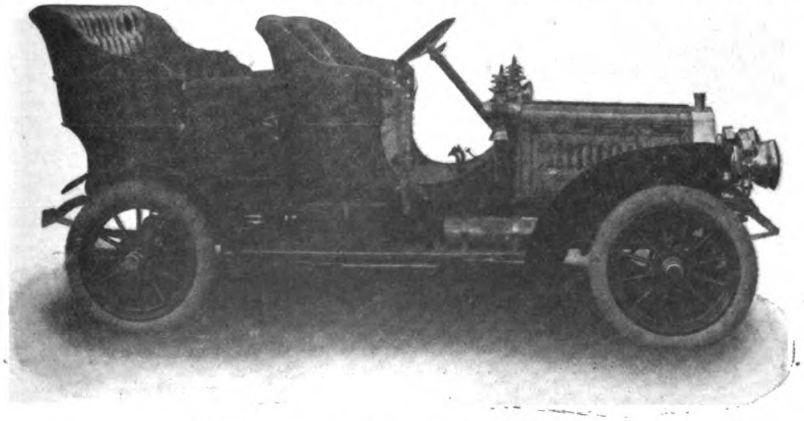


MITCHELL CRANK CASE.

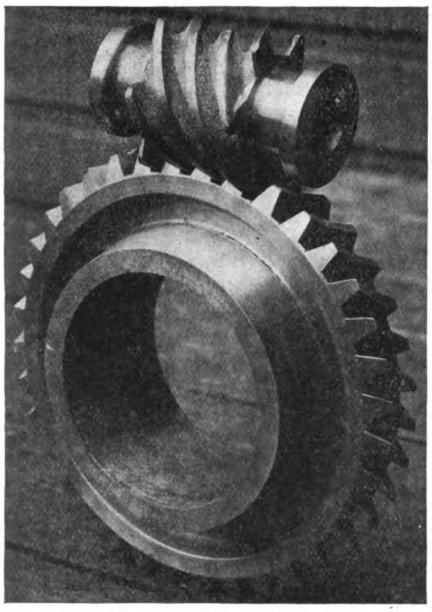
The change gear, which operates on the progressive principle, gives three forward speeds and one reverse. The reverse pinion is slid into mesh separately. The drive is direct on the high gear, with no gears in mesh, the driving gear being slid out of mesh by a positive action and spring returned.

The sliding pinion shaft is round, with one large key. The gears are of high carbon steel, carefully hardened. They are shifted by a rod in the top of the case which connects to a cross shaft at the rear, from which connection is made to the hand lever. The bushings are Phoenix babbitt. The bottom of the case is of aluminum, with four arms to the sub-frame; the top is of cast iron, with a very large inspection opening.

The rear axle is mounted on standard roller bearings. The pinion shaft has a roller bearing back of the pinion and annular ball bearing at the small end. The wheels are keyed to the tapered ends of the axle shafts. A most interesting torsion rod is used. It is really a leaf spring, as



MITCHELL 30-35 HORSE POWER TOURING CAR.



DRIVING GEARS FOR MITCHELL ONE TON TRUCK. WORM STEEL, WORM WHEEL BRONZE.

it is made up of two thicknesses of spring steel, which are bolted to the driving gear case at their rear ends, and given a quarter turn about midway of their length so that the forward portion acts as a spring. The front end is linked to a cross member of the frame.

A tubular Lemoine type front axle is used. The front wheels run on roller bearings. Steering is through a Warner gear on a post with rather more than the usual rake. Both front and rear springs are semi-elliptic, the rear being swung out from the frame.

The frame is of pressed steel, with straight side members and a drop cross member in front to support the sub-frame.

BRAKES AND CONTROL.

Both sets of brakes act on drums on the rear wheels. The hand lever operates the expanding brakes, while the right pedal applies the external brakes. Both sets are forced with Gandy belting. The spark and throttle levers are just under the wheel, and an accelerator button is located between the pedals. The muffler is cut out by pressing the heel on the stem of a poppet valve, which projects above the floor just forward of the heel board.

The front fenders have an unusually large flare and extend inward until they join the frame. The pressed steel dash is attached to the sub-frame by forged brackets, and carries nothing except the coil. Gasoline is carried in a 15 gallon tank under the front seat. This tank is supported by brackets from the sub-frame, and is entirely independent of the body.

In addition to their pleasure cars, the Mitchell Company are making a one ton truck and delivery wagon with worm drive. It is driven by a four cylinder 4½x5 inch motor, and has a sliding change speed gear giving three forward and one reverse speeds. The driving gears are shown in the illustration. Further details are not yet ready for publication.

New Franklin Runabout.

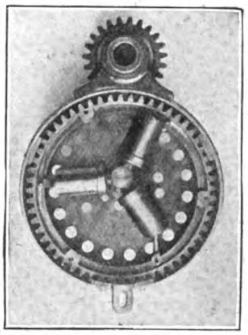
The H. H. Franklin Manufacturing Company write us of some improvements in their Model G runabout, which they claim has been entirely changed, bringing it strictly into the runabout class—as distinct from a combination or convertible touring car. The mechanical portion, it appears, is exactly the same as before, and the car is claimed to weigh 1,250 pounds.

The body is placed well back, giving extreme space between the dash and seat. The steering column and levers are also arranged in a manner which, while giving a free passage for entering and leaving the car, makes their operation an easy matter. The seats are full and ample in size, being of the bucket type, upholstered in black leather, the plan of the upholstery being smooth with a well formed roll around the edge of the seat and across the front of the cushion. The turtle back hamper is large and symmetrically designed, being made without a bottom, and so built as to be easily removed when it is desired to clean the deck of the car, which, by the way, is covered with a heavy sheet of aluminum. The mud guards, while similar in design to those of the other Franklin models, are different in that the front guards hang lower. Instead of using a long running board with cumbersome boxes, a short step-like affair is conveniently placed, to which are attached the front and rear guards. The absence of the battery and tool boxes also tends to give the car a lighter and neater appearance.

The Triplex Rotary Tire Pump.

The accompanying illustration shows a new type of power tire pump which has just been brought out by the Rotary Triplex Pump Company, of 126 South Jefferson street, Chicago, Ill. As can be seen from the cut the pump consists of a cylindrical casing or housing, which is securely mounted on the crank shaft bracket at the forward end of the radiator. Within this casing are three short pump cylinders mounted in a hub, which has its journal bearing seated eccentrically in the front wall of the casing. A close fitting annular gear ring is mounted on three pump roller bearings concentric to the inner walls of the casing, to which the piston rods of the piston heads are hinged.

The rotation of this gear ring about its axis causes the pump cylinders to rotate about their axes and the pistons within the cylinders to move in and out. The air pressure so developed is delivered through the cylinder heads to the hollow shaft on which the heads are mounted and to which the rubber tube leading to the tires is connected. A small gear pinion mounted on a sleeved extension of the engine shaft meshes

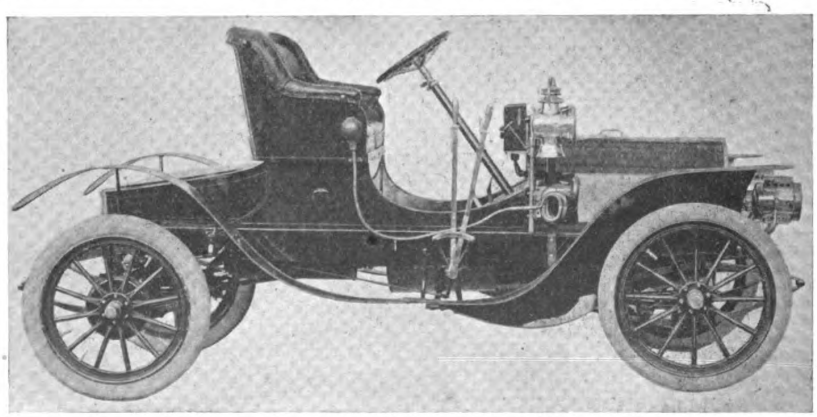


INTERIOR OF TRIPLEX ROTARY PUMP.

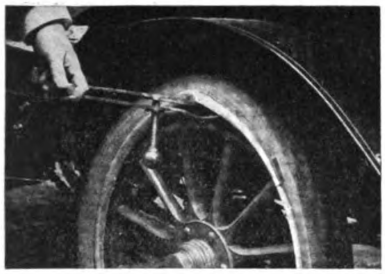
with the teeth of the large gear ring and causes its rotation. The manufacturers claim for this new pump extreme simplicity, rapidity of tire inflation and freedom from disarrangement. The design is claimed to be ornamental and when attached to a car to form a very attractive and useful accessory.

Lever for Tire Valve.

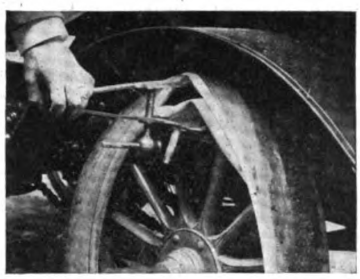
The principal difficulty involved in repairing a punctured tire is not so much in the actual removal of the outer cover, which is a comparatively easy matter, as in the lifting up of the long inner tube valve through the wooden felloe. Even with detachable rim flanges the easing out of the valve is not a simple operation, requiring some amount of skill, as well as the ex-



MODEL G FRANKLIN 1907 RUNABOUT.



No. 2.—Lever Inserted.



No. 3.—Lever in Position fog Removing Valves.

penditure of a considerable amount of muscular energy. Tire manufacturers have been content to send out just the same old pattern of lever, based upon a pattern introduced some ten years ago by an American firm for the removal of bicycle tires having a continuous wire in each edge. It has been left for automobile users to cudgel their brains to devise labor saving appliances, and one just patented in England is the result of the inventor having to wrestle single handed with obstinate outer covers on the roadside. In appearance it is very similar to a pair of callipers or dividers of the pattern which can be set in a desired position by a locking screw. Two arms, one slightly longer than the other, are hinged at one end. The longer and lowermost of the two arms has its free end formed into a two pronged fork, the prongs being slightly curved over so as to rest upon the beaded

Tire Valve Lever.

edge of the tire rim. The upper arm is finished off at the free end with a fixed projection or crutch for engaging with the beaded edge of the outer cover to prevent it from slipping off the upper arm when raised up from the rim. Just behind the root of the fork on the lower arm a round hole is drilled and cut with a thread, and through this hole a threaded bolt passes, the bolt head being circular and carrying a small detachable knobbed bar. Beneath the upper arm, in line with the bolt, is a circular depression, in which the end of the bolt can revolve, the object being to prevent the upper arm slipping off the bolt when the latter is revolved. The method of using is quite simple. After the cover has been detached by the ordinary tire levers the two arms are permitted to close together by unscrewing the bolt, and are then inserted between the cover and rim, exactly opposite the inner tube valve or one of the security bolts, this being the position shown in Fig. 2. Turning the bolt with the bar raises up the upper arm, carrying with it one edge of the outer cover, the movement being continued until the cover is sufficiently high to enable the valve to be lifted straight out. Fig. 3 illustrates this action, the valve being free from the felloe and the tube ready to be drawn clear of the wheel as soon as the tool is removed. The removal and replacement of the security bolts is effected in the same way, and it is claimed that so little strength is required that it is quite possible for a lady to undertake a tire repair.

Wishart Steam Vulcanizer.

The John Wishart Machine Works, 65 South Canal street, Chicago, have put upon the market a steam vulcanizer for tubes and tires. Being 5 feet long and 4½ inches square, it is possible to vulcanize the entire length of a tube in one setting, while by the arrangement of the clamps at the top the smallest puncture can be repaired. The steam box is made out of semi-steel, the four walls being 1 inch thick. At the ends are two joints made to fasten to a steam pipe. The tire is laid upon the top of the box, and is pressed down upon it by as many of the clamps as it is necessary to use. From 80 to 120 pounds of steam are required, and it takes from a half hour to an hour to complete the operation.

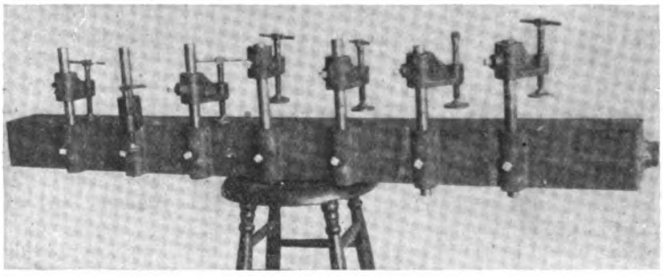
Owing to its size this vulcanizer is said to be especially adapted for garage and repair shops, where a great deal of this sort of work has to be done. It is said that it has been used with success by some branches of the Diamond Rubber Company in the repair department.

