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The Silent Chain.

By F. E. Watts.

Wherever the duties of rotating parts demand that they be driven positively it is customary to drive them either by gears or chains. In automobile practice recent tendencies have favored an increased use of gears in preference to chains. This has probably been due to two reasons: First, gears are easier to enclose in oiltight cases. Second, when properly made they are likely to be quieter than chains of the ordinary block and roller type. Up to the present time these two types of chain are the only ones which have been extensively used in this country for automobile work. Quite recently, however, the "silent" type has been adopted to a certain extent for driving accessories, cam shafts and for transmission to the rear axle. As it is still unfamiliar to many and possesses advantages for certain classes of work which are likely to bring it into more common use, a description of its construction and use may be of some service to designers.

DESCRIPTION.

Silent chains are made up from links stamped from high grade of sheet steel and joined together with hardened pins. The links are so shaped as to form teeth on the face next the sprockets, the outer face being practically smooth. The sprockets are cut much like ordinary spur gear, and engage with every link. Fig. 1 shows the relation of chain and sprocket. A shows a new chain and B one which is much worn. If the action of such a chain is followed it will be seen that as the chain rolls on the sprocket the flat faces of the links make direct contact with the sprocket teeth and as the chain rolls off they break this contact without having moved from the first contact position. There is no slippage of one part over the other, as in ordinary gears or chains, consequently there is little wear on these faces. The only places where much wear is likely to occur are at the joints where there is a hinge motion, the chain bending and straightening as it moves on to and leaves the sprockets. Wear at the joints lengthens the chain and this increase of pitch is compensated for automatically by the chain's movement outward, as in B, Fig. 1. So a chain of this type always remains in proper contact with its sprockets and runs quietly until badly worn.

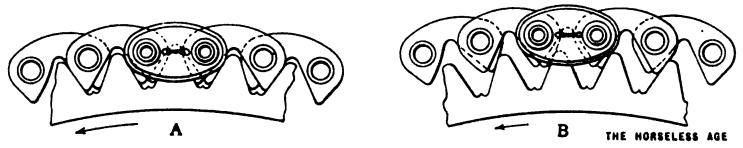

Fig. 1.

The origin of this type of chain is, I believe, of historical interest only, as it dates back quite a number of years. Indeed, I have seen sketches of chains closely resembling this type in the reproductions of the mechanical work of Leonardo da Vinci, which dates back several centuries. Much of the credit for its modern use, however, belong to Hans Renold. The Renold chain was introduced into this country from England and is now manufactured in the Indianapolis plant of the Link Belt Company, of Philadelphia.

It will be seen that in a chain of this kind, made up from stampings, the strength must be increased by placing several stampings side by side and pinning them together; this increases the width of the sprocket faces. As it is desirable to distribute the sheering stresses along the entire length of the joint pins, putting them under shear quite a number of times in the wider chains, it is customary to alternate the side links so that each one pulls on the pin in the opposite direction from its neighbor. In some chains, however, two thicknesses of sheet metal are placed side by side, and these double thickness links are alternated.

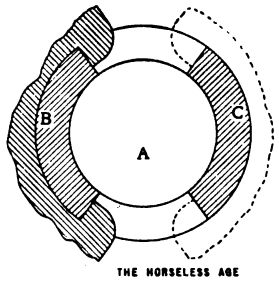

Fig. 2.

THE THREE MAKES.

At the present time there are three prominent makes of silent chain sold in this country. The chief distinction between them lies in the form of joint used, though there are quite a number of minor differences which can best be seen by inspecting the chains.

The Renold joint is made on the principle shown in Fig. 2. The hardened pin A extends the full width of the chain, as also do hardened bushes B and C. As shown, B is held in a groove in one set of links, while C is free to turn in these links but is held in a similar groove on the other set.

In the Morse chain, made by the Morse Chain Company, of Ithaca, N. Y., the joint pins are made in two parts, each of which extends the entire width of the chain. As shown in Fig 3, these pins rock on each other. One has a flat bearing surface A O B, and the other an angular surface C O D. The chain is run as shown by the arrow, which pulls the angular against the flat surface. While on the sprocket the rocking action takes place. On the straight pull between sprockets a flat surface O D or O C makes contact with A B.

In the Coventry chain, which is imported into this country by S. Hoffnung & Co., 116 Broad street, New York, two stamped links are placed together and fitted with a hardened steel bushing; these bushings turn on hardened pins which run the entire width of the chain.

GUIDING.

By again referring to Fig. 1, it will be seen that since the sprocket teeth do not enter between the chain links there is nothing in the construction we have so far described to prevent the chain from

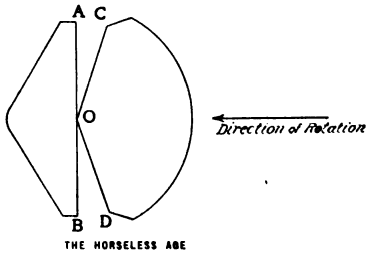

Fig. 3.

TABLE I.—MORSE CHAIN AND SPROCKET DATA.

Pitch (in inches)	1-2	5-8	3-4	9-10	1 2-10	1 1-2	2	2
Minimum number of teeth—								
Small sprocket driver	13	13	13	15	15	17	17	...
Small sprocket driven	17	17	21	25	29	29	31	....
Desirable number of teeth in small sprockets	15-17	17-21	17-21	17-23	17-23	17-27	17-31	....
Maximum number of teeth in large sprockets (see Note 3)	99	109	115	125	129	129	129	....
Desirable number of teeth in large sprockets	55-75	55-75	55-85	55-95	55-105	55-115	55-115	...
To find pitch diameter of wheel multiply number of teeth by	.159	.199	.289	.2865	.382	.477	.636	.954
Addendum for outside diameter of sprockets 20 to 180 T. (see Note 1)	.05	.06	.075	.09	.12	.15	.2	.3
Maximum revolutions per minute	2,000	1,600	1,200	1,100	800	600	400	...
Tension per inch width chain—								
Small sprocket driver	65	80	95	120	160	210	350	....
Small sprocket driven	50	65	75	95	125	165	280	....
Radial clearance beyond tooth required for chain	.50	.62	.75	.90	1.2	1.5	2.0	2.0
Approximate weight of chain per inch wide, 1 foot long	1.00	1.20	1.50	1.80	2.50	3.00	4.00	....

Note 1.—Number of teeth = T. Exact outside diameter = D. For T = less than 20 teeth, D = pitch diameter. For T = more than 20 teeth, D = pitch diameter + 2 × addendum.

Note 2.—Use sprockets having an odd number of teeth whenever possible.

Note 3.—When specially authorized, a larger number of teeth than shown may be cut in large sprocket.

Note 4.—Thickness of sprocket rim, including teeth, should be at least 1.2 times the chain pitch.

Note 5.—The number of guide grooves in the sprocket, their width and distance apart, varies according to pitch and width of chain. In every case leave the designing and turning of these grooves to the Morse Chain Company.

Note 6.—The width of the sprocket should be 1/8 to 1/4 inch greater on small drives, and 1/4 to 1/2 inch greater on large drives than nominal width of the chain.

Note 7.—The chain should have an even number of links and the wheels an odd number of teeth.

Note 8.—Horizontal drives preferred; tight chain on top necessary for short drives without centre adjustment, and desirable for long drives with or without centre adjustment.

Note 9.—Adjustable wheel centres desirable for horizontal drives and necessary for vertical drives.

Note 10.—Avoid vertical drives.

Note 11.—Allow a side clearance for chain (parallel to axis of sprockets and measured from nominal width of chain) equal to the pitch.

Note 12.—Maximum linear velocity for commercial service, 1,200 to 1,600 feet per minute.

working sidewise. In the Morse chain this is accomplished by turning one or more grooves in the sprocket and using straight links in these grooves, which are not cut out to fit the sprocket teeth. In the Coventry chain plain links are placed on the sides and run outside the sprockets. A flanged driving sprocket is employed for the same purpose with the Renold chain.

CHAIN AND SPROCKET SIZES.

Having explained the general principles and construction, we will now proceed to consider the sizes in which the chain is made at present.

In specifying the size of a chain of this kind two quantities are given, the pitch and the width. By "pitch" is meant the chordal pitch; that is, the distance in a straight line from the centre of one pin to the centre of an adjacent one. This distance is given in inches. Having this dimension given and knowing the number of teeth it is easy to calculate the pitch diameter from the general formula for polygons. A handier method, however, is to use the constants given in the accompanying table which is here reproduced through the kindness of the Morse Chain Company (see Table I). The diameters obtained by the use of these tables are within a few hundredths of those obtained by the use of the formula. The other manufacturers use practically the same constants.

For the smaller sprockets the outside diameter is the same as the pitch diameter, the ends of the teeth being on the pitch circle; but in their larger sprockets, the Morse Company at least lengthen the teeth somewhat to reduce the effects of stretching.

The bottom diameter of the sprockets may be found by subtracting the following constants, multiplied by two, from the outside diameter of the sprocket blank:

TABLE II.—SINGLE DEPTH OF TOOTH (MORSE CHAINS).

Pitch. Inch.	13 to 20 Teeth. Inch.	21 to 100 Teeth. Inch.
1/2	.275	.325
3/4	.412	.487
1.200	.660	.750
2	1.100	1.300
5/8	.343	.405
.900	.495	.585
1 1/2	.825	.975

Sprocket wheels must be cut by the chain manufacturer, as special cutters are required for the work. Two slots are cut at a time, as shown by the accompanying illustration, which also gives complete directions for the use of these cutters. Cutters are sold outright with quantity orders.

The Coventry importers inform me that

TABLE III.—CHAIN WIDTHS (COVENTRY).

Pitch of Links.	Widths.	Combination of Links. 2 x 2	2 x 3	3 x 4	4 x 5	5 x 6	6 x 7	7 x 8	8 x 9	9 x 10	10 x 11	11 x 12	12 x 13	13 x 14	14 x 15
5/8	Wheel	1/4	1	1 3/4	1 3/4	2 1/8	2 1/2	2 7/8	..	..	..	..	..	..	..
	Chain	1 3/16	1 7/16	1 15/16	2 3/16	2 9/16	2 15/16	3 5/16	..	..	..	..	..	..	..
3/4	Wheel	1 5/16	1 5/16	1 11/16	2 5/16	2 11/16	3 1/16	3 11/16	4 1/16	..	..	..	..	..	..
	Chain	1 1/2	1 3/4	2 1/4	2 3/4	3 1/4	3 3/4	4 1/4	4 3/4	..	..	..	..	..	..
1	Wheel	1 3/4	1 9/16	2 5/16	2 13/16	3 7/16	4 1/16	4 11/16	5 5/16	5 15/16	..	..	..	..	..
	Chain	1 7/8	2 5/16	2 13/16	3 7/16	4 1/16	4 11/16	5 5/16	5 15/16	6 5/16	..	..	..	..	..
1 1/4	Wheel	1 3/4	1 9/16	2 5/16	2 13/16	3 7/16	4 1/16	4 11/16	5 5/16	5 15/16	6 9/16	7 3/16	..	..	..
	Chain	1 15/16	2 1/4	2 7/8	3 1/2	4 1/8	4 3/4	5 3/8	6	6 5/8	7 1/4	7 7/8	..	..	..
1 1/2	Wheel	1 1/2	1 13/16	2 9/16	3 5/16	4 1/16	4 13/16	5 9/16	6 5/16	7 1/16	7 13/16	8 5/16	..	..	..
	Chain	2 1/4	2 9/16	3 5/16	4 1/16	4 13/16	5 9/16	6 5/16	7 1/16	7 13/16	8 9/16	9 5/16	..	..	..
1 3/4	Wheel	1 1/2	1 13/16	2 9/16	3 5/16	4 1/16	4 13/16	5 9/16	6 5/16	7 1/16	7 13/16	8 5/16	9 5/16	10 1/16	..
	Chain	2 5/16	2 5/8	3 3/8	4 1/8	4 7/8	5 5/8	6 3/8	7 1/8	7 7/8	8 5/8	9 3/8	10 5/8	10 7/8	..
2	Wheel	1 11/16	2 1/8	2 15/16	3 3/4	4 9/16	5 3/8	6 3/16	7	7 13/16	8 5/8	9 7/16	10 1/4	11 5/16	12
	Chain	2 13/16	3 1/8	3 15/16	4 3/4	5 9/16	6 3/8	7 3/16	8	8 13/16	9 5/8	10 7/16	11 1/4	12 5/16	13

Special sizes for motor buses, 1 1/2 pitch (3 x 4), 2 inch (made with centre guide or outer guide links as required).

will shortly place on the market a ller chain for driving accessories. It have a pitch of 8 millimetres (0.315).

WIDTHS.

he width of a chain is determined by number of links placed side by side. is sets of three may alternate with sets two. This will give a total width of links, and the chain will be known 1 2x3. The widths of the various Cov- ry chains and sprockets are given in ble III.

STRENGTH.

As before stated, the strength of these chains increases directly as the width until the width is several times the pitch, where additional width may not be effective owing to the bending of shafts. The breaking strength of a half-inch pitch chain one inch wide is said to be about 2,300 pounds. So it will be seen that the running loads given in Tables I and IV are very conservative and can probably be considerably exceeded for automobile work.

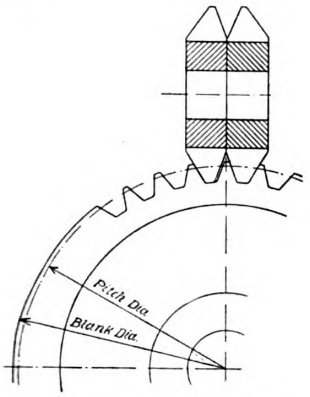

FIG. 5.—POSITION WHEN CUTTING SMALLER PITCH.

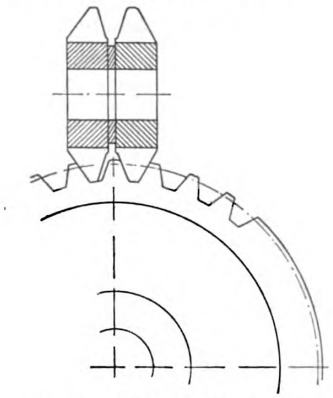

FIG. 5.—POSITION WHEN CUTTING LARGER PITCH.

RUNNING CONDITIONS.

For most uses the pitch line speed should not exceed 1,500 feet per minute. Indeed, one maker recommends that it should not exceed 1,400 feet. The shorter the pitch the higher the permissible rotative speed.

When the small sprocket is the driver it may have as few as thirteen teeth in the smaller pitches, but it is always desirable to have fifteen teeth or more. If the speed ratio is great, however, the number of teeth which are desirable in the small sprocket is to some extent determined by the size of the large sprocket.

It is always desirable to use an odd number of teeth in the sprockets, especially in the smaller one, for the chain links combine in multiples of two and the use of an odd number of teeth distributes the wear

DIRECTIONS FOR CUTTING SPROCKETS (MORSE).