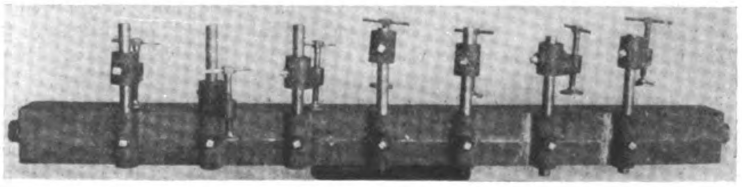
Non-Inflammable Wood.

Warned by the great damage caused by the recent fire at the Milan Exposition, in which valuable paintings, tapestries and other works of art were destroyed, the deputy commissioner-general of the International Maritime Exposition, to be held at Bordeaux next year, devoted much time to the study and investigation of the different methods of rendering wood, paper, silk, cotton and woolen stuffs non-inflammable. Of all the formulæ submitted he decided to experiment with the following: Sulphate of ammonia, 135 grams; borate of soda, 15 grams; boric acid, 5 grams, and water, 1,000 grams. An exhibition was given recently on the exhibition grounds, consisting of treating pine shavings, wood, paper, and cotton fibre with this preparation and after a thorough drying applying the fire test.

A huge pile of shavings, pine kindlings, and wood was set on fire, and in the blaze were thrown shavings and sticks of wood impregnated with this "ignifuge." When the fire had exhausted itself the impregnated shavings and wood were found to be simply blackened and charred; they gave out no flame. Paper and cotton fibre treated with the same solution when exposed to the flames consumed very slowly without a blaze. All wood and timber used in the construction of the exposition buildings and all cotton, canvas, and linen stuffs, carpets and rugs employed in the furnishing thereof will be treated with this "ignifuge."

If this process is as successful as it appears to be, it would seem to be well adapted for the treatment of wood used for garage construction.





Wishart's Steam Vulcanizer.

"Testing Motor Cars."

Editor HORSELESS AGE:

I have read with interest the leading article on "Testing Motor Cars," by Mr. Faurote, in your issue for November 14. While the portion of this article dealing with tests made on the engine may be in accordance with current practice, the final portion on "out of doors testing" seems to contain much that is at present only an ideal. He seems to speak as a factory authority, but whatever the case in his establishment a good deal of rather strenuous experience has taught me that the testing usually given a car is of little or no value. Just about six years ago I bought my first automobile. Since that time I have owned five cars, each of different make, and can truthfully say that, with the exception of a runabout built to order and under my own supervision, not one left its shop in other than the most disgraceful condition. There is no need to recount the experiences with the earlier cars, such as a muffler dropping off on the road before reaching my house, or a merry stream of gasoline falling from a badly soldered tank on to a hot exhaust pipe, also before reaching home—the numerous little incidents of this sort belonged to the time when automobile history was being made faster than were automobiles.

But when this summer I purchased a heavy touring car of one of the oldest and most prominent manufacturers it was natural to suppose that the car would be delivered in condition to require no more than the ordinary care. On the run home I was accompanied by a very careful and intelligent man from the agency, and this is what we found.

1. A considerable quantity of fine brass chips in the oiler, pumps and piping. This was found out by failure of the oiling system. These chips had apparently been in the oiler ever since it was machined.

2. The springs in the oil checks at the cylinders were so stiff that the oiler was often unable to force oil past them. To remedy these two troubles alone took about five hours' work, to say nothing of more or less injury to the engine from the chips and lack of lubrication.

3. The water system leaked in three distinct places, one of them being a blow-hole conspicuously situated in the pump casting.

4. The strainer at the pump was partially filled with mud.

5. The rubber gaskets where the water manifold is secured to the cylinders were cut with so small a hole, further reduced by tight squeezing, as to impede the circulation.

6. The transmission brake heated from dragging; while the hub brakes were also totally out of adjustment, in that one dragged and the other was without effect.

7. As the mixture did not seem to be exactly right, we took the carburetor down and found dirt, water, and an object resembling the partially macerated body of a dead fly. Even after cleaning it did not seem to be just right, and after driving for several weeks with a more or less unsatisfactory mixture I finally found that a small part had been so bent—apparently with some forcibly applied instrument—that supplemental air was being drawn in at an improper place. It took me a long time to locate this difficulty, because both car and carburetor were strange, but am quite sure I could recognize it another time in a few minutes, and it certainly should have been discovered at the factory.

Now, it is impossible that all these difficulties, which developed on the first run of some 15 miles, could have been overlooked if the car had really been tested out before leaving the shop. It is all very well to talk about the "eagle eye" and "straining ear" of the inspector, but it is evident that such testing and adjusting as this car may have received was done by a person with very little knowledge of automobiles; and I believe that my experience is quite a usual one. Nearly all of my friends tell me they have had the same kind of experiences, and inquiry at the large garages in a nearby city further confirms this belief. I have recently seen three different demonstrating cars, all of high price and old established reputation, arrive, and in each case before a satisfactory demonstration could be given it was necessary to take them up to the machine shop and give them a thorough overhauling. One car had to be practically rebuilt at the expense of a week's time. At another agency they make a practice of never delivering a car to a customer until they have driven it four days.

Living not far from three factories, I have seen something of shop testers. They are usually reckless, ignorant youths, who smash gears in and out, drive all the time at the utmost speed the car is capable of, and execute various feats of violence with clutch, brakes and steering gear. All this may be necessary in trying out a new model, but after the design is once fixed there seems little use in submitting each customer's car to such abuse. At any rate, a man of the education and temperament of the average tester is not fit to tune up a car for delivery. To do this properly requires just the opposite personal characteristics. Before a car is delivered to a customer, a quiet, thoughtful, well trained man should take it out and drive it in a normal way for several hours. He should be instructed to regard the car as his own for the time being, and to spare no pains to make sure that everything, large and small, is exactly right before he leaves it. This is precisely what the private purchaser now has to do; yet it is no more reasonable to demand it of him than it would be to expect him to take apart, clean, and adjust a newly purchased and valuable watch.

Just why a manufacturer should take the necessary pains to turn out a well designed, beautifully built machine, and yet, after receiving a large price for it, deliver it to a customer in such a condition that a few hours' running would well nigh ruin its engine, is incomprehensible, but that is just what happens every day; and until one can buy not only a good car but a car in condition to run safely, it is quite probable that manufacturers may still occasionally be subjected to the "cursing" spoken of by Mr. Faurote and which he regards as unjust. C. W. M.

The Air Cooling Situation.

Editor HORSELESS AGE:

Permit us to say a word on "The Air Cooling Situation," as brought out in the editorial in your most excellent Engineering Number. You say that "there has undoubtedly been something of a reaction to the air cooling boom this season, especially in the West." We do not agree with you. If an inexperienced singer gets into grand opera and is dropped the incident is not considered a reaction to the grand opera boom. This is simply the case with the air coolers that have dropped it.

You rightly say that you "believe that the cases in question bear their lessons, and that it is interesting at least to look for the cause of their return to the water cooled system." As we see it the lesson has no particular bearing on air cooling. In every instance you have in mind the product was a copy, with an attempt to improve on the product copied. In other words, engineers without air cooling experience endeavored to do at the start what experienced air cooled makers had not then undertaken.

You omitted in your editorial a very important point. The makers who have returned to water cooling did not employ the auxiliary exhaust. In every case also these makers endeavored to depart from what has been proven to be good practice.

Permit us also to call your attention to the fact that an air cooled maker was recently admitted to the License Association.. Not only is this a compliment to the maker admitted, but it is quite contrary to a reaction to the air cooling boom. Manufacturers are not admitted to the License Association until they can prove the quality and merits of their cars.

In view of your editorial we believe you will be interested to know that after five years of successful experience in making and selling air cooled cars we are so satisfied that we are preparing to go still further, and that another year will see still greater efficiency in our air cooled motors.

You must remember that we hold the record for motor efficiency, and that though we are one of the youngest makers in America, we are today leaders.

You state that "the craze for cars of

very high power certainly favors the water cooled car." This is true in the cases you cite, no doubt, but not true here. Because of the great efficiency of our air cooled motor and our form of car construction, we are able to give the speed and capacity of the very high powered cars. For example, our 30 horse power Type H car seats seven people, and will meet any condition of speed on American roads that any other "very high power" car can set for it.

H. H. FRANKLIN MANUFACTURING COMPANY,
H. H. Franklin.

Inoperative Pressure Regulator.

Editor HORSELESS AGE:

I have a 1906 flash steam automobile and am troubled with the thermostat not regulating the fire properly; instead of the gasoline being shut off by the action of the thermostat at about 500 pounds steam pressure, as it formerly did, the fire stays on, and unless I shut off the main supply by the hand valve, the steam frequently blows off, which is very annoying. My car has been to the repair shop three times, and the thermostat has been taken out and altered by three different men, and while one of these men succeeded in making it work properly, it lasted only for a very short time. Can you or some of the readers of your journal offer me any suggestion to remedy this trouble? J. H. SMITH.

[It would appear from your description that it is the water regulator, rather than the thermostat, that is out of order. The steam pressure is really controlled by the water regulator. When the pressure becomes too high the water feed is shut off, the boiler then becomes very hot and the thermostat begins to act. If the water regulator does not act when the proper pressure is reached the boiler may not reach the temperature necessary to actuate the thermostat, and the fire will then keep on burning. We would therefore recommend that you have the water regulator looked over or substitute a new one—ED.]

Understatement of Weight.

Editor HORSELESS AGE:

We know that you are always looking for opportunities to give information that will assist both purchasers and manufacturers.

It has been our experience that a great many cars weigh from 500 to 750 pounds more than they are advertised, and in conversation with purchasers, in arguing the weights of the different cars, one is constantly annoyed by having catalogue weights quoted in place of actual weights.

We think it would be mighty good reading if THE HORSELESS AGE could give some actual weights of cars and state definitely whether they have tops on, Prest-O-Lite tanks, generators, etc., and give full description of them.

The Adams-Farwell 1906 car, with 116 inch wheel base, with a Sprague Cape top, two large solar No. 683 lamps, large Prest-O-Lite tank, no generator, and with five cylinder motor, 5 inch bore by 5 inch stroke, weighs 2,750 pounds. We would like to have an opportunity to verify this weight in any way you might suggest.

We frequently have an opportunity to weigh cars and find while the ——— advertises 3,200, it actually weighs 3,700 to 3,750 pounds. The ——— weighs 4,000 pounds, listed at 3,100 pounds. The only way to get at this actual weight would be to take cars in New York and have them actually weighed, and not take anyone's word for it. THE ADAMS COMPANY,
Eugene Adams, President.

[We have repeatedly called attention to the pernicious practice of greatly understating the weight of cars and can only advise our readers that they require the weighing of any car the purchase of which they are seriously considering.—ED.]

Starting on the Spark.

Editor HORSELESS AGE:

The article "Starting On The Spark" by Mr. Smith, in your issue of October 31, shows up fine for the six cylinder Napier. There are others. I have had a four cylinder 20 horse power air cooled Waltham-Orient car since July last; it never fails to start with the switch; if properly stopped, it will start by putting on the switch any time within twenty-four hours, if it has gasoline and a good spark. I have started it several times with the switch seventy-two hours (three days) after stopping.

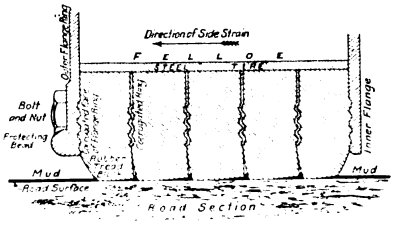
E. C. KNOWLTON.

The Hartridge Non-Skid Tires.

An English firm is marketing a novel form of sectional rubber tire under the above name, which is claimed to possess absolute non-skidding qualities. The rubber of the tire is divided both circumferentially and crosswise, and, as shown by the sectional view herewith, corrugated steel rings are interposed between adjacent circumferential sets of blocks. The manner in which this construction prevents side slip is explained as follows:

"Whatever the weight on the wheels the spacings between the rubber blocks touching the road surface are preserved. Any displacement which takes place in the rubber blocks occurs from about one-quarter inch inward to the bases. That is to say, the greater the weight the more is the rubber compressed above the faces.

"As a result of this maintenance of interstices while in contact with the road surface each driving wheel has never less than six entirely independent contacts with the road and twelve contacts whenever a cross division comes down to the road surface while the wheel is revolving. On an average, therefore, the two driving wheels have 18 points of independent contact with the road surface.



HARTRIDGE NON-SKID TIRE.

"Now when the vehicle has a tendency to a side slip, the tires permit only a side movement of about one inch at the commencement, and then refuse to move sideways. The greater the side strain the more firmly do the tires grip the road, and nothing less than an extraordinary circular movement of the vehicle with the front wheels as pivots will displace them.