Each cutter cuts the full range from 13 to 180 teeth for the pitches of chain stamped thereon. Depth of cut below pitch circle = .55 × circular pitch.

TOTAL DEPTH OF CUT.

	13 to 20 T. Inch.	21 to 30 T. Incl. Inch.
1-2 inch pitch.....	.275	.325
5-8 " "	.343	.405
3-4 " "	.412	.487
9-10 " "	.495	.585
1.2 " "	.660	.780
1.5 " "	.825	.975
2 " "	1.1	1.3

Cutters are made up in combinations of pitches, and when placed on arbor with the plain (not lettered) faces together, as shown, will cut the small pitch stamped on the lettered faces. When the collar furnished with each set of cutters is placed between the plain faces, as shown, they will cut the larger pitch.

When using these cutters it is desirable to make a double divide, or divide for every other tooth, as when a single divide is made one of the pair cuts the full cross section of the cutter below the sprocket blank, while the other cuts on one side and bottom only, which, unless care is used, may crowd the sprocket blank around on the mandrel, thus causing improper dividing.

Chain Data.							Guide Groove Data			
							Width of Groove.		Depth of Groove.	
Pitch.	Range of Width.	1 Guide in Centre for Chain Widths Below.	Centre to Centre. 1 inch. 1¼ inch. 1½ inch. 4 inch. 2 Guides spaced as above for Chain widths given below.				Pinion.	Gear.	20 Teeth or less.	21 Teeth or more.
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
½	⅛ to 3	½ to 3					⅛	3/32	.250	.300
5/8	¼ to 4	¾ to 2½	3 to 4				5/32	⅛	.313	.375
¾	¼ to 5	¾ to 2½	3 to 5				5/32	⅛	.375	.450
.9	1 to 10	1 to 3½		4 to 7		8 to 10	¼	5/16	.450	.540
1.2	2 to 14	2 to 4½			5 to 8	9 to 14	¼	5/16	.600	.720
1.5	2 to 15	2 to 4½			5 to 8	9 to 15	¼	5/16	.750	.900
2	2 to 18	2 to 6			7 to 8	9 to 18	11/32	¼	1.000	1.200

TABLE IV.—RUNNING LOADS.

	With Small Sprocket Driver.							With Small Sprocket Driven.				Tension Relative to R. P. M.	
No. 16 Type Pitch. Inch.	Speed in R. P. M.	Tension for 1 in. Wide.	Min. No. Teeth Driver.	Max. No. Teeth Driven.	Desirable No. Teeth, Driver.	Desirable No. Teeth, Driven.	Min. Desirable Centre Distance. Inch.	Max. Pull.	Min. No. Teeth.	Speed in R. P. M.	Min. Centre Distance. Inch.	Normal Tensions. From R.P.M.	To R.P.M.	Increase Tension Inversely Prop'l. From R.P.M.	Down to R.P.M.
1-2	2,400	65	13	99	15-17	55- 75	15	50	17	3,000	24	2,400	1,800	1,800	600
5-8	1,800	80	13	109	17-21	55- 75	16	65	17	2,400	26	1,800	1,300	1,300	450
3-4	1,200	95	13	115	17-21	55- 85	19	75	21	1,600	30	1,200	900	900	300
9-10	1,100	120	15	125	17-23	55- 95	23	95	25	1,200	36	1,100	800	800	275
1 2-10	800	160	15	129	17-25	55-105	31	125	29	850	40	800	600	600	200
1 1-2	600	210	17	129	17-27	55-115	38	165	29	650	48	600	450	450	150
2	400	350	17	129	17-31	55-115	51	280	31	450	60	400	300	300	75
No. 23 Type.															
1-2	2,400	80	13	99	15-17	55- 75	15	65	15	3,000	24	2,400	1,800	1,800	600
5-8	1,800	100	13	109	17-21	55- 75	16	80	15	2,400	26	1,800	1,300	1,300	450
3-4	1,200	120	13	115	17-21	55- 85	19	95	15	1,600	30	1,200	900	900	300
9-10	1,100	150	15	125	17-23	55- 95	23	120	17	1,200	36	1,100	800	800	275
1 2-10	800	200	15	129	17-25	55-105	31	160	23	850	40	800	600	600	200
1 1-2	600	270	17	129	17-27	55-115	38	210	23	650	48	600	450	450	150
2	400	450	17	129	17-31	55-115	51	350	27	450	60	400	300	300	75
3	250	750	17	100	19-31	55-100	72	600	35	275	84	250	175	175	62½
Nos. 25 & 26.															
1-2	2,800	80	13	99	15-17	55- 75	20	65	15	4,000	30	2,800	2,100	2,100	700
5-8	2,400	100	13	109	17-21	55- 75	23	80	15	3,500	36	2,400	1,800	1,800	600
3-4	1,400	120	13	115	17-21	55- 85	25	95	15	2,000	40	1,400	1,050	1,050	350
9-10	1,200	150	15	125	17-23	55- 95	30	120	17	1,400	48	1,200	900	900	300
1 2-10	850	200	15	129	17-25	55-105	35	160	23	950	60	850	640	640	210
1 5-10	600	270	17	129	17-27	55-115	38	210	23	700	72	600	450	450	150
2	400	450	17	129	17-31	55-115	51	350	27	500	84	400	300	300	75

across the entire face of the sprocket and avoids any tendency to wear ridges.

The centre distance should be so arranged if possible that there will be an even number of links in the chain, otherwise it is necessary to use a special offset link for joining the ends, since otherwise two links of the same kind would come together.

As in all chain drives, it is desirable to have the centre distances adjustable, but where this is not possible any slack may be taken up by a smooth idler pulley acting on the outside of the chain.

A chain of this kind should, of course, be enclosed as completely as possible, but the makers state that an oil bath is not necessary. Indeed at high speeds much of the oil is thrown from the links, but only a little is required. In designing the chain case it is necessary to allow considerable room both for side "slat" and for the "bellying" due to centrifugal force at high speeds.

The efficiency of these chains is shown by tests to be over 98½ per cent., which compares very favorably with that of good spur gears.

Making Fuel Economy Tests.

By Albert L. Clough.

Quite a large number of motorists are in the habit of putting on new carburetors, once in a while, in the hope of securing better fuel economy, improved flexibility and increased power. Carburetors are undoubtedly being improved, and there is always a possibility that the installation of one of the late models may result in bettered service. Then, too, there are special carburetor attachments upon the market, designed to save gasoline, and some of these seem to possess merit. They are being quite extensively tried by motorists. Every carburetor has almost an infinite number of settings, each of which is likely to produce its own result in fuel economy, maximum speed, maximum torque at low engine speeds, and so on.

PURPOSES OF TESTS.

In order that a motorist shall be able to determine whether or not he is securing better fuel economy by the installation of a new carburetor or economizing device, or by means of changes in carburetor adjustment, fuel consumption tests under condition of practice are required. With most cars it is quite easy to make such a test with a sufficient degree of accuracy to prove convincing as to whether or not the new apparatus or the new setting is actually a good thing from the standpoint of economy.

There are two ways in which a fuel consumption test may be made. The car may be driven over a course of known length, under prescribed conditions and the quantity of fuel accurately measured, or a known quantity of fuel may be set apart as the carburetor supply and the car be driven over a certain course, under prescribed conditions, until the supply is entirely consumed, when the distance covered may be read off on the odometer. If the total amount of fuel supplied the carburetor be exactly 1 gallon the distance run upon it represents the performance of the car in miles per gallon, which is the most common, if not in all respects the most logical, way of expressing fuel economy.

SELECTION OF COURSE.

If the fuel economy realized in any particular test is to be compared with that obtainable in any other test of the same car, it is obviously essential that the course used, its condition, the weather, the total weight of the car and other conditions be the same in the two or more tests which are made.

Each of the two methods above mentioned possesses its own advantages and disadvantages. Probably the very best method is the first, when used in connection with a gasoline meter, which is a device that measures very accurately and indicates directly (as does a gas or water meter) the quantity of fluid passing to the carburetor. Such instruments are not at all common, are expensive and, when used, require pipe connections to the dash and the mounting of the instrument thereon, which is objectionable in the case of anything but a test car. The best substitute for a gasoline meter is probably a small, special tank, capable of holding not more than 3 gallons, mounted upon the dash and specially connected to the carburetor by a pipe run through the floor boards. This tank should be carefully calibrated to gallons and decimal fractions thereof, and the height of the liquid be shown upon a legible scale, either through a transparent window tightly set in the front of the tank, or through a gauge glass. The writer has used such a special dashboard tank with satisfaction, but, as its construction and mounting involve some little expense, and the dashboard and flooring are somewhat defaced in setting it up, it is not likely that the average motorist will care to use the arrangement.

CALIBRATED TANK.

If a calibrated tank is used, it is only necessary to fill the tank with an accurately known volume of gasoline, then to start the car and drive over the course in the prescribed manner and, when the course is completed, to read off the volume of gasoline remaining in the tank in gallons and fractions thereof and subtract this amount from the number of gallons originally placed in the tank. The distance traveled in miles divided by the quantity of fuel used in gallons at once gives the miles per gallon.

CALIBRATING THE REGULAR TANK.

A reasonably accurate result may be obtained without the use of a special fuel tank if the regular tank of the car be accurately calibrated. As a rule, fuel tanks are somewhat irregular in form, and especially is this the case when an emergency or reserve tank or compartment is built into the main tank. In nearly every case the main tank requires to be calibrated before it can successfully be used in a fuel economy test. This may readily be accomplished in the following manner: Draw off the gasoline at the carburetor or the strainer until no more will flow from the tank. Then take one of the measuring sticks, marked in inches, now so much used as advertisements for garages, and sandpaper off the advertising matter, which is usually to be found upon the reverse side, leaving the wood free from any marks. Then see that the car is resting upon a level floor and introduce the lower end of the stick perpendicularly into the tank through the filling hole, until it strikes the bottom. It will usually be found that the stick shows a slight amount of gasoline still in the tank, as the gasoline pipe often rises slightly above the bottom of the tank. The height of gasoline as shown by the stick under these conditions should be marked zero on the stick. Then take a gallon measure, of known accuracy, fill it exactly to the mark with gasoline and pour it into the tank. Insert the stick carefully and mark the height shown by a straight mark across the stick and a figure 1. Repeat this operation of adding a measured gallon and marking the height shown upon the stick until the tank is full.

A cylindrical tank will show quite wide spaces between each gallon for the first few gallons added and narrower ones as the middle of the tank is reached, after which the spaces will become wider as the tank is filled more and more nearly full. A prismatic tank, with an emergency compartment located near the top, will show nearly uniform spaces per gallon upon the measuring stick until the liquid reaches the emergency tank, when the spaces will suddenly become wider. In the case of a tank of this kind, or one which for any other reason changes its form abruptly at a certain distance from the bottom, it is well when this part of the tank is reached in the filling process to add the gasoline by quarts and make a mark on the stick for each. Other gallon divisions upon the stick may be divided in tenths or other equal parts.

If this work is carefully and neatly done, legible marks and figures made upon the

stick and the marked surface shellacked over, one has a gauge which will give at once the amount of available gasoline remaining in the tank at any time. The larger the tank's capacity, and the larger its horizontal dimensions compared with its depth, the less accurate will be the indications of the measuring stick, but they will be sufficiently close for most purposes. Unless the tank is of perfectly regular form and has the filling hole located very nearly in the centre of the top surface, it is necessary to have the car setting level in order that the indications of the stick may be relied upon.

PROCEDURE OF TEST.

To make a fuel consumption test, using the main tank calibrated as just described, the procedure should be somewhat as follows: The engine should be warmed up to what may be considered its average running temperature, after which it should be run to the beginning of the course which is to be followed, the engine shut down and the amount of fuel in the tank measured as accurately as possible. The car should then be run over the course in the prescribed manner, and at the end thereof the amount of fuel remaining in the tank should be measured and the miles per gallon figured as explained above. The longer the course made use of, the more accurate the result will be, for the larger the quantity of fuel used in the test, the less will be the effect of a given error of measurement. If the motorist has frequent occasion to make trips over the same route from one town to another, for instance, business or pleasure and a technical test may be combined.

EMERGENCY TANK FOR TESTS.

Some cars are equipped with an emergency tanks holding not more than perhaps 2 gallons, and sometimes the draught tube from this tank is so arranged that it permits of the tank entirely emptying itself. If this is found to be the case the second of the two methods mentioned in the earlier part of this article may be adopted. The emergency tank should be filled with exactly 1 or exactly 2 gallons, after its shut off is tightly closed. Then the engine may be warmed up with fuel from the main tank, the car brought up to the beginning of the test course, the main tank shut off tightly and the engine allowed to "die" by emptying the float chamber of the carburetor. The emergency tank should then be turned on, the engine started and the car driven along the prescribed course, under prescribed conditions, until the engine "dies" from lack of fuel. If 1 gallon of fuel is used, the mileage as indicated by the odometer, which is read at the start and at the finish, is also the miles per gallon. If 2 gallons of fuel are supplied, the mileage traveled is twice the miles per gallon. When 2 gallons, or even 3 gallons, can be placed in the emergency tank the result obtained is perhaps likely to be a little more accurate than when but 1 gallon is used, but a longer time is required to make the test, and the car suffers more wear and tear. The writer has found that 1 gallon tests, from an emergency tank which completely empties itself, give very consistent results, the car frequently stopping from exhaustion of fuel within a hundred feet or so of the same spot in a total run of about 15 miles, and never more than a few hundred feet from the same point if care is taken in keeping the conditions of the several tests as nearly alike as possible.

PRECAUTIONS NECESSARY.

As to the precautions to be used in making tests of this kind, the following suggestions may be made: The course should be chosen with considerable care, and, if practicable, the same course should be used in all tests of this nature, so that the results obtained may be directly comparable. If the fuel consumption tests are to be made as such, and not in the way of regular pleasure or business driving, it is usually of advantage to choose a course in the form of a loop, so that the car starts and ends its run at a garage where its fuel can readily be replenished. This applies especially if the first method is used. When the second method is employed the writer has found it advantageous to lay out a course on parallel city streets, where there is not too much traffic, with the garage near the centre of the district covered. When this is done, no matter where the test ends from exhaustion of the fuel supplied, the car will not be far from the garage, and little time is wasted in reaching it for a replenishment of the tank.

CARBURETOR SETTING.

One very important consideration in making fuel economy tests is to be sure before they are undertaken that the carburetor setting is a practical one, that is, that it enables the car to show an acceptable degree of speed and hill climbing power and proper flexibility. It is of very little advantage to make a fuel test with an adjustment suitable only for running about upon the level, for a car would never be used in practice with such an adjustment. One very good carburetor recently tested was found to be so adjustable that 19 miles per gallon could be made on level streets with perfect operation of the motor. With this adjustment, however, the car was very weak on hills, and could not run on open throttle, under load, without knocking and popping back. When the carburetor was adjusted for practical road work the fuel economy, over the same course, fell to a little under 15 miles per gallon.