"A tendency to side slip throws a greater strain than usual on the tire surfaces, and they immediately first squeeze out any superficial grease of the road into the spaces between the rubber blocks. Practically these have then a dry surface to cling to. As the side strain increases the rubber tread on the side nearest the direction in which the strain is trying to drive the tire grips the road surface tighter and each rubber tread backwards also increases its grip to a corresponding degree. The result is that there are six very thin plane ridges formed on the road surface between the acute ridges caused by the squeezing of superfluous grease and mud between the rubber blocks. The plane ridges are thicker on the side opposite to the direction of the strain, that is, to the inner side of the wheel than on the side nearest to the outer side of the wheel. Consequently as the side strain increases the thick side of the ridges forms an almost insuperable obstacle to the further progress of the next inner rubber section and the side slip is stopped."

New York Motor Club's Economy Contest.

Six cars contested in the economy run of the New York Motor Club from New York to Albany and Springfield and return by way of Connecticut, November 14, 15 and 16. Heavy snowstorms were encountered November 15 in the Berkshire Hills, between Albany and Springfield, and the contest was practically broken up. None of the contestants was able to conform to the rules of the contest on account of the snow. The conditions were said to have been worse than in the run to Pittsburg in 1903.

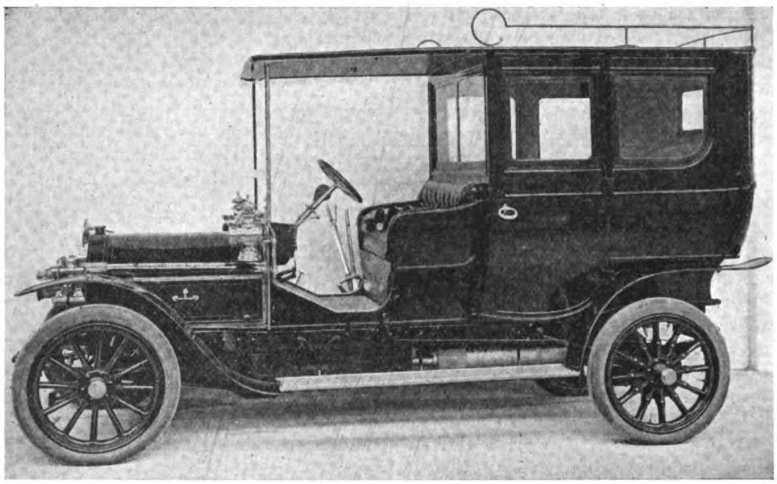
The honors went to the 24 horse power Frayer-Miller car, driven by Harry Knepper, which arrived in New York about 6 o'clock November 16, and to the official car, a 16 horse power Compound, driven by D. F. Graham, which arrived at midnight. The latter was not a contestant on account of a misunderstanding in regard to its entry. The 24 horse power Premier, driven by C. C. Singer, arrived at 3 o'clock the morning of November 17. The Simplex, the Dorris and the Reo withdrew between Albany and Springfield.

The club's committee will meet November 21 to award medals to the cars making the best showings, although the rules were not lived up to.

OUR FOREIGN EXCHANGES.

Contest Control in England.

The decisions of the judges in the Town Carriage Competition, writes our English correspondent, have aroused more discussion than any other competition ever held by the A. C. G. B. I., and will, it is hoped, lead to complete reorganization of the methods by which this and similar trials have been carried out. In the early days of the automobile club its Reliability Trials were conducted by a joint committee of twenty members, half nominated by the club and half nominated by election from the trade. As the club has grown in power the trade has been pushed to one side, because some of the members used their association with it for "log rolling," and all recent trials have been conducted by amateurs. Some of these are professional men, some are professors, others can be best defined as automobilists with a hobby, and the remainder have been tacked on for their ownership of big cars rather than for any technical knowledge they possess. The result has been a considerable weakening of the club influence, and while there is no question of the absolute impartiality of the judges in the various events, there is growing dissatisfaction with the regulations that the different committees see fit to draw up and the "tin god on wheels" position assumed by the permanent paid officials. The annual Reliability Trial has been taken out of the hands of the English club, and the last two have been run off by the more energetic Scottish A. C. The Town Carriage Competition has brought matters to a head, and the foolishness of attempting to decide upon the merits of three perfectly distinct types of vehicles in one and the same class has exasperated even those members of the trade who have hitherto loyally supported the club. Nobody objects to electric or steam carriages gaining gold medals, but when judges award top marks to an electric vehicle for "absence of vibration with car stationary," and put gasoline vehicles below it, sufficient cause for grumbling is shown. It is probable that the aggrieved parties will take such steps as will induce their powerful trade society to effect the needed reform.

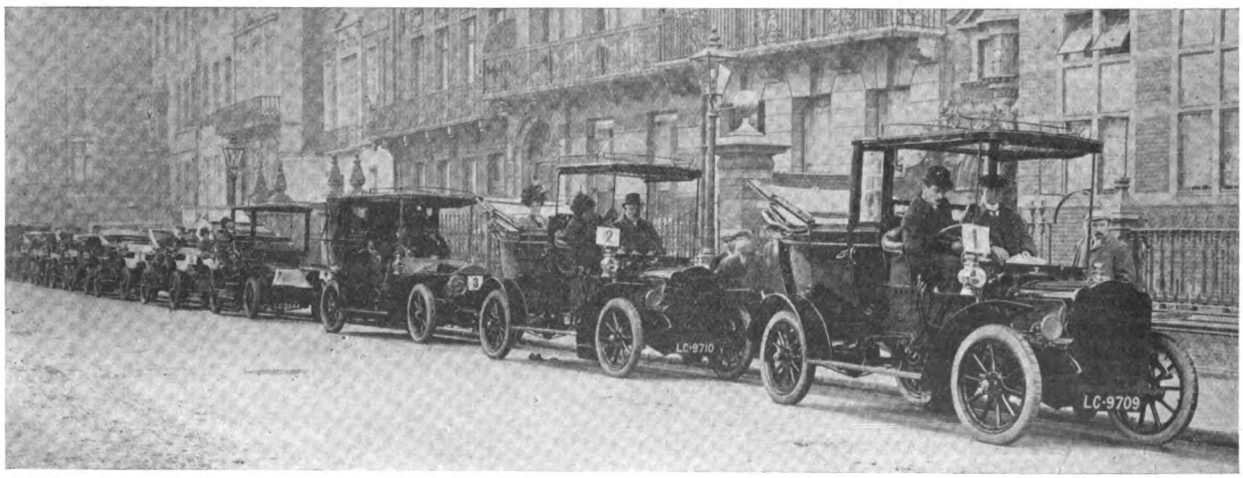


Wolseley Limousine Which Was Awarded a Gold Medal in the Town Carriage Competition.

Anti-Skid Tire Covers.

With the approach of the winter season, motor car owners begin to turn their attention to the use of devices for the prevention of skidding, says a writer in an English paper. For the most part these consist of leather bands studded with rivets and attached so as to cover the treads of the tires on the back wheels. Now, the varieties of these studded leather bands upon the market are legion, and though they resemble each other very closely in appearance, they differ very widely indeed in durability, in efficiency and in quality, though not very much in price. It is therefore very desirable that the motor car owner who is contemplating having his tires shod for the winter should first acquaint himself with the details of construction of the principal makes of non-skids at present in use.

In general it may be said that the less the amount of metal in the tread the better, for metal conducts heat to within the tire and is apt to cause the rubber to deteriorate. Similarly, treads containing a very great thickness of leather, especially at the sides, should be avoided, as leather detracts from resilience and prevents the rubber performing its proper functions. In particular, attention must be directed to the fastenings by which the studs are held in position, for in some treads the studs are quickly worn out, while in others they soon part company with the leather, tearing in doing so the latter and injuring the rubber tire beneath.



Town Carriage Competition Cars Assembled for Start of Thirty Mile Run.

It is highly undesirable to allow, as is done in some bands, the turned over ends of the rivets to be in contact with the rubber of the tire. A suitable protective strip of leather should always be interposed.

Some bands are made detachable, and have steel clips riveted to them, by means of which they can be hooked or strapped to the inside or outside of the wheel rims; others are attached by vulcanization. Now, most detachable bands are at best cumbersome and heavy; when attached outside the rim the straps or wires have to be anchored to the spokes, and this means scratching the paint; when attached inside the rim the steel clips or shoulders have a tendency to injure the beading of the tire. The steel clips also possess the objection that they permit water to enter and rot the canvas in the tire.

In connection with the vulcanization of the treads, the bands may merely cover the exposed surface of the tire, or they may pass round the beading—the latter system being the more popular. Furthermore, the band may be vulcanized to the tread of the tire or only to the sides, the argument in favor of the latter course being that by it greater freedom of movement is possible. It should be remembered, moreover, by the motorist who is purchasing non-skid bands that, as the latter seriously affect the resilience of the tire and have a tendency to cause heating, it is advisable when possible to use tires of larger diameter than one might otherwise do, taking care, of course, that the beadings are not too wide for the rim.

Attention should be called to some of the tricks being practiced by certain unscrupulous dealers. It will be readily understood that when a motorist goes to a dealer with an old tire or a new one and gives orders for a leather non-skid tread to be fitted, the identity of the tire is apt to become lost. If the tire is old but in good condition it may be changed for one still older but in bad condition; if the tire is new it may be changed either for an old one or more often for what is termed technically a "casing," which is merely the canvas part of the tire covered with very little rubber, the big rubber "croissant," or tread, being missing. A very big trade is now being done in casings, and they wear very fairly well; but they are very much deeper than the full tire, and that is where the unscrupulous dealer has his opportunity to get the better of his customer.

Now, in the work of fitting a non-skid band to a tire, whether new or old, the first part of the process consists in "roughing" the surface of the tire. This roughing, according to the bona fides of the firm in question, may be merely a kind of filing treatment just sufficient to give good contact to the cement which is used, or it may be more thorough and comprise a generous skinning of the rubber from off the tire, so that the latter becomes merely a casing, its expensive thickness of rubber remaining a perquisite with the dealer.

Six Cylinder Cars.

(Louis Lacoin in *Omnia.*)

The six cylinder machine is the latest fashion which will create a sensation at the next automobile show. Everywhere in France, and particularly abroad, six cylinder motors are being brought out.

What possible advantages can these new motors present? Are they lighter, more economical or better balanced than four cylinder motors? Do their advantages compensate for the great complication of their mechanism? We shall attempt to elucidate these questions with perfect impartiality, as usual.

It is readily seen that this question cannot be settled off hand, and that six cylinder cars have their staunch supporters and also their vehement detractors. This is due to the fact that in this question one is brought face to face with two separate sets of facts which it is impossible to gauge by the same measure, and regarding which personal preferences become the sole judge—complication of the mechanism on the one hand, and personal comfort on the other. These two considerations can only be compared with regard to the importance attached by the individual to suffering a breakdown or to enjoying smoother riding qualities.

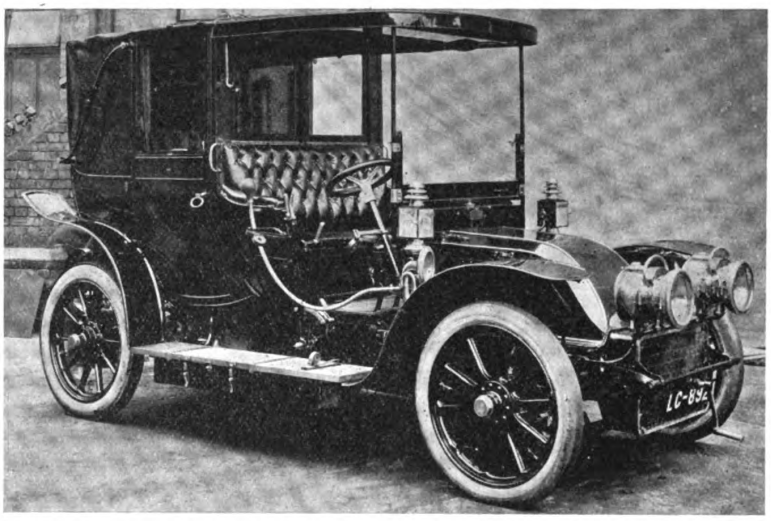
It will at once be seen at what I am driving. The six cylinder car, which was formerly entirely out of the question, is becoming more practicable as the motor demands less attention. It will increase more rapidly as ignition troubles become rarer, as lubrication is effected automatically in a more perfect form, and less care is required by all the wearing surfaces, such as pistons, valves, cams and bearings.

Does this mean that six cylinder cars will be constructed in all sizes? Very likely not, and up to a certain power, which may be set down as 40 horse power, the four cylinder will probably continue as the standard.

The question may be considered by analogy with single and double cylinder motors. Up to a bore of 4½ inches only a single cylinder is used. Then comes the two cylinder motor, most frequently of about 3¼ inch bore. This is made up to the same limiting bore of 4 to 4½ inches. For greater power four cylinders are used, of 3¼ inch, 3½ inch and greater bores.