Not only should all fuel economy tests which are to be discussed in comparison with others be made over the same course, but they should be made at as nearly a standard speed as possible. What speed should be selected is partly a matter of individual preference, but it should not be higher than 15 miles per hour upon streets, as it is hardly practicable to maintain a faster pace on account of traffic and other considerations. On country roads 20 or 25 miles per hour is a good speed.

COMPARATIVE TEST RUNS.

When two or more tests are being made with the idea of closely comparing their results, as, for instance, when two makes of carburetor are being tried out, one against the other, when a carburetor is being tried out with and also without an economizing attachment, or when two adjustments of the same carburetor are being compared, the tests should be made with as small intervals of time between them as possible, so that the condition of the car may not change materially during the series.

Settled fair weather should be selected as the best time for such tests, as rain makes a difference in the tractive effort required and wide changes of temperature, humidity and pressure have their effects upon carburation.

WEIGHT MUST BE CONSTANT.

Of course, the same total car weight should be used in all tests in a series, and, if possible, in all tests upon the same car. This requires the carrying of the same number of passengers, accessories and supplies at all times. The top and wind shield should, in all tests, be either up or down, one or the other.

If, for any reason, in the course of a test run, the car has to be stopped for more than a few instants, the engine should not be allowed to idle, but should be at once shut down.

It is a good idea to so choose the course that it includes some grades upon which the throttle may be fully opened without the speed becoming prohibitive. This gives an opportunity of noting the relative hill climbing power from different carburetors and from different settings, when the readings of the speedometer are noted at stated points upon the various grades.

The suggestions here given relate not only to tests of various carburetors but to tests of various fuels, various grades and qualities of the same fuel and mixtures.

In conclusion, it may be remarked that the essence of all tests of this kind is the careful measurement of the fuel expended in covering a known distance, and in the maintenance of as nearly as possible standard conditions in all respects, in all the tests made.

Even if no change is made in carburetors, mixture adjustments or the quality of fuel used, an occasional fuel economy test will throw considerable light upon any change which may have taken place in the car's condition since the last similar test was made.

The Austrian Daimler Motor Company has taken over the assets and liabilities of the Société Mercedes Electrique, and also the business of the Société des Automobiles Commerciales, both of Paris. The former company is now being dissolved, while the latter was dissolved about a year ago.

Torque Due to Reduction of Speed.

By Gearing

In Fig. 1 A is the so called clutch gear, i. e., the gear which is the integral part of the clutch mechanism; it is constantly in mesh with B; B and C are rigidly connected by the shaft Y. D is free to slide on the spare or spline shaft X, which drives the universal joint of propeller shaft cars or the bevel gears of chain driven vehicles, as the case may be. The clutch gear A affords a bearing for X, in which the latter is free to turn.

To simplify the problem we will neglect friction, radial pressure and a few other minor points.

Suppose the transmission shown in Fig. 1 is coupled to a motor developing 60 horse power at 1,200 r. p. m. The torque on the clutch, and, consequently, on the clutch gear A = 3,150 inch-pounds nearly. The above figure is obtained from the well known formula:

$$\text{Torque} = 63{,}024 \times \frac{\text{H. P.}}{\text{R. P. M.}}$$

From the same formula it is clear that horse power remaining unchanged, the torque varies inversely as the revolutions

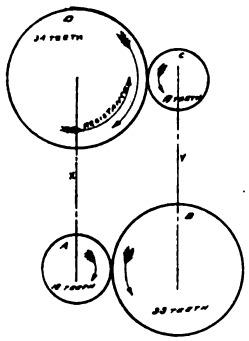

FIG. 1.

per minute. Now, the revolutions per minute of the gears in mesh vary inversely as their diameters or as their respective numbers of teeth. Consequently the torque of any two gears in mesh varies directly as their respective numbers of teeth. Neglecting friction, the 60 horse power developed by the motor are transmitted unchanged in amount to the rear axle. The torque on B (and hence on Y and C as well)

$$= 3150 \times \frac{33}{18} = 5575 \text{ inch-pounds.}$$

Similarly, the torque on D

$$= 5575 \times \frac{34}{17} = 11{,}550 \text{ inch-pounds.}$$

This last torque, on D, is balanced by an equal torque (provided there is no slipping of the wheels) which acts in the opposite direction to the first.

The gear box must be, and is, supported at two points on the axis of X. The driving torque of A is transmitted through B to the bearings of Y, and thence to the walls of the gear box. If unsupported laterally the gear box would revolve clockwise about X.

Similarly the resisting torque of D has a tendency to revolve the gear box about

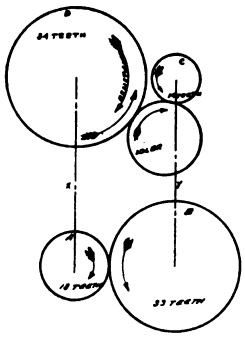

FIG. 2.

X counterclockwise. The net torque which tends to produce rotation of the gear box about X is equal to

11,550 inch-pounds counterclockwise.
3,150 inch-pounds clockwise.

8,400 inch-pounds counterclockwise.

It is evident now that the greater the reduction of speed by gearing the greater the net torque tending to rotate the gear box about the axis of support. This statement is true, however, for forward speeds only, the reverse presenting an exception.

Fig. 2 is a diagrammatic representation of the reverse speed arrangement. The resisting torque on D

$$= 3150 \times \frac{33}{18} \times \frac{34}{14} = 14{,}000 \text{ inch-pounds,}$$

but this time it is clockwise.

Then the total torque tending to rotate the gear box about X =

14,000 inch-pounds clockwise.
3,150 inch-pounds clockwise.

17,150 inch-pounds clockwise.

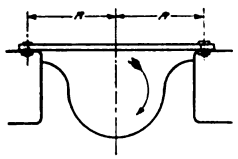

FIG. 3.

This torque is of such magnitude that no designer can neglect it, and a careful provision for same must be made.

METHODS OF SUPPORT.

The most common method of support is shown in Fig. 3, in which the box is bolted onto the frame or sub-frame. The bolts are in tension, and only those on the left of the figure are in active service on the reverse speed, since the right lugs of the box merely produce pressure on the frame without straining the bolts on the right. Then, if

n = the number of bolts and the belt side,
A = net normal area in square inches of one bolt (at the root of the thread),
t = allowable stress per square inch,
T = net torque due to reduction of speed by gearing (on reverse),
R = distance of bolts from the centre line of the square of spline shaft,

$$n \times A \times t \times R = \tfrac{1}{2} T,$$

since the right side sill shares equally with the bolts on the left the work of balancing the whole torque.

Fig. 4 represents a flange cast on the back of a transmission box. A bracket of similar outline is fastened to a cross member of the frame, and the two are fastened together by bolts. Or, as in the Oakland "40," a steel tube completely inclosing the propeller shaft has a flange on either end of the form shown in Fig. 4, and the gear

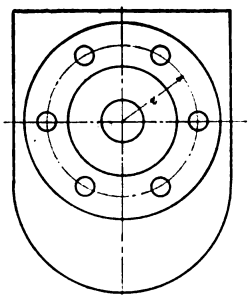

FIG. 4.

box is bolted onto the tube. Then if

n_1 = total number of bolts,
A_1 = normal area of one bolt in square inches,
f = allowable shear per square inch,
r = radius of bolt circle,

$$n_1 \times A_1 \times f \times r = T.$$

Car Speeds Corresponding to Normal Piston Speeds.

The motors of the Pierce-Arrow Motor Car Company are rated according to the A. L. A. M. rating formula, which is based on a piston speed of 1,000 feet per minute, and in order to inform owners of its cars at what car speed the pistons of the engines move at 1,000 feet per minute, and the engines therefore are working at their normal rated horse power, the company has figured out these speeds for all its different models, which are as follows: 36 horse power, 38.38 m. p. h.; 48 horse power, 40.21 m. p. h.; 66 horse power, 46.36 m. p. h.

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Silent Chains in Automobile Construction.

The silent chain of the Renold and allied types appears to be assuming increasing importance in the automobile industry. Within the last few years it has become a feature in the transmissions of most electric vehicles, where it has displaced gearing of the spur and other types.

Moreover, of late it has made its appearance in connection with gasoline motors, having, in a few instances, been adopted in place of bevel or spur gearing in the operation of overhead cam shafts and as a substitute for ordinary spur gearing for running enclosed cam shafts.

The most obvious merit of the silent chain, and, indeed, of all sprocket and chain arrangements, is its comparative independence of the distance between the driving and driven shafts. Under conditions in which an idler would have to be used and the gears be made of large diameter, were spur gear wheels employed, a chain and sprocket drive often possesses marked advantages. In driving an overhead cam shaft from the engine crank shaft a special vertical shaft and four bevel or helical gears are ordinarily used, while, if the chain drive be adopted, two sprockets, a chain and a suitable casing only are required.

Not only does the silent chain, owing to its independence, within limits, of the distances between shafts, frequently permit of some simplification being attained, but under favorable conditions this form of drive may operate considerably more quietly than any but the most carefully designed and constructed arrangements of meshed gears. At the same time it is highly efficient, reliable and not at all short lived.

Like all accurately fitted devices for the transmission of power the silent chain requires to be protected from dust and mud, and like other chain and sprocket arrangements the angular relation of the driving and driven shafts is maintained only for a given direction of rotation, but as a vehicle engine always runs in the same direction this latter peculiarity need hardly be taken into account.

As the capabilities of the silent chain become generally understood it is not unlikely that it may play a considerable part in gasoline motor car practice. The article by Mr. Watts in the present issue goes into the subject quite thoroughly and will be read with profit by engineers.

The Precession of the Season Opening.

When last year the first announcement of a 1910 model was made in the automobile papers for the third week in May, it was thought that the limit in early announcements had been reached, and some rather uncomplimentary comparisons were made with magazine issuing dates and the hours of appearance of 10 o'clock newspaper editions. However, the opening of the "season" has again preceded one week, the first 1911 announcement having appeared in the papers for the second week of May.

Manufacturers prefer to come out with new models early for several reasons. In the first place it is desirable to close deliveries of a certain season's models by the time the driving season opens, thus avoiding trouble with impatient customers. Secondly, an early announcement enables a manufacturer—if he has the necessary standing—to take his pick of agents, as no one is yet tied down for the ensuing year. This latter advantage is, of course, dependent upon being earlier than one's competitors, and has nothing to do with the absolute date. The advantage of being early in the field for a season's business has been repeatedly dwelt upon in these columns, and is just being appreciated by manufacturers. The result will probably be that while the first announcement of new models this year was made only a week earlier than last year, there will be a great many more early announcements this year than last.

The early opening of the season for 1911 models reflects the very favorable trade conditions of the past year. A manufacturer will not talk of 1911 model cars before he has disposed of all of his 1911 stock, because there is some reluctance on the part of buyers to purchase a car which they know will in a short time be superseded by an improved model. The real objection to such purchases is far less now than formerly, when radical improvements were made each season, but buyers understand the situation pretty well, and are reluctant to take a car late in the year by which it is designated unless they can get a substantial discount, so—happy is the manufacturer who disposes of his season's output early.

Let Convicts Do Road Work.

In several Southern States convicts are now successfully employed in the construction of improved highways, and we believe that the examples set by Georgia, Arkansas, etc., should be followed by other States throughout the country. It is foolish to let convicts spend their time in idleness; in fact, it is more or less cruel to the convicts and unjust to the taxpayers, on whom falls the burden of supporting the inmates of the penitentiaries. Probably a majority of all convicts are accustomed to hard physical labor and it would improve the general state of health among them if they were set to work out of doors. In the past attempts have been made at producing various simple articles of general use in prisons, and often prison labor has been hired out to contractors, but such attempts have always met with strenuous

opposition from the labor unions of the trades involved. The justice of these protests can hardly be questioned, because no manufacturer or contractor will employ prison labor unless he can get it at relatively low cost, and prison made goods sold at low prices naturally tend to spoil the markets for similar goods made outside prisons.

The cry of unfair competition could be entirely stopped by putting convicts to work on the roads. Excepting a few States, there has as yet been very little road construction, and there is as yet no class of wage earners which can consider this line of work its own. The amount of work in this line is practically unlimited, and the rate at which it is being done is limited only by the funds available. The employment of convict labor would reduce the cost of road construction to the taxpayers, and would hasten the completion of the main through routes now planned in various parts of the country.

The employment of convicts for road work would, no doubt, involve a number of difficulties, chief among which would be the proper guarding of the men. This problem always presents itself when putting convicts to outdoor work. Thus, for instance, when the grounds for a new prison were being prepared on the west bank of the Hudson River with prisoners from Sing Sing Prison last fall, escapes were reported several times. But all such problems can be satisfactorily solved by a little application and the expenditure of a fair sum of money, which need not be a large proportion of the actual money value of the work accomplished. If prisoners can be successfully used for clearing prison sites they can for construction highways, and New York's $50,000,000 road appropriation would reach a great deal further if the thousands of men in Sing Sing and Auburn prisons were put to road building.

Anti-Dust Treatment of Suburban Roads.

The efficacy of Kentucky crude oil with a base of asphaltum as a dust layer is attested by its continued use in the vicinity of New York. Some of the suburban towns are now applying the oil for the third season. Unless the weather conditions are very unfavorable a single application will keep the road surface practically free from dust for a whole season, and there are no disadvantages connected with the use of the oil, except that after a strong rain and after the thaws in spring the roads are covered with a thin emulsion which makes them slippery and dirty. But if they are free from chuck holes in which the liquid mud can collect, and well cambered, the troubles from this source are not serious—nothing compared with the annoyance from dust.

Local Traffic Regulations and the Callan Bill.

Quite a stir has been caused during the past week among motorists in the metropolis regarding that section of the pending Callan bill which permits local authorities to establish traffic regulations and limit by ordinance the speed of motor vehicles on public highways, the speed limitations not to be less than 15 miles per hour. While nothing can be said regarding the authorization of local powers to enforce a speed limit of 15 miles per hour or more (which is 50 per cent. higher than the present limit in closely built up sections), there seems to be considerable apprehension regarding the possible effects of local traffic regulation. Traffic regulations usually include the so called rule of the road, rules regarding the right of way at crossings, and —in big cities—a provision compelling heavily laden vehicles to keep to the curb, thus leaving the centre of the roadway free for the lighter, faster moving vehicles. If every town and village were allowed to establish rules of this kind there is a possibility that the rule of the road would soon vary from place to place, and that tourists would have to submit to all sorts of annoyances. It has always been held by leaders of the motor movement that these rules should be absolutely uniform throughout the country, and it is therefore not surprising that trade organizations are fighting this clause of the Callan bill. As the bill has already received the approval of Governor Hughes and may be voted upon by the Senate within the next few days, hurried action is necessary, and every motorist is requested to immediately address his Senator protesting against this clause. The bill could be put into shape to suit motorists by simply striking out the passage "may establish traffic regulations and."

Coming Events.

May 18-19—Norristown, Pa., Reliability Contest, Norristown A. C.

May 18—Cheyenne, Wyo., Cheyenne Motor Club Race Meet, Cheyenne Motordrome.

May 19—Chicago, Ill., Chicago M. C.'s Second Annual Demountable Rim Test.

May 19, 20 and 21—Hartford, Conn., "All-Connecticut" Reliability Run, A. C. of Hartford.

May 21 and 22—Brooklyn, N. Y., Endurance Run, Long Island A. C. and Crescent Athletic Club.

May 22—Fort Worth, Tex., Fort Worth Star-*Telegram* Reliability Run.

May 25—Columbus, Ohio, Columbus A. C.'s Reliability Run to Indianapolis, Ind.

May 27, 28 and 30—Indianapolis, Ind., National Championship Race Meet, Indianapolis Motor Speedway.

May 27-31—Washington, D. C., Washington Post Reliability Run to Richmond, Va., and return.

May 28—Syracuse, N. Y., Start of First Annual Central New York Relay Club Run.

May 28-30—Kansas City, Mo., A. C. of Kansas City, Track Meet.

May 28—White Plains, N. Y., Amateur Automobile Contest Association's First Hill Climb.

May 29-30—San Francisco, Cal., San Francisco M. C.'s two days' race meet at Tanforan.

May 29-31—Playa del Rey, Cal., Los Angeles Motordrome Meet.

May 30—Bridgeport, Conn., Hill Climb, Bridgeport A. C.

May 30—Denver, Col., Denver Motor Club's Road Race.

May 30—Empire City Track, New York, Track Meet, Mount Vernon (N. Y.) A. C.

May 30—Boston, Mass., Bay State Automobile Association's Meet, Readville Track.

May 30-June 7—New York-Atlanta (Ga.) Good Roads Tour.

May 30—Oklahoma City, Okla., Oklahoma A. A.'s Reliability Contest.

May 30—Briarcliff Manor, N. Y., Amateur A. A.'s Second Hill Climb.

June—Cincinnati, Ohio, Start of Seventh Annual Tour for Glidden Trophy.

June 1—Riverhead, L. I., Motor Contest Association's Road Race on Riverhead-Mattituck Course.

June 2—New York City, Annual Orphans' Day Outing at Coney Island.

June 3-4—Buffalo, N. Y., Races at Fort Erie Track.

June 4—Philadelphia, Pa., Quaker City Motor Club's Meet, Point Breeze Track.

June 4—Worcester, Mass., Fourth Annual Hill Climb, Worcester A. C.

June 6—Atlanta, Ga., Start of Second Annual New York-Atlanta Good Roads Tour, Ending New York June 14.

June 7—West Haven, Conn., Yale A. C.'s Third Annual Hill Climb on Shingle Hill.

June 11—St. Louis, Mo., Automobile Club of St. Louis Reliability Contest.

June 11—Newark, N. J., New Jersey Automobile and Motor Club's 280 Mile Reliability Run.

June 16-22—Albany, N. Y., Albany A. C.'s Sixth Annual Tour to Atlantic City and Return.

June 11—Portland, Ore., Wemme Trophy Race.

June 11—Wilkes-Barre, Pa., Giants' Despair Hill Climb, Wilkes-Barre A. C.

June 15-30—A. A. A. National Tour for Glidden Trophy, starting at Cincinnati, Ohio.

June 18—Ossining, N. Y., Upper Westchester A. C.'s Hill Climb.

June 20-July 6—Detroit, Mich., Industrial Exposition, Detroit Board of Commerce.

July 1, 2 and 4—Indianapolis, Ind., Race Meet, Indianapolis Motor Speedway.

July 2—Philadelphia, Pa., Wildwood, N. J.—North Wildwood Automobile Club's reliability run.

July 2-4—Playa del Rey, Cal., Los Angeles Motordrome Meet.

July 4—Dallas, Tex., Dallas A. C.'s Track Meet.

July 4—Cheyenne, Wyo., Cheyenne M. C.'s Track Meet.

July 4—Wildwood, N. J.—North Wildwood's Annual Speed Meet, Ocean Drive.

July 4—St. Paul, Minn., Minnesota State Automobile Association's Track Meet.

July 11—Plainfield, N. J., Plainfield A. C.'s Hill Climb.

July 30—Wildwood, N. J., North Wildwood A. C.'s Track Meet.

August 6—Wildwood (N. J.) A. C. Races.

August 6—Philadelphia, Pa., Quaker City M. C.'s Track Meet.

Sport and Contests.

Simplex, Piloted by Basle and Poole, Again a 24-Hour Winner.

Once again Simplex conquered. Driving r twenty-four consecutive hours last Fri- y and Saturday, Charles Basle and Al ole, alternating at the wheel of a 50 horse wer Simplex car, won the Brighton Beach enty-four hour race, after rolling up a ore of 1,145 miles. The Simplex has won wice-around-the-clock" events before, in 08 and 1909, and once more it strengthned the contention of its makers and conced the public that it is able to stand hat is undoubtedly one of the most sere strains to which a motor car can be bjected—and this in spite of the fact that eorge Robertson, the star Simplex driver, as ill and unable to drive.

Pressing the Simplex team closely for secnd honors was the Stearns, piloted by alph Mulford and Cyrus Patschke, which ulled through creditably with 1,120 miles, hile the Fiat, which experienced considerble hard luck with disabled drivers, capured third honors with a score of 1,107. ts pilots were Ralph De Palma and Edward H. Parker for the most part, and hen these two were disabled from the sere strain of circling a rough course hour fter hour, Ray Howard and Frank Dearorn, whose Stearns entry met with mishap, went to the assistance of the Fiat, and with Edward Hawley relieved the regular team for a while and helped it into a place. Never before was the twenty-four hour event so hard on drivers.

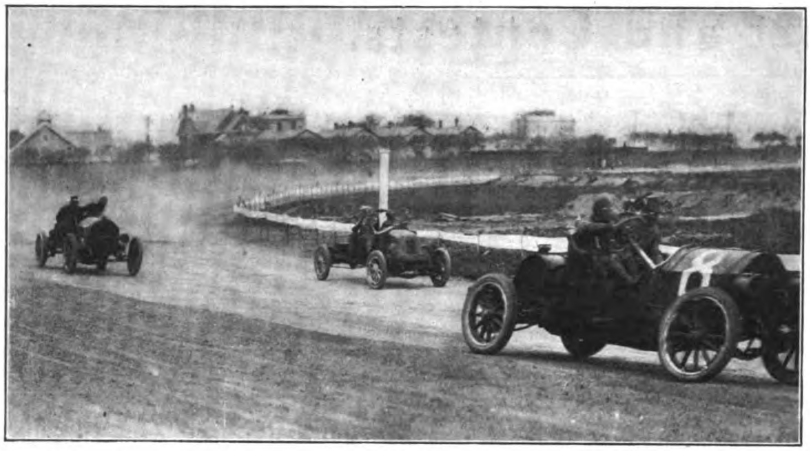
Both the winner and second best banked on Continental heavy flat tread tires and demountable rims. The Fiat and Chevrolet's mount carried Michelins.

Chevrolet brothers, in one of the Buicks, finished fourth, with 1,049 miles, although protested for changing a motor. An appeal was made to the Contest Board by its entrant, and the decision regarding its place now rests with the governing body. Louis Disbrow and Walley Owen, in the Rainier, were fifth with a tally of 1,037, while for consistent running the low powered Croxton-Keeton—a taxicab model—driven by Lund and Spenney, was a surprise and proved that it had remarkable staying qualities by plugging along steadily for 1,044 miles, into sixth place. That Lewis Strang was able to run the Marion entry's score up to 989 miles, in seventh position, after the car had upset and was damaged in its crash through the fence, spoke well for both driver and car. It was most regrettable that while Anderson was at the wheel of this mount the accident should have occurred, due to the dangerous condition of the course, which resulted in the death of William Bradley, his mechanician.

Robert Burman in the second Buick entry, who drove most brilliantly early in the contest, was eighth, scoring 927 miles after George De Witt had upset with it, injuring Jack Tower, his mechanic; William Endicott was credited with 756 miles after going through the fence twice in the Cole "30," while McMahon and Mack in the Selden—this car's first twenty-four hour race appearance—finished in tenth position, with a score of 718. The Houpt car, driven by Roberts and Martin, cracked a cylinder after covering 571 miles and was forced to retire, while the second Stearns entry,

POOLE AND BASLE IN THE WINNING SIMPLEX A FEW MINUTES AFTER THE FINISH.

PATSCHKE, WHO WITH MULFORD PILOTED THE STEARNS TO SECOND PLACE.



POOLE LEADING DE PALMA A CHASE—PASSING SPENNEY AT THE UPPER TURN, SATURDAY A. M.

guided by Ray Howard and Frank Dearborn, was put out of the running with a broken frame after going a distance of 435 miles.

The distance covered by the winner, 1,145 miles, was nowhere near the present twenty-four hour dirt track record held by Mulford and Patschke with a stock Lozier, 1,196 miles, nor does it come up to the former world's mark of 1,177 miles held by the Simplex, with Robertson and Lescault driving, made over a year ago. However, to the credit of Basle, who drove a good deal of the race, it must be said that he did splendidly with a car which he had never before driven. Poole had driven winning Simplexes in numerous events prior to last week and was familiar with the car. What caused greatest comment on all sides was that ten of the twelve cars which started were running at the finish—the largest proportion of contenders that ever finished a twenty-four hour race in this country. This would seem to bear out the contention of many makers that the breed of cars has improved much during the past two years.

It is unfortunate that the Brighton track is such a dangerous course. A number of drivers and mechanicians have lost their lives in contests there, and it is to be hoped that no more long races will be run at Brighton until the track is rebuilt along modern and scientific lines with proper banking. The otherwise successful meet was marred by the several bad accidents, and this seemed to disgust the public and followers of racing rather than to promote interest in automobile meets.

The start of the contest, before the largest crowd ever seen at such an event, was sensational; in fact, the beginning of a twenty-four hour grind is its most interesting feature. After each of the cars had driven an exhibition two laps in order to kill time while the lights were being adjusted Friday evening, and after De Palma had been presented with a floral wreath by some of his friends, the twelve contestants lined up in inspiring array, Mulford in his Stearns having the pole position. Burman got the jump on the field and went out ahead when the pistol cracked, but only got a short distance when Roberts in the Houpt shot in front of him. The rest of the pack followed closely bunched. Roberts held the lead around the first turn, but as the cars drew into the back stretch he had to relinquish the lead to Burman, who set the pace unflinchingly for two hours. Chevrolet, his team mate, immediately got close to his heels, with Parker in the Fiat soon following in third position. Burman and Chevrolet put up a most spectacular driving exhibition from the outset, the latter pilot fighting Parker mile after mile, being passed by the Fiat once or twice, but managing to regain his position behind the leader each time.

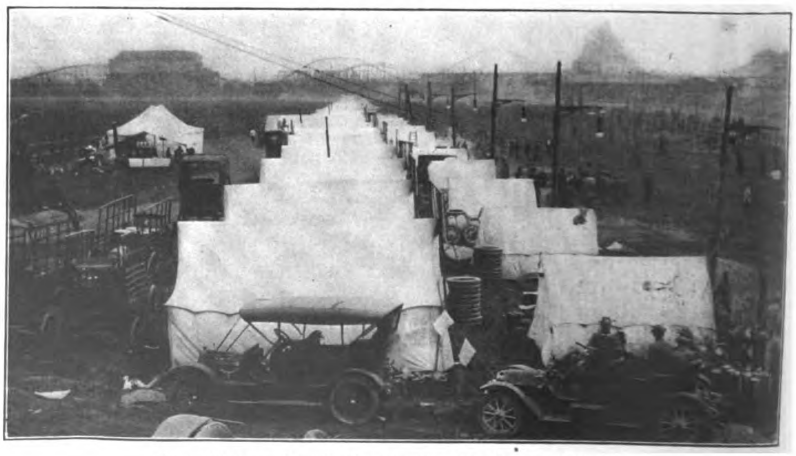
Burman negotiated the first mile in 1:13 and the second in 1:03, making it evident that the pace was to be a warm one. By the end of the first hour Burman, Chevrolet, Parker and Howard's Stearns No. 2, who came across the line in that order, were credited with 56 miles, equaling the track record made by Burman last year. Disbrow in the Rainier, Basle in the Simplex and Mulford in the No. 1 Stearns were two laps behind the winners, having a tally of 54. Strang in the light Marion was running steadily with 51; Endicott's Cole 2 miles less; the Selden and Croxton-Keeton, both newcomers to the game, driving slowly with 48 each, and the Houpt, which had met with difficulty, credited with but 27 miles.

At 11 o'clock, the end of the second hour, Burman and Chevrolet, driving prettily, with 112 miles chalked up, had a clear lead of 3 miles on their nearest competitors, Parker's Fiat and Mulford's Stearns. The latter driver had passed the Howard Stearns when it changed tires, gaining a mile. Howard and Disbrow were tied with 108, with the rest of the field not far behind.

In the third hour Burman relinquished his lead to Chevrolet, who flashed across at midnight with 163 miles to his credit, with Burman and the Howard Stearns and Mulford's car tied for second advantage 3 miles shy. Disbrow was a mile behind these. A number of the contestants had been bothered along this stage with tires, this trouble causing the Fiat to lose its position among the "Big Four." De Palma then replaced Parker at the wheel of this machine, being tied with Basle's Simplex at the close of the hour with a score of 155. De Palma's arms, however, became cramped, and he was forced to retire in less than an hour, Parker taking the wheel again for a while.

Shortly after midnight came the first fatality, when Gilbert Anderson, who had just relieved Strang on the Marion, skidded and crashed into the fence. Bradley, the mechanician, was thrown, and sustained a fractured skull, dying soon afterward. Anderson was unhurt. Owing to the accident the race was stopped for thirteen minutes.

Louis Chevrolet still maintained his well earned lead through the fourth, fifth, sixth, seventh and eighth hours, when after covering 408 miles, 4 miles ahead of his nearest contender, various things went wrong with the Buick's motor, and a halt was made to replace it. In the meantime Dearborn in Stearns No. 2 was fighting it out for second position with the Rainier, guided by Dis-



THE "WHITE CITY"—CAMPS IN THE TRACK INFIELD.

r and Wally Owen, and the Fiat, upon h Edw. Hawley had been placed, run- close at hand. Between 1 and 2 a. m. cott created some excitement when he his Cole through the fence at the club- e turn, fortunately without serious in- to either himself or mechanician.

iortly after George De Witt replaced nan on No. 4, in the fifth hour, he ied through the fence on the back ch. The car overturned, and while De was scarcely hurt, Tower, his mechan- , who formerly drove in races with \. Hearne, sustained contusions and a en leg.