It is thus seen that the cylinder bore varies usually between 3¼ inch and 4½ inch. If the cylinders are smaller, the cooling losses become too important and the cost of construction is also quite high. If they are greater, the pistons become heavy and vibration increases. It is, therefore, likely that four cylinder motors will be continued up to a stroke of about 5 inches, and that no six cylinder motors will be made with less than 3¼ inch bore. There is, consequently, quite a range of powers, from 20 to 40 horse power, with regard to which there exists uncertainty; but it is likely that the six cylinder engine will continue to secure a more important place until the time that the gasoline motor is replaced in turn by some other motor, the same as it dethroned the steam engine in certain applications.

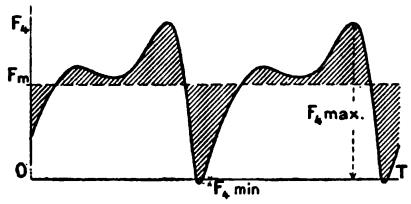
Let us compare a little more closely two motors of approximately equal power, one a four cylinder motor of 4.8 inch bore, and the other a six cylinder motor of 4 inch bore, for example. As to complication, the six cylinder motor not only possesses two additional cylinders, as well as additional valves and igniters, but, besides, its crank shaft is infinitely more complicated to construct than that of the four cylinder motor. In a four cylinder crank shaft all the throws are in the same plane, and the machining process is delicate but easy.



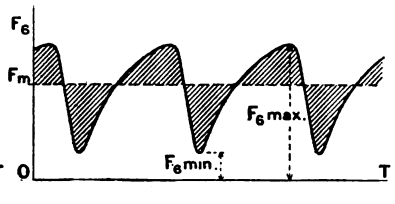
C. G. V. Limousine Which Was Awarded a Silver Medal in the Town Carriage Competition.

The six cylinder crank shaft, on the other hand, has its throws in three different planes, making angles of 120 degrees with each other; and, moreover, the two throws which are in the same plane are not adjacent to each other, with the exception of the two middle ones, with the result that there are at least five cranks. A six cylinder crank shaft is consequently a very complicated and expensive part.

Another disadvantage of the six cylinder



FOUR CYLINDER CRANK PIN TORQUE.

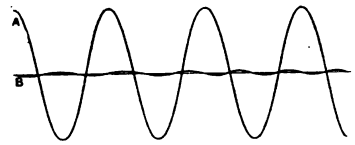


SIX CYLINDER CRANK PIN TORQUE.

motor is its great length. Of the two motors which we are comparing, the six cylinder is 4.8 inch longer than the other. This necessitates increasing the length of the hood correspondingly, which may not be a serious matter in itself, but the wheel base is necessarily increased by the same length, which is objectionable from the standpoint of turning in a short radius, which is difficult even with the present wheel bases.

Hence, so far as manufacture is concerned, the comparison is entirely unfavorable to the six cylinder motor. The size of the parts, such as the piston, is not appreciably reduced (4 instead of 4.8 inch), and the most important piece, the crank shaft, is a part infinitely more difficult to make.

Let us now turn to the use of the motor. In this connection there are two points to



A, four cylinder. B, six cylinder.

UNBALANCED RECIPROCATING MOMENT.

be looked into, as already mentioned at the start, viz.: (1) Complication, or, rather, increase in the number of parts which are a source of trouble, and consequently necessitate an increase in the spare parts in the ratio of 4 to 6; (2) smoothness of the drive and reduction of vibration.

I shall not discuss the first point, as it is self evident. As to the second point, the smoothness of the drive, it may be arrived at mathematically. By comparing the two adjoining curves, it is seen that the turning effort is more uniform with the six cylinder than with the four cylinder motor. It should be pointed out, however, that if the practice had been adopted of inserting an elastic medium in the transmission, the irregularities in the drive of a four cylinder motor would become negligible. Now, inserting an elastic medium in the transmission is infinitely less complicated than the use of a six cylinder instead of a four cylinder motor. We thus find a first advantage of the six cylinder motor in the greater uniformity of its driving effort (smoothness of operation).

The second advantage is the reduction of vibration due to the reciprocating motion of the pistons. One might almost say suppression, because, if in a four cylinder motor these vibrations are already very much attenuated, they are thirty times lighter in a six cylinder motor. In Fig. 2 they can hardly be recognized, in spite of the large scale adopted; and in reality they will be confounded with the vibrations resulting from want of balance of the flywheel and difference in the weight of the individual pistons, connecting rods and crank arms.

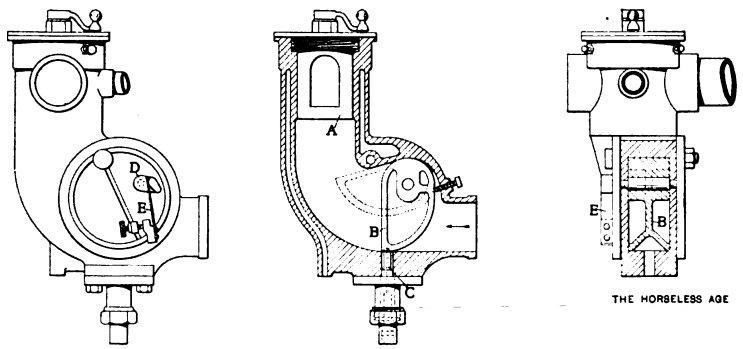
In a four cylinder motor, on the other hand, the influence of the reciprocating motion of the pistons undoubtedly preponderates. The curves have been drawn on the supposition that the crank shaft is offset with respect to the cylinder axis. But a motor with offset crank shaft can only be run in one direction, and the confirmed partisans of the six cylinder motor maintain that with it one may dispense not only with the change speed gear but also with the reverse gear, as by shifting an extra set of cams under the valves one always finds a cylinder in which the piston is on the explosion stroke, so that consequently ignition is certain to occur, and the motor will start without fail, in one direction or the other, at the will of the driver. It is only proper to state that everything which has been done along this line of simplification of the mechanism has always been abandoned at the end of a shorter or longer period. I have been told that some firms have ceased manufacturing six cylinder motors after having been engaged in it for some time, as their advantages did not sufficiently compensate for the increase in the cost of construction.

I have attempted in this article to induce my readers to form a personal opinion of the matter. If the fashion of the six cylinder should become confirmed and they should not be able personally to afford the luxury, they may, nevertheless, convince themselves that this motor is perfectly balanced, better than any other gasoline motor; that it is more silent, as its explosions follow the other more closely; that it draws the vehicle with almost the same smoothness as an electric motor, but that, aside from absence of vibration, which is, moreover, almost attained also in the four cylinder motor, they may have practically its equivalent in the latter type of motor. Those, on the other hand, who are in a position permitting them to enjoy the best of everything, without regard to expense and the annoyance which careful maintenance may cause their driver, will find in the six cylinder car a pretty and pleasing machine which will not be available to everybody for some time to come.

Mercedes 1907 Improvements.

The first of the 1907 Mercedes models has made its appearance in London, and a description of its improvements is given in our English contemporaries. It is stated that the Mercedes Company will, the coming season, make three models, two with four cylinder engines of 35 and 45 horse power, respectively, and one with a six cylinder engine of 70 horse power.

The Mercedes Company for the first time in this new model employ a fan back of the radiator, which is belt driven from the shaft of the intermediate pinion in the cam gearing, while the fan spoked flywheel is retained. The bonnet is cut with louvres in the sides, in order to aid the exhaust of the hot air from the engine space. Louvres are also cut in the apron underneath the frame of the car. The mechanical lubricator, which is secured to the dashboard, is now driven by an eccentric from the inlet



NEW MODEL MERCEDES CARBURETOR.

cam shaft, the eccentric rod actuating the lubricator through a pawl and ratchet wheel. The lubricator consists of eight independent oil pumps, one for each feed. The hand pump for supplying air pressure to the fuel tank at starting is now placed underneath the footboard, its handle projecting at the side, instead of being placed on the dash as formerly.

A pedal is now provided, by means of which a cut-out valve in the exhaust pipe close to the muffler may be opened, and a switch for short circuiting the magneto is mounted on the dashboard close to the lubricator, the use of this switch obviating the need of a valve for cutting off the flow of gasoline in the carburetor for stopping the motor.

The most important change has been made in the carburetor, which is now fitted with a suction actuated air control. Referring to the illustration herewith, the top part of the carburetor will be seen to be fitted with two outlets, one for each pair of cylinders, and at this point is located the throttle valve A. At the lower portion there is a cylindrical opening right through the carburetor, and in this opening is placed a peculiarly shaped aluminum baffle B, which is mounted on a shaft having its bearings in the end plates of the spray chamber. The baffle is provided with a groove of varying section in its circumference, and a portion of this groove is always directly over the top of the spray nozzle C. The shaft of the baffle B is provided at one end, outside the spray chamber, with a small crank arm and pin D, and against the pin bears a flat spring E, which is adjustably mounted on the end plate. When the engine runs slow and the suction is consequently small, the baffle is held in such a position that the air passage by the nozzle is a minimum, by its weight and by the force of the spring E. As the suction increases the air pressure on the baffle causes it to move around its axis, whereby the area of the air passage around the nozzle is increased. The air baffle is actuated by suction only, and is entirely independent of the throttle valve, thus discarding the principle embodied in the former Mercedes carburetor. When the baffle is in the position of rest it rests against a set screw stop. The carburetor can be adjusted by means of the movable support of the spring E, and there is also a permanent adjustment in the shape of a pin valve in the spray nozzle. The spraying chamber is provided with a jacket, through which a portion of the cooling water is circulated.

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FUR HOOD FOR WOMEN.

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WOLVERINE SINGLE BREASTED COAT, GRAY FOX COLLAR.

Furs for Motorists.

Winter weather in the fall has brought motorists' furs into requisition about a month earlier than usual. Every year greater efforts have been made by New York dealers in motorists' garments to provide special furs for the cold weather, until the showings of some metropolitan firms have grown to unexpected proportions.

It goes without saying that many of these garments are most expensive, some of them being more valuable than the motor cars themselves. Many enthusiasts don't count the cost, however, and insist on motoring in all kinds of weather. The heavy fur coat is the only garment that will keep them warm in the bitter cold, and so dealers who cater to this class of trade have practically discarded other materials.

From among the many beautiful fur coats for men and women we have selected for illustration a single breasted coat for women made from wolverine pelts, the collar of gray fox, including head, brush and paws, and lined throughout with brocaded silk. A Manchurian dogskin coat for men, in gray or black, is said to be quite popular. It is lined with either quilted sateen or duck, so that the garment may be worn reversed.

Among the skins used in producing these garments are the following: Russian pony, nutria, plucked and unplucked otter, Delaware otter, mink, Australian opossum, silver wombat, muskrat, gray and red squirrel, moiré calf, China cat, krimmer, racoon, astrakhan, beaver, South American beaver, Chinese mink, India mink, lynx, black Mongolian bear, king tailed cat, wolf, Persian lamb, spotted cat, civet cat, black dog, mole rat and marten.

A larger variety of fur head gear is shown this season than ever before. A hood for women, herewith illustrated, protects both head and shoulders. It will be noted that it is a combination of hood and cape. On this account it has been found a most serviceable head covering. It is made of electric seal (as in the illustration), natural muskrat, mink dyed muskrat, nutria, Japanese mink and beaver.

Among the other fur garments that are specially provided for motorists may be mentioned leggings, boots, gloves, foot muffs and robes in great variety. We illustrate a fur hip legging for use over shoes and trousers. It wraps about the leg and fastens with three large hooks and eyes. It is made of Australian opossum (as in the illustration), gray racoon, Manchurian dogskin and French kid leather fur lined.

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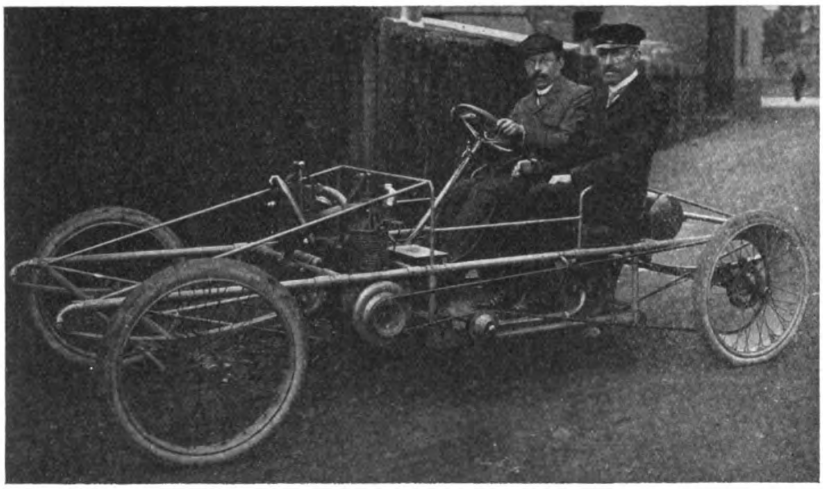
FUR HIP LEGGING.