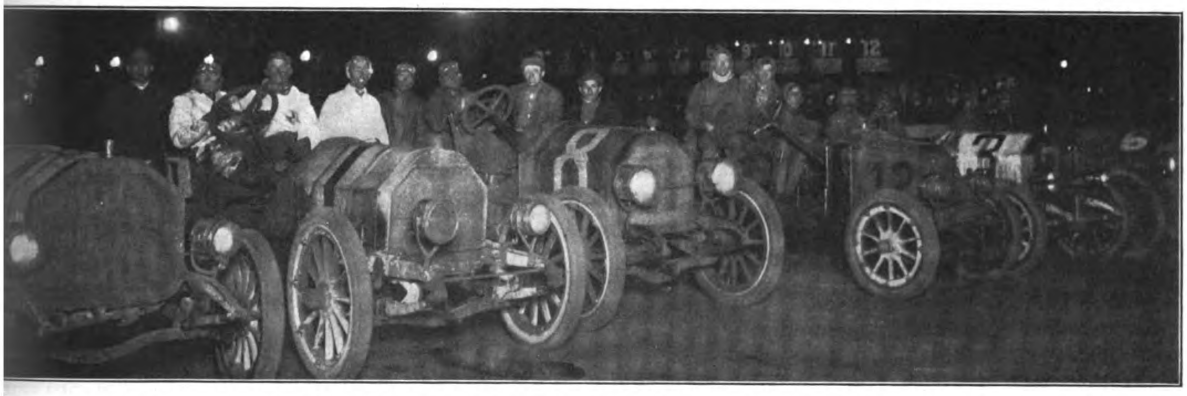
ith the two Buicks temporarily out of running, shortly after daybreak the Fiat got past Dearborn's Stearns, which had ked a frame, and in the ninth hour ched the lead, De Palma driving at t intervals only. At the end of the h the Italian car had a tally of 448 s, five laps ahead of Owen's Rainier. vas then announced that the Howard-Dearborn Stearns was withdrawn from the contest.

In the tenth hour the Owen-Disbrow team, in second place, almost caught the leading Fiat, with Poole's Simplex pressing for third place only four laps behind. The Rainier driver kept plugging away, and when the clock ticked off the eleventh hour this car was leading the field for the first time during the contest with 550 miles. The Fiat and Simplex, both tied with 5 miles less to their credit, were battling for second place. The Mulford-Patschke Stearns, which had picked up during the last few hours, was running fourth, 22 miles astern.

The end of the first half of the race saw a new leader, the Simplex, whose drivers, clinching the head of the procession with 598 miles, set up a hot pace, and for the remaining twelve solid hours the car was never passed. Other scores at the half way mark were: Fiat, 593; Rainier, 580; Mulford-Patschke Stearns, 579; Chevrolet's Buick, 558; Croxton-Keeton, 535; Marion, 520; Cole, 430; Burman's Buick, 405; Selden, 399; Houpt, 344. The twelve hour record is 624 miles, held by Louis Chevrolet.

In the thirteenth hour Poole's Simplex gained 3 miles on the Fiat, the Stearns running third and the Rainier fourth, and during the next hour it was a case of battle royal between Disbrow's Rainier and the Chevrolet Buick for fourth place, Chevrolet having 2 miles advantage at the end of the fourteenth, 43 miles behind the leader. Poole kept increasing his lead during the next few hours, which was considered poor judgment by the experts, but fortunately the car held together.

There was no change in the order of the leaders in the fifteenth hour, save that the Rainier caught Chevrolet for fourth position, but in the sixteenth the Stearns snatched second position from the Fiat, and finished the hour making a strong bid for first honors, with 775 miles, against the Simplex's 794 and the Fiat's 759. Dearborn



JNE UP AT THE FINISH—SIMPLEX, No. 8, WINNER, IN CENTRE, WITH POOLE UP, AND BASLE, HIS ALTERNATE, STANDING. PATSCHKE IN STEARNS No. 1, WHICH GAINED SECOND PLACE, AND MULFORD, HIS PARTNER, STANDING WITH BASLE.

Hourly Scores in 24-Hour Contest, Arranged in Order of Finish.

No. Car.	1	2	3	4	5	6	7	8	9	10	11	12
8. Simplex—Basle, Poole	54	106	155	202	240	289	341	388	440	492	545	598
1. Stearns—Mulford, Patschke	54	109	160	210	221	289	325	370	423	476	528	579
9. Fiat—De Palma, Parker*	56	109	155	202	244	299	352	395	448	497	545	593
3. Buick—L. and A. Chevrolet	56	112	163	219	269	320	370	408	408	453	508	558
11. Rainier—Disbrow, Owen	54	108	156	208	256	305	353	404	443	496	550	580
12. Croxton-Keeton—Lund, Spenny	48	95	143	185	231	273	317	360	405	451	491	535
5. Marion—Strang, Anderson	51	102	151	161	205	249	283	327	375	425	473	520
4. Buick—Burman, De Witt	56	112	160	209	242	242*	242	242	268	305	351	405
6. Cole 30—Endicott, Edmonds	49	99	145	185	187	227	236	270	314	353	389	430
10. Selden—Mack, McMahon	48	94	127	151	155	201	243	285	319	367	399	399
7. Houpt—Roberts, Martin	27	72	125	175	203	236	266	266	266	266	296	344
2. Stearns—Howard, Dearborn	56	108	160	213	258	310	349	400	435	Out with broken frame.		

No. Car.	13	14	15	16	17	18	19	20	21	22	23	24
8. Simplex—Basle, Poole	649	697	745	794	842	880	926	971	1,014	1,059	1,103	1,145
1. Stearns—Mulford, Patschke	630	677	726	775	824	857	901	952	993	1,038	1,076	1,120
9. Fiat—De Palma, Parker*	641	689	729	759	808	842	881	930	974	1,018	1,060	1,107
3. Buick—L. and A. Chevrolet	609	654	703	730	774	810	852	894	933	979	1,015	1,049
11. Rainier—Disbrow, Owen	616	652	703	747	793	818	865	906	935	959	998	1,037
12. Croxton-Keeton—Lund, Spenny	581	621	664	706	752	774	802	845	889	920	963	1,004
5. Marion—Strang, Anderson	563	613	661	698	742	770	805	828	870	906	947	989
4. Buick—Burman, De Witt	458	500	536	586	628	661	712	752	793	840	881	927
6. Cole 30—Endicott, Edmonds	448	456	466	503	533	556	588	627	660	692	723	756
10. Selden—Mack, McMahon	407	451	495	531	569	588	609	637	666	682	691	718
7. Houpt—Roberts, Martin	385	422	445	490	526	535	539	571	571	571	Out cracked cylinder.	

* Ray Howard, Frank Dearborn and Edw. Hawley relieved Fiat team for several hours Saturday.

and Howard in the meantime had been loaned to the Fiat Company, the former driving but a short time when his eyes bothered him and caused him to quit.

The leading cars ran through the next eight hours to the finish in this order, the Rainier crew taking fourth place from Chevrolet in the sixteenth, and holding it most successfully until the twenty-second, when Chevrolet secured a safe berth, holding fourth position to the finish. In the seventeenth hour there were many stops to attach mud guards when the rain poured down and made the track slippery, at one time only five of the eleven contenders being on the track.

Toward the end the Croxton-Keeton taxicab made the crowd take notice when it pulled up into sixth place behind the Rainier. In the meantime the Houpt had retired with a cracked cylinder.

The last hour saw De Palma, who returned to the Fiat, give Patschke in the Stearns a hard fight for second, and while the Fiat driver gained a few miles Patschke's lead of some thirteen laps was too much for him to cut down. The Stearns drove home second with 1,120 miles and the Fiat third with 1,107. Inasmuch as it was a foregone conclusion toward the wind-up that the Poole-Basle Simplex could not lose the enthusiasm of the crowd was not as great as it might have been, although when Poole finished his 1,145 miles he and Basle were cheered. The attendance was smaller than on the opening night, which had numbered about 25,000, and hundreds of motor cars.

Elgin Promoters Active.

Now that it has been definitely decided by the Chicago Motor Club to hold a road race next September on a circuit at Elgin, Ill., considerable preliminary work is being started. A committee of five Elgin citizens is busy selling stock at $25 a share in an effort to raise $20,000 capital, and the written consent of three quarters of the property owners through whose land the circuit runs, to permit the road to be used for racing, has been secured. The Elgin Association, which has just received a charter, has agreed to pay these farmers 33⅓ per cent. of the sale of tickets for viewpoints on their respective premises, and while the returns may not be very rich in every case, the co-operation of these farmers is assured. A sanction will be requested as soon as a date can be decided upon which will not conflict with other motoring events.

Columbus A. C. to Hold Run.

The Columbus (Ohio) Automobile Club has completed details for a reliability run to Indianapolis and return on the occasion of the race meet on the Motor Speedway. The start will be made the morning of May 27 and the first night will be spent at Richmond, Ind. On May 28 the run will be made to Indianapolis. The return will be made in one day, June 1.

Record Entry List Expected at Indianapolis Speedway.

Indianapolis, Ind., has hopes of a large entry list for its first meet this season when the national championships will be held, May 27-30. More than twenty racing cars manufactured in Indianapolis alone are practicing almost daily on the course, including the Marmon squad of seven cars, the National team of six, two special Marions, a pair of Coles and Empires. At least twenty-five local and many factory entries from other cities are anticipated.

E. A. Hearne, of Chicago, has made the first entry with a Fiat stock chassis, which he will put in the Wheeler & Schebler trophy race and other short spring events, including the championships. He has also entered a Hupmobile in the light class. The Empire Company has entered its team in the championships and the opens, as have the National, Marmon, American and others. No bonus or appearance money is offered the star drivers this season.

Announcement is made by the Speedway officials that the Remy Brassard will replace the G & J trophy race in the May meeting, and the latter prize will be offered at the July events. The Brassard goes to the victor in a 100 mile event at the May meeting and carries a weekly salary of $75 with it, provided the winning car is equipped with a Remy magneto.

The Brassard again will be a bone of contention in the July meet 200 mile race and in the first 200 miles of the twenty-four hour race in August.

Announcement is also made that the Cobe trophy race will be run at the Speedway July 2 instead of the Fourth, as first planned.

An additional scoring system is being installed at the Speedway, and when completed there will be three large score boards operated by thirteen men. Each board will have three sections, each section being capable of showing the time and standing of ten cars.

The Remy Company has hit upon a unique plan for its trophy for the August twenty-four hour race. The trophy is offered for stock chassis cars of 450 cubic inches piston displacement or less. The car which leads the field across the tape at the end of 200 miles in this class in the twenty-four hour race will be awarded the cup and cash weekly prize. The Speedway will give $1,000 in cash to the winner of the race, $600 in cash for second place, and $400 in cash for third place in this event.

In addition to the automobile races at the opening meet, May 27, 28 and 30, the Speedway management is arranging for an outdoor exhibit of the aeroplanes that will take part in flights June 13, 14, 15, 16, 17, 18.

Space will be roped off at the entrance of the grounds so that the enormous crowds can view at close range the machines that will make aerial history. The Wright Company has agreed to send a couple of its flyers in advance of the meet to show at the exhibition, while the Farman, the Fisher-Indianapolis, the Harroun and many others will be shown. The first licensed meet open to the world is attracting international attention, as the foreigners are preparing their machines pending the attitude of the Wrights.

Amateur Contest This Week.

Saturday and Sunday, May 21-22, will see the match contest between the Crescent Athletic Club and Long Island Automobile Club teams for the Pardington Trophy, from Brooklyn to Riverhead and return

ROUTE OF CRESCENT A. C.-L. I. A. C. RUN.

The event will be novel in several respects, one of the requirements being that all contesting drivers must be amateurs and active members of their respective clubs. The teams will be distinguishable by numbers, as the L. I. A. C. members will carry odd and the Crescents even numbers. Penalizations will be imposed for adjustments, repairs or stopping of motors outside of controls.

The route will be via Blue Point to Easthampton, thence to Quogue and Riverhead, where the night stop will be made. Sunday the cars will take the route to Mattituck, Wading River, Port Jefferson, etc., to Smithtown, the noon control, and in the afternoon run over the Jericho turnpike to Commac, Huntington, Woodbury and Mineola back to the Crescent Athletic Club country house.

Young Michelin Meets Tragic End.

Hauvette Michelin, of the family whose name is famous in the automobile and aeronautic world, met with a tragic death at Lyons, France, Friday, May 13, while competing in an aviation meeting. Mons. Michelin was driving an Antoinette monoplane and shortly after ascending from the ground struck a telephone booth and then a derrick, which fell and fractured the aviator's skull. He was 23 years of age.

Eighteen Clean Scores in Morgan's Run

Vhen the Motor Contest Association hich consists of "Senator" W. J. Morgan l a couple of others) decided to an- nce the scores in the 311 mile "Around w Jersey reliability run," held May 10-11, m New York to Atlantic City and re- n, they counted up and found that eighteen he original twenty-eight starters in the nt pulled through with perfect scores. was the first contest of the sort start- from New York, to be run under the v A. A. A. rules, the cars being divided o price classes. Instead of running off larger number of ties in a supplemen- y run, the perfect score entrants in ch class will draw for gold medals, one which will be awarded to the lucky ntestant of each division, while gold ited medals will be presented to all the her clean score drivers. The accompany- g table shows the scores of the con- stants.

The contestants started out at 7:30 a. m. om the New York headquarters of the otor Contest Association and were offi- ally checked out just before 9 o'clock at rsey City. The route to Lakewood, the rst control, was via Newark, Elizabeth, erth Amboy, Middletown, Red Bank and long the Jersey Coast resorts through sbury Park and Point Pleasant.

It was unfortunate that reckless driving n the part of one of the pilots should ave resulted in such a bad accident at the ery start of the run. A. D. Bryer, who vas driving the Koehler car entered by Dr. Alexander Dallas, had passed a number of the cars and had nearly caught up to the pacemaker near Rahway, when, in trying o pass a grocery wagon, he crashed into a Ford runabout driven by W. H. Mount, of Kent City, Ind. The latter was on a picnic with some of his family, including Mrs. C. A. Applegate and Mrs. Adelaide Myer. The impact was so great that it smashed the Koehler car, which turned on its side with crushed wheels and radiator and other parts badly wrecked. Bryer, the driver, was thrown out, as were Harold See, a news- paper correspondent, and N. M. Egerts, the physician's brother-in-law, while Dr. Dallas remained in the tonneau through the crash. He sustained a scalp wound and a broken finger, while the others were badly shaken up, but not seriously injured. In the Ford party, however, Mrs. Applegate was thrown and had her skull fractured, while Mrs. Myer fractured several ribs and was se- verely bruised.