A Peculiar Vehicle.

Monsieur J. Cormé, a Belgian enthusiast, has been working for some time on the design of an automobile which, by reason of the simplicity of its construction and the lightness in weight, should be capable of carrying two persons at a high rate of speed with a comparatively small engine. The whole of the framework is built up from cold drawn, seamless steel tubing, the lugs for the various joints being brazed on, as in the frames for pedal bicycles. The constructor employs what he terms a trapezoidal arrangement of the tubes for securing the maximum of strength with a minimum weight. The frame has two long, parallel side members, the extreme ends having dumb irons inserted, from which the half elliptic springs are supported from shackles in the normal manner. There are six tubular cross struts, two of these being at front and rear, while the other four carry the engines and passengers' seats. If the illustration is carefully examined two vertical tubes will be seen slightly to the rear of the engines, extending above and below the frame, the tops taking a slight curvature and being joined by a cross strut; from the tops of the vertical tubes two diagonal stays extend downward to the front edges of the frame at the place where the first main cross strut is fitted. The lower front portion of the frame is carried out in an exactly similar way, thus forming two triangles, which are joined in every direction. By turning the illustration sideways the peculiar and original truss system will be apparent. The double triangulation is repeated at the rear, the back tubes that are bent around to form seats for the driver and passenger making the bases of the triangles. The drive and transmission is certainly elemental and can be likened to two motor bicycles placed side by side. Two separate and quite distinct 6 horse power, air cooled Buchet motors are installed, with overhead mechanical inlet valves.



M. Corme's Belt Driven Vehicle.

The muffler extends across the frame below the passengers' seats, the exhaust pipes from each engine being led into opposite sides, the final exit to the atmosphere coming out midway of the centre of the muffler. This somewhat daring exhaust system is even better than the designer hoped for, as the two streams of waste gas impinging upon each other effectually mix and instantaneously break up, the exhaust at the outlet being practically noiseless. The engines have pairs of heavy internal flywheels within the crank chambers, with outside pulleys keyed on to short extensions of the crank shafts, which are machined to take leather "V" shaped belting. Each of the rear driving wheels is constructed with an inwardly dished rim and to this is bolted the large dished driven pulley having a "V" depression on the periphery, in which the very long belt runs. The belts are carried between leather covered guides suspended from the main frame and are kept at the correct tension by the aid of small jockey pulleys running in ball bearings. The back axle is a fixed one and no differential is employed, each driving wheel running in ball bearings on the outer ends of the axle, just as in a side chain driven automobile. No attempt is made to connect the crank shafts of the two engines, although both are controlled with respect to throttle, ignition and air regulation from levers on the steering column, which are all synchronized. From this description it will be understood that each engine drives directly onto its own rear wheel, no gearing of any kind being employed, and a reverse is therefore out of the question. There is no difficulty in manipulating the vehicle around corners and on curves, as each engine automatically adjusts itself and drives slowly or quickly, according to the strain taken by the elastic belt. To get the car on the move one engine only is started up, both jockey pulleys being simultaneously slackened down to let the engines run free; as the two jockeys are gradually drawn up the belts are tightened, one rear wheel commencing to take up the drive and compelling the other engine to start and cut in by reason of the friction of the two driving wheels with the road surface. The gasoline tank is strapped to the frame behind the seats, a pedal actuates two balanced hub band brakes and another pedal with a locking ratchet controls the jockeys. In the road trials which have been carried out the machine has attained a speed of 50 miles per hour, and, owing to the low centre of gravity, is said to be perfectly steady and to run without a symptom of side roll.

Maxwell-Briscoe Company to Locate at Newcastle, Ind.

The Industrial Company, of Newcastle, Ind., state definitely that the contract for the new Maxwell-Briscoe plant has been closed, and that the factory will be located in that city. When it was first decided to locate the new factory in the West citizens of Newcastle organized the Industrial Company, and offered a bonus of $100,000 for the factory. This amount has all been raised by the sale of 400 building lots located between Newcastle and the new factory site. On November 16 every factory whistle in the city was blown for fifteen minutes to announce to the citizens that the deal for the factory had been completed.

The Maxwell-Briscoe Motor Company inform us that it is practically settled that they will locate at Newcastle. The committee of the board of directors, consisting of Messrs. Benjamin Briscoe president, J. D. Maxwell vice president and R. Irvin treasurer, together with their counsel, Mr. Hatheway, of New York, returned last week from a trip through Indiana. Newcastle is a town of about 10,000 population, 40 miles from Indianapolis. The idea of the company is to build up around their factory a manufacturing community that will have Maxwell interests at heart.

The new building will occupy a site of about 15 acres, and will have about 350,000 square feet floor space. The buildings will be one story high, of steel reinforced concrete construction, and sawtooth roofs. About 2,500 men will be employed. Every part of the Maxwell cars will be made from the raw material. The company will try to induce other manufacturing companies to locate near their factory.

New Automobile Phrases.

"* * * Another original feature of the machine will be that if any foot-plate or release clutch is touched, it automatically slows down the motor. A safety device will be connected on the steering wheel, whereby it will be possible to stop the machine absolutely by merely pressing a button, which will produce short circuits throughout the machine. * * * The storage battery, dry cell battery, commutator or vibrator will be used.—*Davenport (Ia.) Times.*

Commercial Applications.

Motor Buses on Van Ness Avenue, San Francisco.

The San Francisco Auto Omnibus Company, 1237 Van Ness avenue, was organized soon after the earthquake and fire by Robert A. Roos, of the firm of Roos Brothers. The capital stock is $250,000, and the officers are Clarence Grange, president; R. L. Radke, vice president; Robert A. Roos, secretary; Henry Kahn, J. N. Brittian, Paul Verdier and V. H. Howe, directors.

The object of the company is to supply transportation south from Pacific avenue to Market street, and north from Market street to Pacific avenue, along Van Ness avenue, which, formerly a residential street, has become the principal retail thoroughfare of San Francisco. The buses have been running since the latter part of last July. They make trips at intervals of five minutes from 7 a. m. to 7 p. m.. A 5 cent fare is charged, and the patronage is said to have been sufficient to make the business successful. Seven buses are in daily use, and the officers of the company believe that in a short time twenty will be needed to maintain the service.

Of the vehicles employed some are Reos, and others were assembled in San Francisco from parts of various machines. The company has its own garage on Austin avenue, off Van Ness avenue, in the middle of the run covered by the buses. About two dozen machinists and chauffeurs are employed. The advertising contracts for space on the buses produce nearly enough to pay the running expenses of the line. The route runs in a northerly direction, and is hilly, with quite a steep grade between Turk and Eddy streets. On this account it has been found necessary to use low geared vehicles. The engines develop about 16 horse power.

As Van Ness avenue is almost deserted on Sunday, the buses do not make any trips on that day. They are usually rented to private parties, the rate charged for a vehicle capable of seating from eleven to fourteen persons being $8 an hour.

Motor Trucks in Election Service at Detroit.

The following is a record of the work performed by eleven Reliance motor trucks which were placed in service for the metropolitan police department of Detroit on Election Day. The city is divided into nine precincts, and each precinct captain was furnished with a motor truck and driver. The first and eighth precincts were furnished with two each. The ballots were collected in two trips, and two boxes were collected on the 2 o'clock run from each voting booth, which made from four to thirty-eight boxes per truck. On the 8 o'clock trip, in addition to the two boxes from each booth, there were two boxes of unused ballots carried. During last year's election, when ten patrol wagons and six horse drawn trucks were used, the usual time taken for collecting the votes and carrying them to the central counting board at the Light Guard Armory was two and one-half hours in the afternoon and three and one-half hours in the evening; while in this year's collections all of the votes were in, both afternoon and evening, in one hour and forty minutes after the polls closed.

The automobile service gave the police the chance to keep order in the city during the serious condition of affairs on Election Day. With police patrols they made twenty-three calls. The officials of the department of police state that these autos saved the horses of the different stations, as the strain of the election was great; and motor vehicles proved satisfactory, as all of the machines made both of the trips without adjustments.

The total distance run by the eleven trucks on the trips was 308 miles; the number of stops made for collection was 310; the total time consumed by the eleven trucks was nineteen hours and nine minutes. The gasoline used on the eleven trucks was 27 gallons, and the lubricating oil nine-tenths of a gallon. The average distance traveled by each truck was 28 miles.

Motor Cars With Safes.

Nearly all the important banks of San Francisco employ motor cars in their business. Most of these corporations are occupying their old quarters in the burned district, but for the convenience of their customers maintain branches in the region between Van Ness avenue and Fillmore street. This was formerly a residence district, but has now been occupied largely by retail storekeepers, attorneys, physicians, dentists, insurance companies, real estate dealers, etc. In order to maintain rapid communication between the head offices downtown and the uptown branches the banking corporations find it necessary to employ automobiles.

The Bank of California, which occupies the quarters formerly tenanted by the Bank of London and San Francisco, in California street, employs two automobiles; the California Safe Deposit Company, which occupies its former quarters on the corner of Montgomery and California streets, has two motor cars in its service. Motor cars are also employed by the Metropolitan Trust and Savings Bank, the Crocker-Woolworth National Bank, the Wells-Fargo Nevada National Bank, etc.

The American National Bank of San Francisco employs two motor cars constantly, and keeps a third in reserve, ready for use in case of either of the others needing repairs. The rear entrance doors have been closed, and small safes have been fitted into each tonneau. The safe is laid on its back, so that the door opens from the top. Sacks of coin or valuables are dropped into the safe, so that if the car should be damaged in a collision the valuables would not be scattered in the street. Greater security is also afforded against highwaymen, who are very prevalent in these troublous times in San Francisco. The object is to have the cars as inconspicuous as possible, and to avoid anything unusual in their appearance. Armed guards always accompany them.

Motor Bus Line in Illinois.

Z. E. Williamson, Buda, Ill., has operated a 16 horse power, two cylinder touring car on a regular schedule between the Burlington Railroad station at Buda and the Rock Island station at Sheffield, 6 miles distant, since July 1 last. Three round trips are made daily, the distance between the two towns being covered in from fifteen to twenty-five minutes according to road conditions. The fare charged for passengers is 75 cents, and trunks are carried for 50 cents each.

Motor Buses in London.

Motor omnibuses in London work from eighteen to nineteen hours per day and travel about 115 miles. The average number of stops per mile in London is six, and the average number of times the driver changes gear in the same distance is nine, while the brake is applied no fewer than twenty-two times per mile. It will be seen, states *Motor Traction*, that if a motor omnibus does a full day's work it will be stopped no fewer than 690 times, gears will be changed 1,035 times and the brake applied 2,530 times for one day's running.

The Craig-Toledo Motor Company.

The Craig-Toledo Motor Company has been incorporated to succeed the Maumee Motor Car Company. The main office of the company is at Toledo, Ohio, and the factory is at Dundee, Mich. The officers are as follows: J. Frank Zahm, president; George L. Craig, vice president; Walter E. Jacoby, second vice president; William K. Terry, secretary; A. W. Colter, treasurer; Frank E. Southard and Charles F. Aaron, directors.

They are manufacturing a touring runabout to be called the Craig-Toledo, after the Craigs, of Toledo, who are heavily interested in the company. They have formerly been known as ship builders.

Lewis T. Rhoades, of Philadelphia, informs us that he has completed the tour from Evansville, Ind., to New York city in a Simplicity touring car. He went by way of Terre Haute, Indianapolis, Columbus, Dayton, Pittsburg, Harrisburg and Philadelphia. He claims to have made the entire trip without mishap, in spite of bad roads in the Alleghany Mountains, in seven days' running time, and to have arrived with the same air in the tires that he started out with.

LEGISLATIVE and LEGAL

Legal Pointers.

By Xenophon P. Huddy, LL.B.

Following are some points of law in relation to automobiles that have been established by the highest courts in the country in recent decisions. Judicial decisions concerning the rights and liabilities of automobile drivers are being handed down every day and the number of undecided cases that are now pending is quite large.

AUTOMOBILISTS' RIGHT TO USE STREETS.

Owners of automobiles have the same rights in the public highways that drivers of horses have, but neither class has the right to use its means of locomotion without regard to the rights of others traveling on the highways.—Wright vs. Crane, 106 North Western Rep. 71.

A party driving an automobile has the same right as one operating any other vehicle to use the streets of a city, and must exercise reasonable care and caution for the safety of others.—Hannigan vs. Wright (Del. 1906), 63 Atl. Rep. 234.

RIGHTS OF PEDESTRIANS.

A pedestrian using the streets of a city has the same right as an automobilist, but he is under the duty of exercising reasonable care to avoid collision with a vehicle. —Hannigan vs. Wright (Del. 1906), 63 Atl. Rep. 234.