The Glide entry in the run was disquali- fied before it checked out, owing to the referee's decision that the driver was in- capacitated. There were a few other mis- haps on the run to Lakewood, several cases of tire trouble being noticed. When about 3 miles from Lakewood, Colonel Pardee's Maxwell ran out of gasoline and lost its clean score. The roads were in splendid condition, but the contestants suffered from dust, owing to the fact that so many of the cars bunched close together directly behind Pacemaker Ireland.

After luncheon at the Bartlett Inn, Lake- wood, the caravan started out again, making a trip of 71 miles to Atlantic City through Toms River, Barnegat, Port Republic, etc. Shortly after checking out W. C. Daven- port's Buick broke a spring and was obliged to retire, and W. Shuttleworth's Haynes, in the course of the afternoon, broke a clutch, so that the car had to be driven on throttle control only to the night stop.

The official car, which carried W. J. Morgan, the promoter of the run, got marooned in the meadows about 35 miles from Atlantic City. Blown out shoes, which it was found difficult to repair, delayed the car so that it did not reach the night con- trol until shortly before midnight. The American roadster, which carried Millard Newton, the chief checker, broke its sod pan, which sagged and necessitated repairs at Atlantic City.

A cold, drizzling rain greeted the con- testants Wednesday morning when they started on the return trip to Jersey City via Trenton, the noon control—a contrast to the ideal weather of the previous day. The mud, however, was not deep in the roads and few cases of bad skidding were re- ported. About noon the rain subsided and made the rest of the trip fairly enjoyable. The participants in the run, many of whom reached the Jersey capital soaked through, had plenty of incidents to talk about, one of the most spectacular being the pyrotech- nic display of the George Reiss Overland, which caught fire while being filled with gasoline at the noon control. The prompt arrival of a chemical fire wagon enabled the car to start again and finish the run in good shape.

The Zust entry, piloted by Joseph Kings- land, lost the trail in the morning and went about 40 miles out of its way, reaching Trenton with scarcely a minute's margin on its time score. The breaking of the axle on the Cole car driven by T. C. Emsley, in passing into New Brunswick, passed off without serious harm, neither the driver nor his observer being thrown. Checker Newton's car, the American, was again "hoodooed," for it failed to start out from Atlantic City after making its repair until afternoon, and, after tire and fuel feed trouble, did not reach Jersey City until 3 o'clock the next morning.

Twenty-eight of the original thirty-one cars, however, checked in at Jersey City, having experienced no apparent difficulty or time penalizations, which was surprising, inasmuch as so many of them lost the route and got into Camden by mistake, adding about 15 miles to the distance. General satisfaction was expressed on the part of the contestants.

Sporting Flashes.

The Portland, Ore., A. C. has scheduled a road race for January 11.

Spokane automobile dealers are planning a speed contest early in June, to be run from Spokane to Lewiston, Idaho, and return.

The Hol-Tan Company has just received a cablegram from Italy dated May 12, 1910, that a Lancia car beat the mile record in the Modena four inch bore contest, aver- aging 114 kilometers (about 71 miles) an hour.

Scores in "Around New Jersey" Reliability Run.

CLASS 1A—$800 AND UNDER.

Car.	Driver.	Points Penalized.	Penalized For.
Hupmobile	R. E. Gillam.	Perfect.	
Hupmobile	E. D. Cutting.	9	Oil and water replenishment.

CLASS 3A—$1,201-$1,600.

Regal	W. H. Bowers.	Perfect.	
Overland	Geo. L. Reiss.	Perfect.	
Maxwell	W. Mulstay.	1	Stalled motor.
Buick	W. C. Davenport.	191	Broken spring and water replenishment.
Cole "30"	P. Warmingstone.	1,000	Out on account of accident.

CLASS 4A—$1,601-$2,000.

Pierce-Racine	Lewis Strang.	Perfect.	
Auburn	Herbert F. Earl.	Perfect.	
Franklin	Paul Harvey.	Perfect.	
Chalmers	Joseph Bell.	Perfect.	
Marion	Wm. F. Bradley.	Perfect.	
Cadillac	N. L. Lichtenberg	Perfect.	
Cadillac	L. R. Burne.	Perfect.	
Midland	Leo Anderson.	Perfect.	
Maxwell	Chas. Schaeffer.	3	Gasoline replenishment.
Koehler	J. L. Bryer.	1,000	Out on account of accident.
Buick	Phil Hines.	191	Broken spring; water replenishment.

CLASS 5A—$2,001-$3,000.

Stoddard-Dayton	Richard Newton.	Perfect.	
National	W. C. Poertner.	Perfect.	
Mitchell	O. R. Delamater.	Perfect.	
Mora	Chas. Hinman.	Perfect.	
Glide	W. H. Foltz.	Disqualified at start.	

CLASS 6A—$3,001-$4,000.

Franklin	Chas. F. Fox.	Perfect.	
Matheson	Neil Whalen.	Perfect.	
Haynes	W. Shuttleworth.	1,051	Broken clutch finger.
Welch-Detroit	Robert M. Flagg.	2	Sticking valve.

CLASS 7A—$4,001 AND OVER.

Zust	V. P. Pisani.	Perfect.	
Zust	Jos. Kingsland.	41	Carburetor adjustment.

Trio of Perfect Scores in Harrisburg Run.

After a tiresome all day task the contest committee of the Motor Club of Harrisburg, Pa., last Thursday announced the awards in its fourth annual reliability contest, May 9-11, run under "sealed parts" conditions, the result being three perfect scores out of twenty-one contestants who started. In Class A Norman Gallatin's Pullman was declared the winner over a field of six entrants, having a perfect road and technical score, while the Franklin, driven by John Burns, had a perfect road score, but three points placed against it in the technical test.

In Class B W. W. Vandergrift's Interstate proved best, having eleven points penalization against it, all due to an oil leak which developed on the third day of the contest. H. L. Brownback, who drove an Enger, pressed Vandergrift for second place in this division. A Kline car piloted by James Kline, its designer, pulled through with a complete perfect score in Class C, and won first place, having a bulge on a Pullman entry, which lost five points for a poor emergency brake, although perfect in other respects. A surprise was sprung in Class D by a Baby Maxwell, piloted by A. D. Rea, which finished with a spotless score, outstripping the performances of a number of cars in this division costing more than twice its price.

No announcement has been made at this writing of the winners in the members' class. The chief trophy goes to Gallatin, the Class A winner, while the other victorious ones will also receive trophies. The technical committee's examination was most exhaustive, and many of the cars whose scores were otherwise perfect suffered from brake examinations. Nine of the contenders finished the three days' run with clean road scores. The following shows the penalizations imposed:

The first day's run was from Market square, Harrisburg, to Atlantic City by way of Lebanon, Reading, Philadelphia, Camden and Hammondton. On the second day the route was through Mays Landing, Seaville, Bridgeton, Cape May into Wildwood, and on the wind-up the route led from the latter resort to Harrisburg through the towns of Newfield, Glassboro, Woodbury, Philadelphia and Langston. Both wet and dry weather were encountered.

Rules of the contest required that only stock cars were eligible, and these had to have all working parts sealed, and observers were appointed to take note of all adjustments and repairs.

New Motordrome Company Incorporated.

The motordrome for Philadelphia, Pa., about which rumors have been in the air for some time, may materialize in the near future, for a promoting organization, known as the Philadelphia Motordrome Association, was incorporated a few days ago at Trenton, N. J., with an authorized capitalization of $2,000,000, and it is said that the construction of a combined automobile race course and aviation field will begin shortly. The incorporators are: F. R. Hansell, Geo. H. V. Martin and James A. MacPeak, all of Camden, N. J., but it is stated that the names of the men who are really financing the venture are being withheld for the present.

Worcester Expects Big Climb.

Twenty events have been carded for the Worcester A. C. Hill Climb on Dead Horse Hill, Worcester, Mass., on June 4. In the price class division there are seven events, ranging from $800 and under to $4,000 and over; amateur and professional free for alls, and an amateur event for the Worcester County Championship trophy, while in the piston displacement class there will be six events. One of the features of the program will be an event for commercial cars.

Penalization Schedule, Harrisburg M. C. Run.

	Road Scores				Technical Scores			
Class A. No. Car	First Day.	Second Day.	Third Day.	Total.	Brake.	Clutch.	Tech.	Total.
36. Pullman, Norman Gallatin	0	0	0	0	0	0	0	0
13. Franklin, John Burns	0	0	0	0	0	0	3	3
8. Kline-Kar, R. L. Morton	0	0	0	0	7	0	0	7
10. Kline-Kar, Sam Cole	0	0	0	0	42	0	4	46
37. Pullman, Herb Bitner	0	1	2	3	46	0	2	51
45. Columbia, E. Yeager	19	0	0	19	26	5	13	63
Class B.								
46. Enger, H. L. Brownback	0	9	5	14	45	0	0	59
41. Interstate, W. W. Vandegrift	0	0	18	18	0	0	3	11
12. Regal, Frank Hosmer	0	20	26	24	0	0	0	44
40. Kline-Kar, William McCulla	0	3	20	23	53	0	3	81
Class C.								
7. Kline-Kar, J. A. Kline	0	0	0	0	7	0	0	0
35. Pullman, Herbert Walker	0	0	0	0	5	0	0	5
47. Marion, E. Greenwood	0	0	0	0	4	0	5	9
56. Kline-Kar, W. P. Seig	27	0	3	30	5	0	0	35
34. Pullman, H. P. Hardesty	4	0	0	4	30	0	2	39
11. Mitchell, L. F. Snyder	15	Withdrawn.						
Class D.								
57. Maxwell, A. D. Rea	0	0	0	0	0	0	0	0
9. Kline-Kar, C. C. Fairman	0	0	0	0	5	0	0	5
48. Overland, C. Greenwood	0	12	0	12	0	0	24	36
43. Warren-Detroit, Tom Berger	0	0	58	58	9	0	1	93
39. Pullman, George Ickes	0	15	0	15	Withdrawn.			

Scouts Complete Their Road Search.

It's over—that Glidden Tour pathfinding expedition. When the Chalmers scout car, in charge of Dai Lewis, driven by Joe Gardham and carrying E. L. Ferguson as the official photographer, reached Chicago last week, there was a big reception awaiting the crew. A banquet was tendered to the scouts by members of the Chicago Motor Club, which is donating the miniature tonneau trophy, and the welcome was a cordial one.

The distance of the national tour this season will be approximately 2,800 miles—about 300 miles longer than originally intended—and contestants will pass through thirteen of the more important Southern States. The intermediate distances and the itinerary, so far as the night stops are concerned, together with the approximate mileages, will be practically as follows:

	Miles.
1st day, Cincinnati to Louisville	
2d day, Louisville to Nashville	
3d day, Nashville to Sheffield	
4th day, Sheffield to Memphis	
5th day, Sunday in Memphis.	
6th day, Memphis to Little Rock	
7th day, Little Rock to Texarkana	
8th day, Texarkana to Dallas	
9th day, Dallas to Lawton, Okla	
10th day, Lawton to Oklahoma City, Okla	
11th day, Oklahoma City to Wichita	
12th day, Sunday in Wichita.	
13th day, Wichita to Kansas City	
14th day, Kansas City to Omaha	
15th day, Omaha to Des Moines, Ia	
16th day, Des Moines to Davenport, Ia	
17th day, Davenport to Chicago	
Total	

The total area of the country to be [illegible] within the distance is very nearly 1,000,000 square miles, or more than one-fourth of the area of the United States. Ten large cities, with an aggregate population of 4,000,000, will be visited, and the tourists' party will make fifteen night and two Sunday stops. The ten largest cities on the route are: Cincinnati, Louisville, Nashville, Memphis, Little Rock, Dallas, Kansas City, Omaha, Des Moines and Chicago.

To the credit of the pathfinders and the Chalmers car it may be said that the work could hardly have been done better by any crew in any car. All sorts of road conditions were encountered, including some of the worst in the country. Rivers had to be forded, deep mire plowed through, sandy deserts crossed, and steep slopes climbed under most trying circumstances, including adverse weather, and the car withstood it. Gardham is to be congratulated upon the careful handling of the machine. Included in the equipment carried by the car were Morgan & Wright tires, Continental demountable rims, and Jones speedometers, and each of these components was thoroughly subjected to and stood the strenuous test.

Now, provided the Three A's get busy and scares up a few more entries there will be something to call a tour.

Lowell to Have Road Race After All.

Automobile enthusiasts of Lowell, Mass. are beseeching John O. Heinze, president of the Lowell Automobile Club, to run another road race next fall, in spite of the fact that the Lowell Club decided to abandon the idea of holding the National Stock chassis competition this season. Accordingly plans are being formulated, and it has been definitely decided to promote a big stock car race meet on the Merrimac Valley course and a sanction will be requested from the Contest Board of the A. A. A. within a week or so. The date proposed will be about the middle of September, although it has not been fully decided whether to have just one big race or a two day meet with a light car event preceding the feature. In view of the fact that Lowell's course is such an ideal one, there is every reason to believe that there will be as many if not more entries made for the proposed event than entered the list last year. Details of the event will be announced later by the club.

Five Clean Scores in Virginia Run.

Trophies were awarded in profuse fashion in the *Times-Dispatch* endurance run which wound up at Richmond, Va., Saturday night, May 7. The lucky ones included E. Maxwell, who drove a Hudson "20," which was awarded the clean score cup in division 2; Lee A. Folger, driving a Chalmers, was the winner in division 3, with F. E. Nichols' Reo second, capturing the "clean sweep" cup; J. R. Williams' Buick received the "clean score" trophy in the fourth division; E. J. Allen's Rambler the same in division 5, while John B. Swartwout's Stevens-Duryea received the "walkover cup" in division 7.

There were no awards made in divisions 1 and 6, as the cars which entered in these did not finish, while another trophy, the "sweepstakes cup," will have to be decided by drawing.

As a whole, the cars performed creditably, two of the contestants being fined $10 each for speeding at Petersburg.

Mercer Car in Transcontinental Tour.

Early Monday morning last a 30 horse power Mercer car left New York on a trip from coast to coast with Los Angeles as its objective point. The car is in charge of C. H. Bigelow, a well known Western pilot, who expects to set a new world's record for distance. Mr. Bigelow hopes to open a new route to the coast and to secure appropriations for new roads so that within a few years motorists can make the trip from the Atlantic to the Pacific coast through the most picturesque part of the country in comparatively less time than is now possible over the present unsafe trail.

Miss Scott Off on Her Transcontinental Jaunt.

To demonstrate that it is possible for a woman to make a trip across the country unaccompanied by a mere man to change tires and make adjustments, Miss Blanche Stuart Scott started from New York city Monday last, May 16, on a transcontinental drive in an Overland runabout.