RIGHTS AND LIABILITIES OF AGENTS.

A party applied to a motor company for an agency to sell automobiles, and was referred to the defendant, who was then the motor company's agent in the locality in question. The plaintiff was informed by the defendant that he would have to purchase or sell a machine in order to be appointed an agent. It was held that the defendant acted as the agent of the motor company, and not for himself, and he was not liable to the plaintiff for commissions on orders.—Hoyt vs. Hoyt, 64 Atl. Rep. 18.

RELATION BETWEEN OWNER AND CHAUFFEUR.

The relation of master and servant exists between a chauffeur and his employer, and the rules of law applicable to that relation apply.—Hannigan vs. Wright (Del. 1906), 63 Atl. Rep. 234.

NEGLIGENTLY OMITTING HEADLIGHT.

Whether it is negligence for the owner of an automobile to run it in the dark without the warning to one approaching from the opposite direction which a headlight gives, is a question for the jury.—Wright vs. Crane, 106 N. W. 71.

CONTRIBUTORY NEGLIGENCE.

Where one who is injured by an automobile in the streets of a city saw the machine before it struck her or by reasonable use of her senses could have seen it in time to avoid the injury, she was held not to be entitled to the recovery of damages.—Hannigan vs. Wright (Del. 1906), 63 Atl. Rep. 234.

ALLEGATIONS OF NEGLIGENCE.

A complaint alleging negligence of the defendant in operating an automobile in the street, in running it into a space behind another vehicle, which cut off the plaintiff's view when the space was too short for either defendant or plaintiff, who was riding a bicycle, to prevent a collision, states a good cause of action.—Hughes vs. Connoble (Del. 1906), 64 Atl. Rep. 72.

Counts in a complaint alleging negligence of the defendant in operating an automobile in a street, in that he ran it at a high rate of speed without giving the plaintiff any warning of its approach, were held to be bad.—Hughes vs. Connoble (Del. 1906), 64 Atl. Rep. 72.

MATTERS FOR CONSIDERATION OF JURY.

In an action for injuries to a party who is run over by an automobile in the streets of a city, in determining the degree of care that the operator should have used, the jury may consider the speed, size, appearance, manner of movement and amount of noise made by the machine.—Hannigan vs. Wright (Del. 1906), 63 Atl. Rep. 234.

POLICE POWER OF STATE.

Automobile provisions requiring registration and the necessity for taking out licenses are within the police power of the State, and do not contravene the provisions of the Federal Constitution.—Unwin vs. State (N. J. 1906), 64 Atl. Rep. 162.

LICENSE FEES.

The fee charged for an automobile license constitutes a valid license fee.—Unwin vs. State (N. J. 1906), 64 Atl. Rep. 162.

EVIDENCE AND PROOF OF SPEED.

A witness who testifies that an automobile approaching in the dark made no noise heard by him; that when running at a high rate of speed it makes but little noise, and that when running at a low rate of speed it makes much noise, is not competent to estimate the speed of the vehicle. An estimate of speed should have as a basis at least a reasonable opportunity to judge.—Wright vs. Crane (Michigan 1903), 106 N. W. 71.

COMPETENCY OF WITNESSES.

Where in an action for injury received in consequence of a horse being frightened by an automobile approaching in the dark, there was a sharp dispute in the facts, and any reckless rate of speed in running the automobile was calculated to affect the verdict, the error in permitting a witness not qualified to estimate the speed of the machine was held to be prejudicial and ground for a new trial.—Wright vs. Crane, 106 N. W. Rep. 71.

PENNSYLVANIA LAW.

A city ordinance requiring the owner of an automobile to take out a license, and carry a license tag, was held not to be affected by the Pennsylvania act of April 19, 1905, providing that every automobile driver shall obtain from the State Highway Department a license, and that the license shall be carried, exhibiting the license number and the number of the year.—Brazier vs. City of Philadelphia (Penn. 1906), 64 Atl. Rep. 508.

Annual Meeting of the A. C. A.

The annual meeting of the Automobile Club of America was held November 19. Retiring President Dave Hennen Morris, in his annual report, said the membership of the club is now 1,000 active, 235 associate and six life, with twenty-seven names on the waiting list. During the last year 300 active, fifty associate and two life members were added to the club. Mr. Morris advised against racing on the public highway, saying that the club is already on record condemning such sport. He also called the attention of the members to the fact that the club was required to pay 24,906 francs as its share of expenses for participation in the Gordon Bennett race of 1905.

"Our organization is the only American automobile club recognized in automobile circles by any foreign country," said Mr. Morris, "and it is everywhere regarded as the national club of this country and has binding treaties with nearly every foreign national automobile club. Owing to the increase in our membership this club pays in annual dues to the American Automobile Association something like $1,250. Are the advantages commensurate and are the members satisfied to continue paying this sum of money?"

He promised that the club would be in their new building in West Fifty-fourth street by Christmas. Many delays had been encountered in the construction of the building. The second mortgage bond issue had been increased to $300,000, and that amount had been practically all subscribed.

The work of the club in obtaining rational automobile legislation in various States was reviewed. The danger resulting from the use of acetylene headlights in the city and on ferryboats was referred to, and members were urged to use their influence to discourage such use. A city ordinance was recommended to punish automobilists who drive with open mufflers or who allow dirty smoke to issue from exhausts.

The bylaws were amended so that the annual meeting will be held on the second Tuesday of April hereafter instead of in November. The other changes in the bylaws and constitution proposed, as published in our columns last week, were adopted.

The following officers were elected for the ensuing year: President, Colgate Hoyt; first vice president, Dr. S. S. Wheeler; second vice president, John E. Borne; third vice president, Gen. George Moore Smith; treasurer, W. S. Fanshawe; directors to serve three years, Dave Hennen Morris, Winthrop E. Scarritt and Albert R. Shattuck.

In connection with the Paris Show this year there will again be held a competition of automatic motor starting devices for the Deutsch prize of 5,000 francs, the same as last year.

N. A. A. M. Executive Committee Meeting.

The regular monthly meeting of the executive committee of the National Association of Automobile Manufacturers was held November 14, with the following members present: E. H. Cutler, Benjamin Briscoe, S. T. Davis, Jr., William E. Metzger, Ezra Kirk, L. B. Kittredge, M. L. Goss, William R. Innis, M. J. Budlong, S. D. Waldon and Samuel A. Miles.

Jefferson De Mont Thompson and A. R. Pardington attended the meeting by invitation to explain the details of the automobile highway which is to be constructed on Long Island and were assured that the Long Island Motor Parkway, Inc., would have the moral support of the N. A. A. M. In accordance with the request of the organizers of the Motor Parkway the executive committee appointed S. T. Davis, Jr., as its representative on the board of directors of the Long Island Motor Parkway, Inc.

The contest committee reported that it had held two sessions of half a day each and one session of a whole day to consider the replies from members of the association regarding the circular letter sent out asking for views on a contest for next year and rules for the same if one was favored. This has not proved to be sufficient time to digest the answers, however, and the committee said that at least one day's more work will be necessary before it will be able to make a report on the subject. The contest committee is to hold another meeting in Detroit on November 27, and its report may be ready for the executive committee at the regular December meeting, which is scheduled for December 5.

The report of the show committee dealt at length with the cases of a number of concerns which exhibited at an unsanctioned show held in Chicago in September, and have since applied for space at the sanctioned shows. The rules of the association provide that no concern which exhibits at an unsanctioned automobile show shall be permitted to exhibit at any sanctioned show, which had been interpreted to mean that those who took part in the unsanctioned show would not be permitted to exhibit at either of the shows in New York or the show to be held in Chicago next February.

A large number of letters had been received whose writers stated, with evident truth, either that they were unaware of the existence of the rule or that they had been led to suppose that an exhibit at a parts show would not debar them from participation in the annual automobile shows. After a full discussion of the subject the executive committee took the ground that inasmuch as the exhibits at the unsanctioned show were exclusively of parts and accessories, and that it was not, therefore, clearly an automobile show, there might have been a reasonable doubt whether it was an automobile show within the meaning of the rules, and decided that exhibitors thereat shall not be debarred from participation from the sanctioned shows by reason of their having exhibited.

At the October meeting of the association it was decided that all matters relative to exhibits of parts and accessories should thereafter be left for decision to the Motor and Accessories Manufacturers, Inc., the executive committee therefore amended the sanction rule so that it now reads as follows:

> No person, firm, company or association shall be permitted to exhibit, directly or indirectly, in his or their own name, or in the name of an agent, dealer, jobber, branch house or any other person, firm, company or association who or which has or have exhibited or contracted to exhibit an automobile or automobiles, or permit an automobile or automobiles made or imported by him or them, which he or they own or control, to be exhibited at any automobile show held in the United States, after the first day of September, 1904, which has not been officially sanctioned by the National Association of Automobile Manufacturers, Inc., or who has exhibited or contracted to exhibit, or permitted parts, accessories, or other goods connected with the automobile industry, made or imported by him or them, or which he or they own or control, to be exhibited at any automobile parts or accessories show held in the United States, after the first day of September, 1904, which has not been officially sanctioned by the National Association of Automobile Manufacturers, Inc., or the Motor and Accessories Manufacturers, Inc.

The American Locomotive Automobile Company was admitted to membership in the association, H. F. Ball being their active representative.

San Francisco Park Commissioners to Stop Speeding.

The San Francisco Park Commissioners, at a recent meeting, expressed themselves strongly against the chauffeurs who speed through Golden Gate Park out to the Cliff House and Ocean Beach resorts at late hours of the night and early hours of the morning.

It is said that the proprietors of the city garages are largely to blame, by permitting the chauffeurs to sleep on their premises and to transfer the numbers of registered motor vehicles from one car to another. The commissioners are so angry at the reckless speeding that they may close all the roads except the South drive to motorists.

Death of Dan Albone.

The death is reported from England of Dan Albone, manager of the Ivel agricultural motors firm of Bigglewade, probably the only firm in the world making gasoline motor propelled agricultural machinery on an extensive scale. Mr. Albone, who was the inventor of these machines, was only forty-six years old.

"Radiator Tubes With Wings."

An esteemed contemporary speaks of "radiator tubes with wings." The era of innovations in the automobile line has evidently not yet passed. A winged radiator would evidently also be the proper thing for an airship motor.

MINOR MENTION

The Motor and Accessories Manufacturers, Inc., have sanctioned the Detroit Automobile Show, February 11 to 16.

It is reported that the Fee Bock Auto Company, Detroit, Mich., will soon engage in the manufacture of automobiles.

Ground is being broken for a new factory for the Welch Motor Car Company, of Pontiac, Mich., which will double their floor space.

The Cadillac Motor Car Company have recently moved their engine department from the Leland-Faulconer plant to their main factory on Cass avenue.

The new factory of the Jones Speedometer at New Rochelle, N. Y., was "warmed" last Saturday evening. A large party of men participated in the festivities.

The Northern Motor Car Company, of Detroit, last week drove their 1907 model from Detroit to Chicago, picking out particularly bad roads, and the test is reported to have ended very successfully.

The A. C. of Buffalo will ask other clubs throughout the country to co-operate in the establishment of a national chauffeurs' bureau, so that employers may obtain definite information regarding the records of drivers seeking employment.

At a luncheon given at the Hotel Breslin November 15 to the exhibitors at the A. C. A. Show, Joseph Troxwell, representing the Crawford car, drew the privilege of exhibiting a car in the lobby of the hotel during the week of the show. He has selected a 50 horse power Crawford with tonneau body.

The construction of a boulevard between Buffalo, Tonawanda and Niagara Falls has been undertaken by the A. C. of Buffalo, and it is the purpose of the club to ask the cities of Niagara Falls and Tonawanda to name committees to confer with a committee of fifteen to be named by President Herbert A. Meldrum, of the Buffalo A. C.

It is understood that the Buckeye Manufacturing Company, of Anderson, Ind., who manufacture the Lambert friction drive gasoline automobile, will not bring out a two cycle runabout for the 1907 season. The company has been working on such a model for some time, but it is said that sufficient progress has not been made to warrant bringing it out next season. It may be a part of the Lambert line in 1908.

Richard F. Corwin, of Grand Rapids, Mich., has a patent pending on a "nonpuncturable" tire. It comprises a pneumatic inner tube, which is almost completely surrounded by a steel casing, except on the inner periphery. The steel casing is firmly secured to the flanges, so that its periphery bears upon the exposed portion of the pneumatic tube. Between the tube and its

metallic casing is placed a fabric jacket, woven to stretch lengthwise, but not crosswise, for the purpose of lessening friction upon the pneumatic tube.

The firm of Charron, Girardot & Voigt, of Paris, will soon be launched as an English limited liability corporation, with a capital stock of £384,000.

The Speed Changing Pulley Company, Indianapolis, have decided on the erection of a new plant with 43,000 square feet of floor space, location not yet decided on.

Lewis A. Dow, an architect and builder, has used his 10 horse power Cadillac in place of a hoisting engine in building a Methodist Episcopal church at Medford, Mass., this fall.

The San Antonio (Tex.) A. C. has been organized with the following officers: G. D. Robbins, president; G. A. C. Halff, vice president; Dr. G. H. Fairfield, secretary; H. F. Cook, treasurer.

It is reported that the H. H. Franklin Manufacturing Company, Syracuse, N. Y., would like to hire 600 additional men if they can get them, as they have orders ahead for 1,500 automobiles.

The Albany (N. Y.) Garage Association has elected the following officers: Matthew Van Alstyne, president; E. Palmer Gavitt, vice president; W. L. Peltz, secretary, and Edward B. Cantine, treasurer.

The New York Motor Club offers $50 for the arrest and conviction of any automobile driver who runs into and injures any person and attempts to get away without offering aid or submitting to arrest.

The Menges Motor Company has been organized at Grand Rapids, Mich., for the construction of motors and motor cars. They have secured a factory at 14 to 18 Mill street. A. C. Menges is the general manager.

The Vermont A. C. has elected the following officers: President, Charles A. Harris, of Brattleboro; vice presidents, E. A. Brodie, of Burlington; F. D. Ladd, of Barre; secretary and treasurer, George E. White, of Montpelier.

The Metal Stamping Company, 243-253 West street, New York, are to place on the market several automobile specialties, among which will be a new radiator. They inform us that they have retained Joseph Tracy as consulting engineer.

An official of the Buick Motor Company stated in the Jackson, Mich., Police Court recently that the company had lost $50,000 worth of material and tools by theft and unaccountable shrinkage at their Jackson and Flint plants during the past year.

The Monarch Motor Car Company have opened offices at 1201 Citizens Building, Cleveland, Ohio. Irwin G. Guthrie, Bernard Guthrie and W. D. Droum are interested in the company. They expect to build 30-35 horse power and 45 horse power touring cars.

The Syracuse Aluminum and Bronze Company, who recently bought the brass department of the Rochester Car Wheel Works, have moved it to Syracuse and made it a part of their factory on Leavenworth avenue.

The New York Motor Club will hold their second smoker of the season December 2.

The A. M. C. M. A. will tender a luncheon to all exhibitors at the A. C. A. Show December 6.

The Pottsville Automobile Association has been organized at Pottsville, Pa., with W. L. Krahmer as president.

The Selden Motor Vehicle Company, Despatch, N. Y., expect to have 1908 models ready for delivery by next August.

The Boston salesrooms of the Dragon Automobile Company will be at 117 Massachusetts avenue about December 15.

The Jencick Motor Manufacturing Company, Port Chester, N. Y., are said to be contemplating the erection of a new plant.

The Wilkinsburg (Pa.) A. C. has elected the following officers: President, Dr. W. R. Stephens; secretary and treasurer, Dr. W. C. Cook.

C. F. Splitdorf, New York, has opened a supply house at 320 McAllister street, San Francisco, Cal., with B. P. Houlihan as manager.

The number of automobiles registered with the Secretary of State of New York from January 1 last to November 15 was just 11,000.

The Quaker City Motor Club has been organized at Philadelphia, Pa., with the following temporary officers: President, George H. Smith; vice president, E. Hubbard Fitch; secretary, Irving J. Morse; treasurer, G. H. Thompson.

William J. Axt, formerly manager of the New York branch of the Continental Caoutchouc Company, Broadway and Seventy-third street, has entered into partnership with J. Stewart Smith. They will handle Panther tires at 253 West Forty-seventh street, New York.

The Chicago Coach and Carriage Company, Chicago, Ill., are experimenting with a car with good road clearance to sell for $750. It will be driven by a two cylinder, air cooled engine, placed under the hood, and will be equipped with shaft drive and selective transmission.

It is reported that the "Whiskey Trust" will begin the manufacture of denatured alcohol on January 1 next in the Atlas distillery in Peoria, Ill., which has been idle for some years. The capacity of this plant is 8,000 bushels a day, and it is thought that this will cover the demand at the start.

Mrs. Jules Gabriel, secretary of the California Women's Automobile Club, is making out a new list of members, the old one having been lost in the San Francisco fire. As soon as a sufficient number of members has been located notice of a meeting for reorganization and selection of officers for the coming year will be issued.

Wm. A. Hansen, a dentist of Walnut Grove, Sacramento, Cal., has invented an attachment for gasoline engines by which their direction of rotation can be changed. It is mounted on the cam shaft, and is connected with a lever, by means of which the spark is circuit made and broken and the valve operation changed.

Tom Cooper, the automobile racing driver and former bicycle racer, was killed in a collision while driving a Matheson car in Central Park, New York, last Monday night. A man with him also met death, and a woman companion will probably die.

The Albany (N. Y.) A. C. has elected the following officers: President, A. J. McClure; vice president, M. L. Ryder; secretary and treasurer, Chauncey D. Hakes; executive committee, Joseph B. Taylor, Dr. E. G. Cox and O. A. Quayle.

The runs and tours committee of the A. C. of Philadelphia have awarded the H. Bartol Brazier trophy to G. Lewis Mayer, who drove a 1906 Thomas car in the cross country run of October 20. W. C. Longstreth finished first, driving a Maxwell car, but did not fulfill all the conditions of the contest.

The Auto Equipment Company, of Detroit, will soon move their factory to 253-255 Jefferson avenue, and their present place will be abandoned. They will soon begin the manufacture of a new type of spark plug, made of imported porcelain. They will also manufacture Zero Fluid, a new anti-freezing solution, claimed to contain no calcium chloride.

Paul L. Snutsel, of the Snutsel Auto Supply Company, New York, is abroad for four weeks, and expects to visit the Paris Salon. It is reported that he will arrange for the manufacture of the Pipe cars in this country. His father, Victor Snutsel, of Brussels, is a director of the Société Belge Construction Automobil, the manufacturers of these cars.

The automobile highway to be built on Long Island will be known as the Long Island Motor Parkway, Inc., the word "Parkway" being substituted for "Highway." A. R. Pardington has been appointed second vice president and general manager. The prospectus announces a capital stock of $2,500,000. The eastern terminus of the parkway will be near Peconic Bay, Suffolk County.

The H. H. Franklin Manufacturing Company inform us that according to a statement of aluminum manufacturers they are the largest consumers of aluminum among automobile makers. Their annual consumption is about 175,000 pounds, of which 75,000 pounds is in specially rolled sheets for bodies, hoods, seats, etc., and the balance in the form of engine bases, transmission cases and other similar castings.

Dr. G. S. Chapin and H. S. Michaels, of Chicago, who are gathering data for a proposed national highway between Chicago and New York, arrived in Syracuse, N. Y., last Thursday and continued their journey Saturday. They expect to lay before Congress the material gathered on their trip. They are making a map of the roads and taking photographs at frequent intervals. They have already used over 200 dozen films.

Garage Notes.

Harry Smith has opened a garage at Pinegrove, Pa.

W. C. Wolson will open a garage at Oxford, Ohio.

J. Bartlett White has opened a garage at Waltham, Mass.

C. W. Maxim is fitting up a new garage at Middleboro, Mass.

C. C. Carter has occupied his new garage at Santa Monica, Cal.

Charles P. Allen is to erect a garage on Cleveland place, Denver, Col.

I. D. F. Lansing will build a garage on Congress street, Albany, N. Y.

The Mercedes Import Company have leased salesrooms at 590 Fifth avenue, New York.

Harris & Dunlap have opened a garage at Lompoc, Cal. They will handle the Reo cars.

Charles W. Johnson has purchased from Samuel and Alfred Johnson the garage at Uniontown, Pa.

The Oakland garage, Oakland, Cal., was destroyed by fire November 5, and twenty-five automobiles burned.

Harry Broadbelt is handling Ford cars in Baltimore at his new garage on Dolphin street and Mt. Royal avenue.

The Dragon Automobile Company, of Philadelphia, Pa., are planning to build a two story brick garage at Boston, Mass.

It is reported that a new garage will be erected for the Chicago Rambler branch on Michigan avenue, near Fourteenth street.

O. T. Johnson is to build a two story garage and machine shop 58x107 feet in size at 110 to 114 East Ninth street, Los Angeles, Cal.

J. D. Blackshaw and Dr. J. M. Allen have formed a partnership to operate a garage at St. Johnsbury, Vt. They will handle Maxwell cars.

The Cornish-Friedberg Company, 347 Wabash avenue, Chicago, will shortly occupy their new garage on Michigan avenue, between Twelfth and Thirteenth streets.

The A. J. Seaton Automobile Company have purchased the Black Diamond Automobile Company's plant at Utica, N. Y., and will operate it as a garage and repair shop.

The four story garage of the Foss-Hughes Motor Company, to be erected at 221 and 223 North Watts street, Philadelphia, Pa., will cost $8,000, and will be 34x58 feet in size.

Henry W. and Walter S. France, doing business as the California Auto Livery Company at San Francisco, Cal., have dissolved partnership. Walter S. France will continue the business.

Edward N. Stahl, Daniel C. Springer and James Cypher, Connellsville, Pa., have formed a stock company capitalized at $20,000 for the purpose of erecting a garage and machine shop in that town.

Howard M. Covey, Portland, Ore., has sold his interest in the Covey & Cook Motor Car Company, and arranged to go into business alone. He will have the Knox, Cadillac, Pierce Locomobile agencies.

A garage is to be built for the Rainier Automobile Company, of Chicago, at 1725 Michigan boulevard. It will cost $40,000, and will be completed by February 1. E. Q. Cordner is manager of the company.

Henry E. Beyster and Thomas J. Thrope have formed a company with $25,000 capital, and are erecting a garage 50x90 feet in size, at 1329 and 1331 Woodward avenue, Detroit, Mich. They will handle Aerocars.

Scott E. Winne and H. A. Wilson, formerly of Colorado Springs, Col., have opened a garage at 118 South Lawrence street, Wichita, Kan. They will do business under the name of the Wilson Automobile Company.

William Aschenberg and V. V. Haidacher, doing business as the Raritan Auto and Motor Company, Perth Amboy, N. J., have dissolved partnership. Aschenberg has opened a repair shop on Madison avenue, and Haidacher will continue the former business.

The Utica Motor Car Company, 333-337 Bleecker street, Utica, N. Y., have purchased the business of the Standard Automobile Company, and thus acquired the Reo, Stoddard-Dayton and National agencies. They also handle Peerless, Thomas, Pierce, Stevens-Duryea, Buick, Cadillac and Baker Electric cars.

Paul H. Bosworth, of San Francisco, Cal., has begun suit against J. W. Leavitt, of Leavitt & Co., of that city, for $1,400 damages for conversion of a Reo touring car, which was sent to the defendants for repairs, and which plaintiff has been unable to recover for his own use.

The Cadillac Automobile Company, with Olin Peck as general manager, has been organized at Indianapolis. They will have the Indianapolis and central Indiana agency for the Cadillac and parts, and temporary headquarters have been taken with the Pioneer Vehicle Company, 211 East Ohio street. For several years the Cadillac agency was held by the Indianapolis Automobile Company.

It is reported that the D. B. Sullivan Automobile Company, of Indianapolis, have relinquished the agencies for the Queen and Mitchell, and will handle the Lambert exclusively in the future. The company expect to make a specialty of commercial cars during the 1907 season. Recently they sold a car for inspection purposes to the Marion County Commissioners, and are now trying to interest the Indianapolis police department, which has an appropriation of $4,000 for the purchase of an automobile.

New Agencies.

Ottawa, Ill.—Bane & Zeller, Buick.

Atlanta, Ga.—Frank Steinhauer, Reo.

York, Pa.—John H. Adams, Marmon.

Brooklyn, N. Y.—J. W. Mears, Acme.

Pinegrove, Pa.—Harry Smith, Rambler.

Troy, N. Y.—Fred W. Cavanaugh, Acme.

Tacoma, Wash.—Acme Auto Company, Acme.

Pittsburg, Pa.—Liberty Auto Company, Acme.

Kalamazoo, Mich.—Wm. O. Harlow, Maxwell.

San Antonio, Tex.—J. A. Roosevelt, Cartercar.

Boston, Mass.—Boston Motor Car Company, Acme.

Los Angeles, Cal.—Standard Motor Car Company, Acme.

Chicago, Ill.—Cornish-Friedberg Company, Wayne and Aerocar.

Detroit, Mich.—The Auto Equipment Company, Rushmore lamps.

Portland, Me.—Allen Motor Car Company, Preble street, Cameron.

Princeton, Ill.—G. A. Trumbull, Moline (Bureau County for 1907).

New York City.—Norris N. Mason, 32 West Thirty-second street, Acme.