She was accompanied by her chum, Miss Annie Phillips, known to many as a clever newspaper writer, and these two expect to show those from Missouri and a couple of dozen other States, motordom in general, suffragettes and others, what a pair of the fair sex can do with a car under both good and bad road and weather conditions. Miss Scott prior to her start drove up Broadway escorted by a dozen Overland and Marion cars furnished by Charles E. Riess, the metropolitan agent of the Willys-Overland Company, and upon arriving at Grant's Tomb paused to let the newspaper men take a generous number of snapshots. Thereupon the party adjourned to the Claremont, nearby, where Mrs. H. G. Holman tendered a farewell luncheon to the petite motoriste. Most of the men who write the local automobile news and a few others were present. John C. Wetmore played his usual rôle of toastmaster.

Nearly everyone present was called upon to say a few words, and Miss Scott certainly heard some pleasing compliments, which she received in very good grace, and wound up the affair by making a few remarks—very few—refraining from talking about herself.

Miss Scott's Overland is quite a creation. It is a stock chassis mounted with a special body painted white, with the name of the car profusely stenciled on the enamel and arranged so as to carry excess baggage (among which is said to be a most elaborate assortment of Paris gowns, such as any woman would want to take with her).

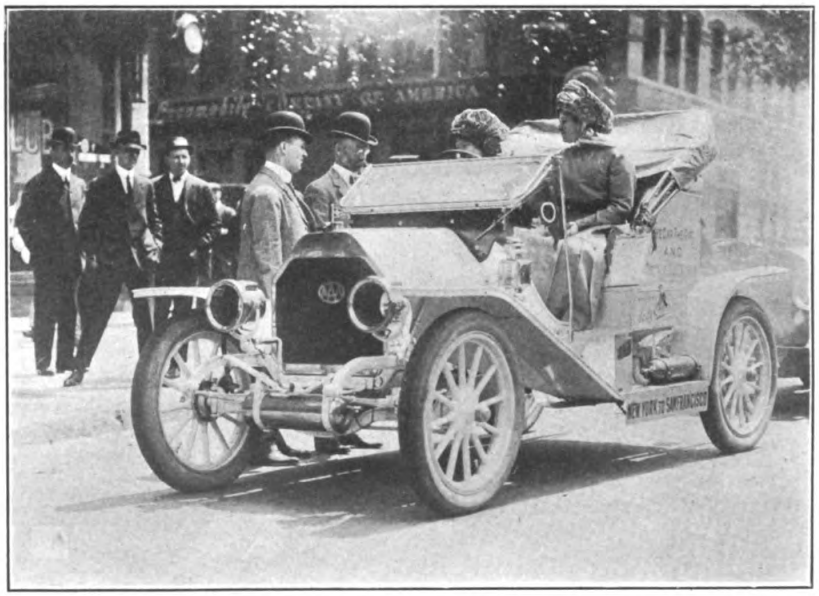
The first day's destination was to be Poughkeepsie, N. Y., from whence Miss Scott will drive through western New York to Erie. From there on she will head westward via Cleveland, Toledo, Indianapolis, South Bend and Chicago, and after a few days' stop in the Windy City will head for the Far West, the itinerary including Milwaukee, Omaha, Denver, Cheyenne, Salt Lake City, Tonopah, Nev., then down to Los Angeles and up to San Francisco.

No definite schedule has been laid out and no attempt will be made at speeding, the trip to be as a go-as-you-please pleasure affair.

New Machinery Company to Operate on a Large Scale.

The Grant & Wood Manufacturing Company, which was recently incorporated at Detroit, Mich., and which controls a number of patents for automatic machinery used in the manufacture of automobile parts, has purchased the Grant Automatic Machine Company, of Cleveland, and installed machinery and equipment in the plant of the Chelsea Stove Works, in Detroit, which has also been absorbed. Additional land adjoining the stove works has been bought and the company plans to erect new buildings on this immediately.

The capital of the new concern is $1,000,000, of which $800,000 is paid in, and the officers are: Eben B. Boye, of Cleveland, president and sales manager; A. O. Smith, of Milwaukee, vice president; Harry L. Stanton, secretary and treasurer. Walter E. Flanders, president of the E-M-F Company, is one of the directors.



Miss Blanche Stuart Scott Starting on Her New York to San Francisco Trip Last Monday.

New Vehicles and Parts.

1911 Packard Motor Cars.

The 1911 line of cars made by the Packard Motor Car Company, of Detroit, Mich., embraces both open and enclosed cars, with bodies designed in a new fore-door style. The company's standard painting colors have been changed from Packard blue and cream yellow to Packard blue, black and Packard gray.

The new open cars, instead of having bodies of the "torpedo" type, are made with both the front and rear body panels in strong relief, and with victoria carriage lines. These panels are painted Packard blue, striped with Packard gray. The frame, bonnet, fenders and similar parts are black, while the wheels and running gear are Packard gray, striped with black.

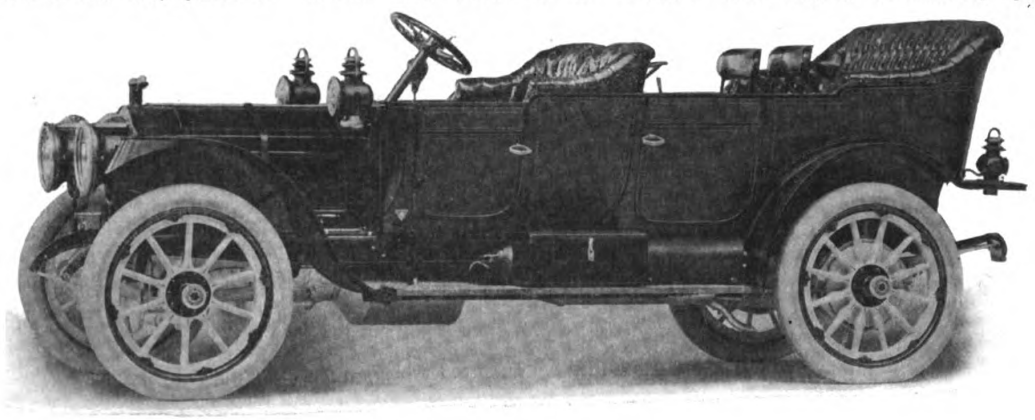
The 1911 "Thirty" line consists of a touring car, phaeton, close-coupled car, runabout, limousine, landaulet, coupé, fore-door limousine and fore-door landaulet. The "Eighteen" town car is made as a five passenger open car, close-coupled car, runabout, and in enclosed car styles similar to the "Thirty." Both cars are the same in quality and general design. The list price of the "Thirty" open cars is $4,200, and of the "Eighteen" open cars $3,200. The standard equipment of all open cars includes tops. All cars are equipped regularly with Continental demountable rims. The tires on the "Thirty" are 36x4½ inches, all around, and on the "Eighteen" 34x4 inches.

The mechanical improvements in the 1911 cars are extensive, but are all in the nature of detail refinement, developing previous models. The motor of the Packard "Thirty" has four cylinders of 5 inch bore by 5½ inch stroke. It develops 30 brake horse power at 650 r. p. m. The "Eighteen" motor is of 4⅛ inch bore by 5⅛ inch stroke, developing 18 brake horse power at 650 r. p. m. The wheel base of the "Thirty" is 123½ inches, except in the case of the runabout, in which it is 108 inches. The "Eighteen" standard wheel base is 112 inches and that of the runabout 102 inches.

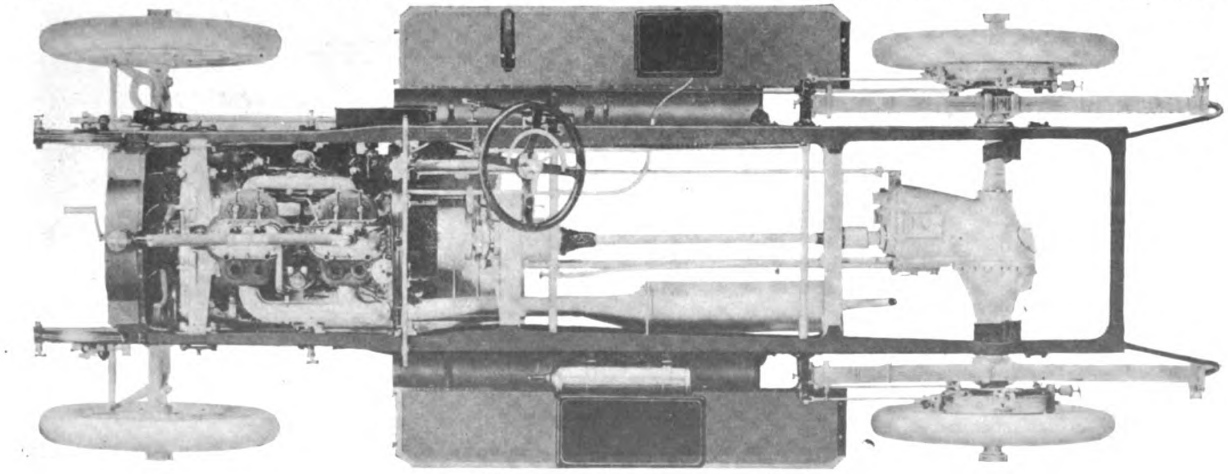
The cylinders are cast in pairs, with integral water jackets and valve chambers. Both cylinders and pistons are ground, and the pistons are fitted with four ground rings. The castings for these parts are made in the company's own factory, from imported gray iron. The crank shaft is supported in three large bearings carried by massive webs in the crank case. The connecting rods are drop forged. All bearing surfaces are ground, and it is claimed that the quiet running of the Packard motor is due to great rigidity and accuracy in manufacturing and inspection.

The inlet and exhaust valves are located in pockets on opposite sides of the cylinders; they are mechanically operated and interchangeable. The cam shafts are enclosed within the crank casing and positively lubricated. The cam gearing, as well as the gearing for the magneto and water pump, is contained in a separate, integrally cast extension of the crank case, and is therefore positively lubricated.

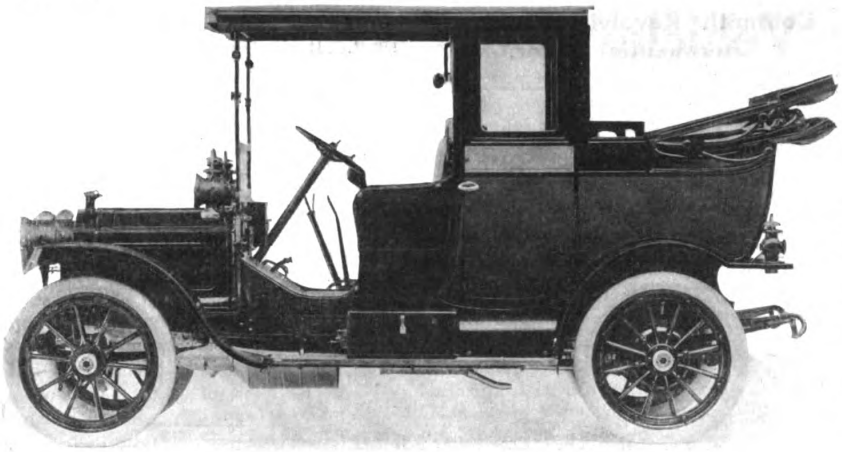
The crank case, cast of aluminum alloy, has three horizontal sections, the uppermost being supported by arms on the main frame. The crank shaft bearings are held between the uppermost and the middle sections, while the bottom section is an oil well, easily removable for inspection or adjustment of the connection rod, cam shaft, etc.,



1910 Packard "Thirty" Touring Car.



Chassis of Packard "Thirty."



1911 Packard "Eighteen" Landaulet.

without disturbing the bearings. An integral web encloses the space between the motor and the frame, thus protecting all motor parts. The crank case is divided into front and rear compartments by a central partition.

The carburetor is of the company's own design and manufacture, of the float feed, automatic mixture regulating type, and provided with a hot water jacket around the cylindrical mixing chamber. The auxiliary air inlet is actuated by the suction, but a small lever on the dashboard permits of varying the spring tension of the valve to suit different atmospheric conditions. The primary air intake may be shut off to assist starting in cold weather. The gasoline is fed by gravity from a copper tank under the front seat. A three-way gasoline valve controls the main supply, a 5 gallon reserve and a shut off. The tank on the "Thirty" has a capacity, including the reserve, of 21 gallons, and that on the "Eighteen" 18 gallons. Runabouts, phaetons and close coupled cars are provided with a pressure fuel feed system, comprising an automatic pump on the engine and a hand pump.

Ignition is effected by means of a Packard-Eisemann low tension magneto, with a storage battery for starting and reserve. The magneto coil and vibrator coil for battery current are enclosed in a unit box on the dashboard. The coils and primary circuits are independent, while the secondary circuit and spark plugs are common to both systems. The storage battery is carried in a box on the running board, and the commutator for battery current is mounted on a vertical shaft at the rear of the motor. A convenient hand and "kick" switch, combined with a Yale lock, is fitted between the battery and magneto coil. The primary winding from the battery to the coil is carried through a protecting tube, and the secondary wiring from the magneto distributor to universally jointed knife switches at the spark plugs is carried through copper pipe.

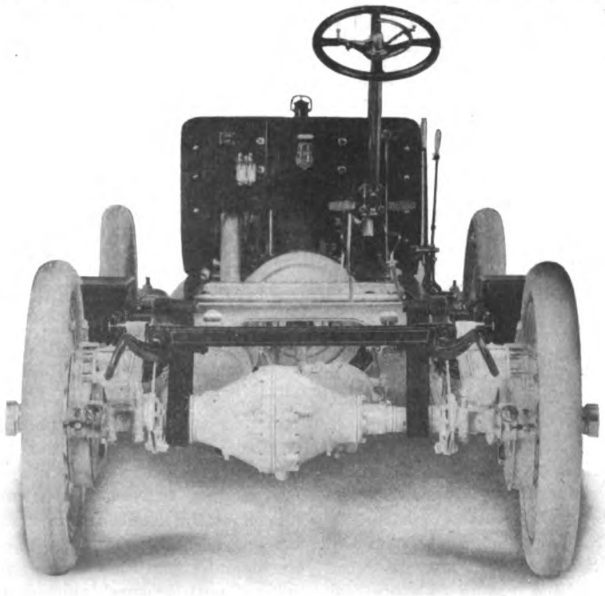
Lubrication is by splash in the crank case, the supply of oil in the front and rear compartments being positively maintained by means of a double plunger pump. The oil feed can be adjusted by regulating the pump stroke. An oil reservoir (1 gallon capacity on the "Thirty"; 2½ quarts on the "Eighteen") is located between the cylinder pairs where the oil is kept at a uniform temperature. Anti-clogging devices are fitted to the crank case drain cocks, as well as stops to prevent their accidental opening.

Both a hand throttle lever on the steering wheel and an accelerator pedal are provided. An hydraulic governor is fitted to steady the motor running and compensate for varying loads within the limits of volitional throttle setting. An ignition lever on the steering wheel completes the motor control devices. An automatic latch holds the motor starting crank in an upright position when not in use. A compression relief handle is fitted near the starting crank on the "Thirty."