Princeton, Ill.—S. L. Bradley, 809 North Main street, Reo (Bureau County for 1907).

New York City.—Bouton Motor Company, 110 West Forty-first street, York "Pullman."

San Francisco, Cal.—A. J. Hechtman, president of the City Hall Garage, American Mors.

Auburn, Me.—George E. Mills, Holsman (Androscoggin, Franklin and Oxford counties).

Albany, N. Y.—Albany Garage Company, 28-30 Howard street, Simplex and Isotta Fraschini.

Mendota, Ill.—Yost & Oester, Illinois street, Jackson (La Salle and Bureau counties for 1907).

Chicago, Ill.—Pardee & Canary, Inc., 1218 Michigan avenue, American Mors and Babcock Electrics.

Brooklyn, N. Y.—I. C. Kirkham, Fulton street and Bedford avenue, Maxwell (Long Island agency).

Earlville, Ill.—Taylor & Barnard, Reo and Premier (La Salle County and part of Lee and DeKalb counties for 1907).

Philadelphia, Pa.—International Motor Car Company, J. R. Overpeck, manager, 514 and 516 North Broad street, Darracq.

Trade Personals.

C. H. Rockwell has been appointed publicity manager of the Autocar Company, Ardmore, Pa.

A. M. Spear, Jr., has severed his connection with the Maine Motor Carriage Company, Portland, Me., and taken the management of the J. A. Dowling automobile business, 22 Forest avenue, Portland.

Erwin D. Hand has been appointed sales manager of the Dolson Automobile Company, Charlotte, Mich.

A. M. Robbins has been appointed traveling sales agent of the De Luxe Motor Car Company, Detroit, Mich.

W. B. Johnson, of Chicago, has been appointed manager of the Welch Brothers Motor Car Company, Milwaukee, Wis.

R. J. Jadwin has been appointed manager of the Scranton Garage, Scranton, Pa., to succeed J. T. Fisher, who goes to Detroit, Mich.

Frederick T. Craig, for the past five years factory superintendent of the Knox Automobile Company, Springfield, Mass., has resigned.

Edward T. Birdsall, M. E., of New York, has been appointed chief engineer and designer for the Selden Motor Vehicle Company, Despatch, N. Y.

Fred Linz, formerly San Francisco representative of Thomas B. Jeffery & Co., of Kenosha, Wis., is now agent for the Renault, Maxwell and St. Louis cars in San Francisco.

Charles J. Pupki has given up the Long Island agency for the Maxwell cars, and is now connected with the Carlson Automobile Company, 1060 Bedford avenue, Brooklyn, who have the Winton agency.

F. W. Ansley has been chosen as Franklin representative for New York and New England. He has been connected with the sales department of the H. H. Franklin Manufacturing Company for some time past.

Joseph H. Nichols, who for a number of years has been examiner of stationary engineers for the city of Buffalo, has resigned that position to accept the post of chief engineer at the new plant of the George N. Pierce Company.

Wallace C. Hood, who left the Motor Car Company, Baltimore, to go to the Auto and Motor Company as sales manager, is back with the former concern, being associated with Howard W. Gill and A. Stanley Zell as their sales manager.

New Incorporations.

Dundee Motor Company, Dundee, Mich.—Capital stock, $10,000.

The Ray Motor Company, Connersville, Ind.—Capital stock, $100,000. Incorporators, Rowan Ray, I. F. Geary, J. J. Maloney, L. D. McCall and W. S. Calder.

The Saint Clair Motor Company, Detroit, Mich.—Capital stock, $400,000 common, and $100,000 preferred (all paid in in property); to conduct a foundry and machine shop.

Oakland Automobile Company, Oakland, Cal.—Capital stock, $50,000. Incorporators, W. J. Freeling, A. T. Brock, H. A. Duckworth, William Russell and Charles K. Enyart.

The American Motor Company, Eau Claire, Wis.—Capital stock, $15,000; to manufacture automobile motors. Incorporators, Ralph Burdick, C. T. Bundy, Roy P. Wilcox and Hannah F. Johnson.

The Alameda Motor Car Company, Alameda, Cal.—Capital stock, $25,000 ($7,525 paid in); to operate a garage. Incorporators, E. C. Maillet, A. A. Stafford, D. A. Cambien, Edward H. Lake and F. G. White.

Citizens' Motor Car Company, Cincinnati, Ohio.—Capital stock, $100,000; to deal in automobiles and operate garages. Incorporators, Briggs S. Cunningham, H. E. Brenneman, J. M. Richardson, J. E. Thoms and Robert Ramsey.

The Automobile Company of Philadelphia, 419 Market Street, Camden, N. J.—Capital stock, $50,000; manufacturing automobiles, carriages, etc., garage and livery stables. Incorporators, J. A. MacPeak, F. R. Hansell, W. F. Eldell, all of Camden, N. J.

Wilcox Motor Car Company, 1030 Marshall Street N. E., Minneapolis, Minn.—Capital stock, $100,000; to manufacture automobiles. Incorporators, Harry E. Wilcox, president; J. F. Wilcox,

vice president; Maurice Wolfe, secretary, and R. D. Wilcox, treasurer.

The Craig-Toledo Motor Company, Toledo, Ohio.—Capital stock, $100,000; to manufacture automobiles. President, J. Frank Zahm; directors, John F. and George Craig, J. G. Swindeman, W. E. Jacoby, Frank E. Southard, William K. Terry and L. W. Knecht.

Trade Literature Received.

Cryder & Co., 583 Park Avenue, New York.—Catalogue of Mors automobiles.

J. H. Bullard, Springfield, Mass.—Circular, "The Bullard Speed Recorder."

Gilbert Manufacturing Company, New Haven, Conn.—Advance Catalogue Season of 1907.

The Cincinnati Milling Machine Company, Cincinnati, Ohio.—Booklet, "Examples of Rapid Milling."

The Continental Fibre Company, Newark, Del.—Booklet, "Some Facts Concerning Vulcanizing Fibre."

The Holsman Automobile Company, Monadnock Block, Chicago, Ill.—Catalogue, "The Holsman Automobiles."

Pope Motor Car Company, Toledo, Ohio.—Advance sheets of description of the chrome nickel steel Pope-Toledo for 1907.

Coming Events.

November 29—Hill climbing contest, Riverside, Cal.

December 1 to 8—A. C. A. show, Grand Central Palace, New York.

December 7 to 23—Paris show.

January 12 to 19—A. L. A. M. show, Madison Square Garden, New York.

February 2 to 9—Chicago show, Coliseum and First Regiment Armory.

February 11 to 16—Detroit show, Light Guard Armory.

February 18 to 23—The Buffalo show.

February 18 to 23—The Cleveland show, Central Armory.

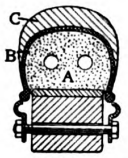
March 9 to 16—Boston show, Mechanics Building and Horticultural Hall.

April 6 to 13—The Montreal show.

Reviews of Patent Specifications.

No. 826,461. Vehicle Tire.—Charles E. W. Woodward of Chicopee Falls, Mass. Application filed June 29, 1905; patented July 17, 1906.

The object of this invention is to provide an improved solid tire as distinguished from pneumatics. The construction may take upon itself various forms, but in each case embodies the principle of enclosing an elastic or resilient core under pressure by a flexible casing of practically non-elastic material. To the outer surface of this casing what corresponds to the usual tread of the tire is either mechanically fastened or vulcanized. The core, which is preferably made of a good quality of rubber, may have either transverse or longitudinal channels, holes or grooves in it, which when the tire is applied to the rim will be compressed, so that an outward or radial pressure in the plane of the wheel will be exerted on the casing the same as that exerted by the compressed air in a pneumatic inner tube. In this case, however, the pressure is limited by the amount of previous compression of the core. The object of this construction is to provide a more resilient solid tire than it is possible to make, using the ordinary construction. The accompanying drawing shows one form of the application of this principle. A represents the core, B the non-elastic casing and C the tread. In the illustration the tire has not yet been applied to the rim and the core compressed. This is done by external pressure when the holes in the core will take



No. 826,461.

the form shown by the dotted lines and the outer casing holds the tire in place by having its beads clamped by any one of the usual mechanical methods. Outside of the added resiliency the inventor claims that the amount of compression can be varied to suit the weight of the vehicle upon which the tire is to be applied, and that the casing protects the inner and more expensive core from wear. That the casing can be removed for repairs or renewal, and that after the tread portion of the tire is practically worn off, the tire is not rendered useless as is the case with ordinary solid tires.

No. 826,405. Elastic Tire.—Arthur Thomas Collier of St. Albans, England. Application filed September 7, 1905; patented July 17, 1906.

This invention relates to elastic vehicle tires built up of short lengths securely held in position, but which can be quickly individually removed and renewed. Several methods of fastening the short lengths to the rim are employed, such as vulcanizing them to rigid carriers with one or more intermediate layers of india rubber of greater hardness between the elastic india rubber which forms the tread and the carrier. These mechanical carriers consist of

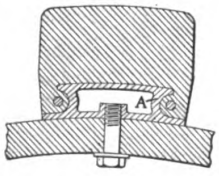


Fig. 1.—No. 826,405.

metal pieces either in the form of ordinary rim channels, or as shown in the accompanying drawing, Fig. 1, at A, which also shows one method of fastening the carrier to the wood felloe; that is, by means of cap screws. If preferred, this can be made a through bolt with a nut on the inner end. According to one method, the short lengths of elastic material are mounted on these carriers, which are secured in position on the wheel rim by metal parts which project beyond the elastic material and engage grooved flanges secured to the sides of the felloe. Another form of the invention shows the projecting ends of pins or

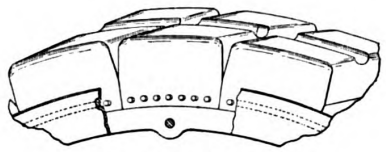


Fig. 2.—No. 826,405.

wire rods which extend through the elastic material, these pins or projections engaging holes or recesses provided in the side flanges. In every case the sections of rubber are placed so that their longitudinal axes are either at right angles to the plane of the centre line of the tread, or slightly oblique to this plane, as shown in Fig. 2. When the sections are placed in an oblique position they are so arranged on the wheels on opposite sides of the vehicle that they are inclined in opposite directions, which tends to prevent the vehicle from side slip.

Patents Issued November 6, 1906.

835,277. Air Cooling Device for Explosive Engines.—Lee A. Frayer and William J. Miller, Columbus, Ohio, assignors to the Oscar Lear Automobile Company, Columbus, Ohio, a corporation of Ohio. Filed January 11, 1905.

835,401. Protective Device for Automobile Motors.—Alexander Churchward, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York. Filed June 12, 1905.

835,460. Automatic Back Stop for Vehicles.—Clarence A. Noble, Catskill, N. Y. Filed March 24, 1906.

Patents Issued November 13, 1906.

835,502. Automobile Tire Envelope.—Charles W. A. Cornish, Pass Christian, Miss., assignor of one-half to Robert B. Miller, Pass Christian, Miss. Filed November 14, 1905.

835,523. Stop Valve.—Ebenezer Hill, Jr., Norwalk, Conn. Filed November 18, 1905.

835,547. Automobile Frame.—Alfred B. Morse, South Easton, Mass. Filed May 7, 1906.

835,564. Vaporizer or Carburetor.—Charles D. Shain, Rockaway Park, N. Y. Filed December 26, 1905.

835,569. Oil Feed Device.—Herbert O. Spade and Henry E. Spade, Vicksburg, Mich. Filed February 23, 1906.

835,721. Clutch.—Alexander Winton and Harold B. Anderson, Cleveland, Ohio, assignors to the Winton Motor Carriage Company, Cleveland, Ohio. Filed May 4, 1906.

835,793. Vehicle Wheel.—John M. Kerwin, Taylor F. Broomall,, Jr., and Harry H. Broomall, Philadelphia, Pa. Filed November 18, 1905.

835,797. Friction Gearing for Motor Vehicles, Etc.—Ludwig Maurer, Nuremberg, Germany. Filed April 20, 1906.

835,808. Tire.—Henry T. Bragg, Yonkers, N. Y. Filed January 16, 1906.

835,828. Goggles.—Emil B. Meyrowitz, New York, N. Y. Filed December 26, 1905.

835,880. Carburetor.—Adolphe Clément, Levallois-Perret, France. Filed March 16, 1905.

835,939. Tire for Wheels.—John Cooper, Camberwell, England. Filed September 11, 1905.

836,035. Clutch Mechanism.—Adam C. Hendricks, Hagerstown, Md. Filed January 20, 1906.

For the commercial vehicle contest to be held by the A. C. F. eleven entries had been received up to the time of the latest reports. These include three Darracq-Serpollet steam vehicles, two Cohendets, two Turgans, two Aries, one Peugeot and one D'Espine, Achard & Co.