Positive water circulation through the cellular radiator and cylinder jackets is effected by a gear driven centrifugal pump. A non-leaking filler cap closes the water tank on the radiator. The motion strainer on the water pump can be removed for cleaning without breaking any water connection. A belt driven, ball bearing fan is located back of the radiator and has means for adjusting the belt tension. The water capacities are 5 gallons for the "Thirty" and 4½ gallons for the "Eighteen."

The clutch is of the dry plate type, adopted by the Packard firm last year, one set of plates being faced with friction material, the other metallic. The three forward speeds and reverse gear set is combined with the rear axle, as in former years, whereby a long propeller shaft with minimum angularity is obtained, and the universal joints can be effectively encased. The change gears are controlled on the selective principle. The gear lever works in a single quadrant, moving forward and backward for the forward speeds and laterally into a notch for the reverse. When in the reverse position the lever is locked by a thumb latch. Gear shifting is assisted by spring locks on the sliding bar. All parts of the shifting mechanism are enclosed within the gear housing. The change gear shafts run on annular ball bearings throughout.

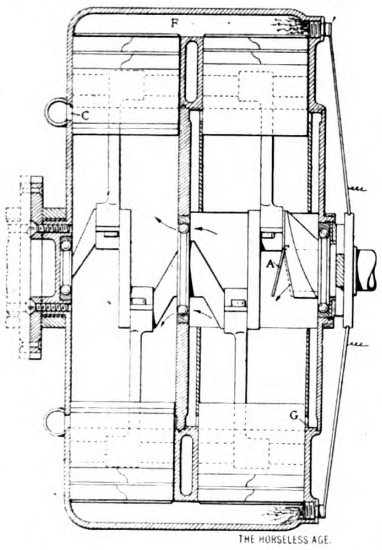
The aluminum housing of the gear set, bevel gears and differential is internally ribbed. The differential gear unit is supported by its own bearings, and the rear axle shafts can be removed without disturbing the gears. A set of internal expanding and a set of external contracting brakes act on drums secured to the rear wheels. The internal brakes are provided with bayonet locks to prevent rattle.



Rear View of Chassis.

The pressed steel frame is arched above the rear axle to give a low centre of gravity, together with liberal spring action. Integral gussets on the top and bottom flanges serve to secure the cross bars. The frame is drilled in rigid jigs to insure accurate alignment, and is cold riveted. All springs are semi-elliptic, the front ones being 40 inches long in both models, and the rear ones 56 inches in the "Thirty" and 50 inches in the "Eighteen." Compression grease cups lubricate all spring shackle bearings and shock absorbers are fitted to both axles. The front axle is made of heavy gauge, large diameter steel tube.

Steering is effected through a worm and sector gear operated by means of a large hand wheel entirely covered with wood, including the spokes near the rim—this for comfort. The worm and sector are forged integral with their respective shafts. Heavy drop forged jaw type yokes are secured to the ends of the front axle tube, and forged steering knuckle spindles are used. The knuckles are provided with ball thrust bearings. All steering gear bearings and connections are directly lubricated by grease cups. The steering connecting rod has ball and socket joints which are encased. The connecting rod is located above the front axle, in a position calculated to minimize the transmission of vibration to the driver's hands.



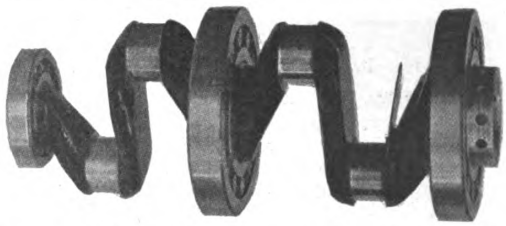
Revolving Cylinder Aeronautic Motor.

Bodies are constructed of sheet aluminum over wood frames. The bonnets are made of aluminum and secured against rattling. The fenders are also of aluminum and are flanged for rigidity. There are splash aprons between the front fenders and the frame, and the rear fenders are so attached to the body as to be practically water tight. Splash aprons also close the opening between the running boards and the frame.

Cobsmith Revolving Cylinder Aeronautic Motor.

This revolving cylinder motor was designed by Wm. Cobb Smith, of Chicago, Ill., and it is claimed for it that full charges are taken in and practically perfect scavenging is effected at all speeds. The motor consists of two opposed pairs of adjacent cylinders which are in communication at their head F. The charge of each pair is admitted through one cylinder and discharged from the other on the two port, two cycle principle. The charge is drawn by suction into the crank case through the hollow end of the crank shaft. The entrance through the crank shaft is controlled by a valve regulated by the end of the connecting rod. When the piston is at the end of its outward stroke the connecting rod cap releases the automatic valve A, which instantly closes on the in stroke of the piston. The charge in the crank case is then compressed by the in stroke of the pistons, and when the circumferential intake port G opens, flows into the inlet cylinder and on into the exhaust cylinder, following the exhaust gases which are escaping from the exhaust port C. This exhaust port opens slightly before the inlet port, allowing a portion of the gases to escape, the remainder being forced out by the incoming charge. The suction on the exhaust due to the disposition of the revolving exhaust pipes, together with muffling and power reactionary effects, are features of the motor. The crank shaft is, of course, stationary, and the crank case is carried upon it on annular ball bearings. The communication at the heads of the cylinders is the main novel feature of the motor. Each exhaust pipe has the form of a flattened tube and is machined to fit snugly on the exhaust cylinder and crank case over the exhaust port.

The outlets of the exhaust pipes are arranged to discharge in the opposite direction from that of the rotation of the motor. The concentric piston pins are fixed against rotation by means of a plain pin loosely mounted in the ring and fitted permanently to the piston at the bottom of the ring grooves. If a magneto is used to generate the ignition current, a gear may be machined on one side of the crank case for driving it. The spark plugs are mounted in the cylinders in such a way as to secure contact with the spark advance lever, which is rotatably mounted on the tube leading from the carburetor to the end of the crank shaft. It is claimed that the centrifugal force acquired by the gases in their passage from the centre of rotation of the motor to a cylinder intake port accelerates their movement through the two adjacent exhaust cylinders, thus facilitating the charging and scavenging of both.



Stationary Crank Shaft, Showing Inlet Passage Open.

"Smith's Littlewonder" Valve Grinder.

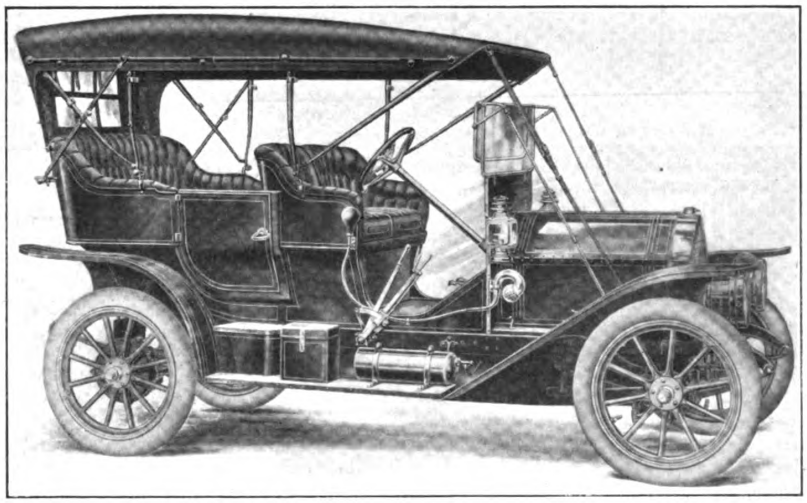
The R. & S. Specialty Manufacturing Company, 4337 Kansas avenue, Los Angeles, Cal., manufactures a simple and handy little valve grinder, known as the Littlewonder. It comprises a screwdriver bit, to which is attached a cross arm; also a handle and a frame. Secured to the operating crank is a steel shell, the edges of which are fashioned into three cams. These cams, coming in contact with fibre rollers on the cross arm of the screwdriver, give the bit a rotary reciprocating motion. In operation a spiral spring (which is furnished with each grinder) is placed under the valve on the stem. At about every second or third revolution of the crank the grinder is raised slightly, which allows the spring to automatically raise the valve from its seat, thereby changing the distribution of the grit and preventing rings being formed under the seat.

Smith Valve Grinder.

Latest Westcott Product.

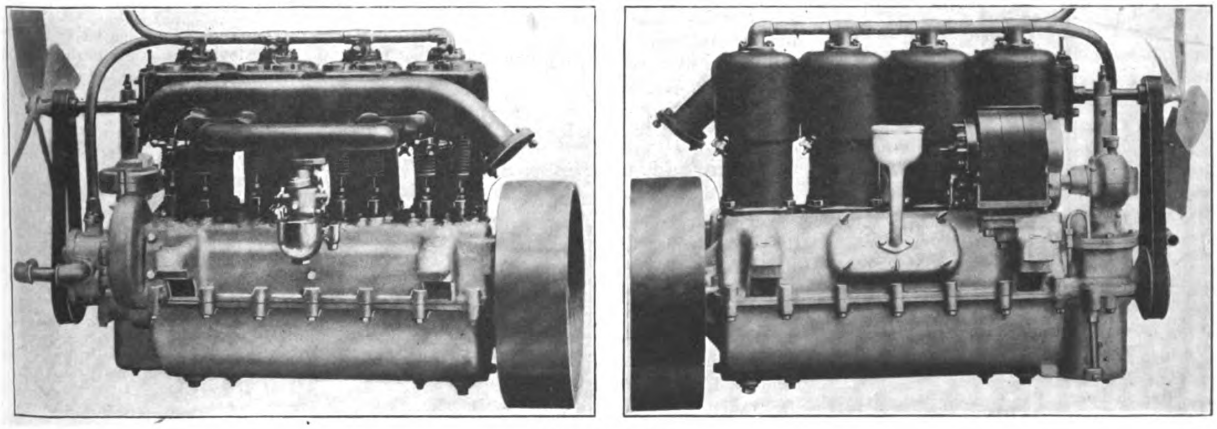
A car of entirely different design from he one formerly manufactured by them s being produced by the Westcott Motor Car Company, of Richmond, Ind. This iew car is equipped with a five passenger ody, has a yellow running gear and a Russian blue body; it weighs 2,750 ounds, and is listed, with top, wind hield and speedometer, at $2,000. The hassis has a wheel ase of 112 inches, nd is equipped with a four cylinder, 35-40 horse ower motor, with 4½ inch bore and 5 inch stroke. The water jackets of the cylinders are divided in such a manner that the cooling water passes down on one side of the cylinder and rises on the opposite side, being received at and discharged from the top of the cylinders. Water is circulated through the water jackets, and the vertical tube radiator by a gear pump gear driven from the forward end of the cam shaft. Valves 2 inches in diameter are actuated by a single cam shaft on the left hand side of the motor. The valve lifters are made with a telescoping cap to prevent oil leakage, and are operated from beneath by a lever with one end hinged to a projection on the under side of the lifter guide; this lifter extends well in toward the centre line of the engine, and carries the cam roller directly underneath the lifter. The valve lifter is adjustable at the top by a hardened steel screw and lock nut. The lifter guides are of phosphor bronze and are attached to the crank case by a flange and two bolts. The cam shaft and cams are forged integral from high point carbon steel, the cams being hardened and ground. The pistons used in this motor are exceptionally long, and are fitted with three compression rings above the hollow piston pin. These rings are provided with lock joints, which prevent them moving circumferentially. These pistons are ground slightly taper; that is, the head end is ground ten one-thousandths of an inch small, to allow for the extra expansion caused by the heat of the explosion. Connecting rods are the conventional I section drop forgings, with phosphor bronze bearings at the top and die cast nickel babbitt at the bottom. The crank shaft is drop forged and turns in white metal bearings of liberal length and diameter. All the motor gears are contained in an oil tight compartment cast integral with the crank case.

Lubrication of the motor is effected by the constant level splash system, the oil of which is contained in a reservoir at the bottom of the crank case, and circulated by a gear pump driven through spiral gears from the cam shaft. The magneto is also driven through the same set of gears, being mounted on the crank case above the oil pumps. The ignition system comprises a magneto, a single plain step up coil and dry battery, and forms a dual system with a single set of plugs, the current on both systems being distributed through the magneto distributor. A Schebler carburetor is used, and is fed by gravity from a 16 gallon gasoline tank located under the front seat.

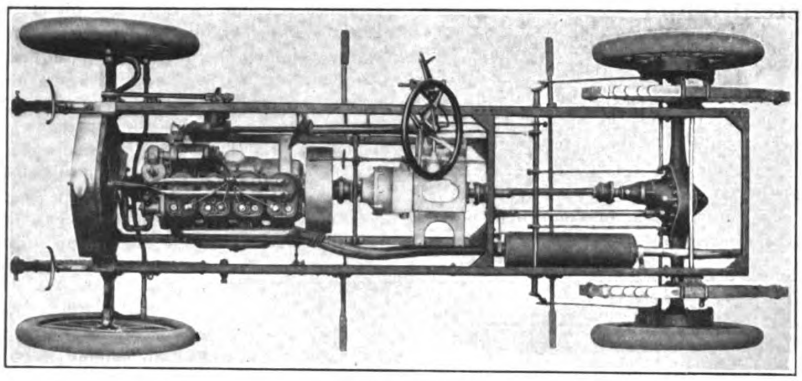


Westcott Touring Car.

The motor is supported on the sub-frame by four heavy arms, cast integral with the crank case. Incorporated as a unit with the three speed selective type transmission, but in a separate compartment, is the multiple disc clutch. Between the flywheel and clutch is a double universal joint. Both shafts in the change gear case turn on annular ball bearings. A 1¼ inch nickel steel propeller shaft transmits the power from the change gear to the rear axle. This shaft is provided with two Spicer universal joints. The torque strains of the rear axle are taken on two 1 inch, heavy, cold drawn, seamless tubes connected to the top and bottom of the differential gear case, running forward to a common centre and joined to the cross member of the frame by a flexible connection. The rear axle housing is drawn of one piece steel. The driving pinion and differential casing turn on Timken roller bearings. Semi-floating, nickel steel drive shafts, 1½



Westcott Motor.



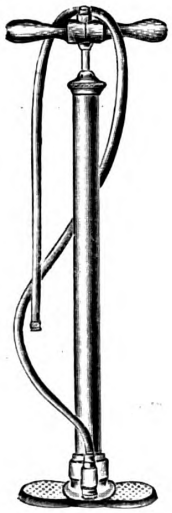
PLAN OF CHASSIS.

inches in diameter, drive the rear wheels.

There are two sets of brakes operating on the rear wheel brake drum. These are internal expanding and external contracting, and are operated in the usual manner. The front axle is the conventional drop forging of I section. Steering is effected through a worm and gear, and provisions are made for easily taking up all wear or lost motion. Semi-elliptic springs are employed in front and full elliptic scroll springs at the rear. The full equipment consists of top wind shield, speedometer, gas tank, two gas lamps, two dash oil lamps, one oil tail lamp, tire repair kit, a tire pump and a full set of tools.

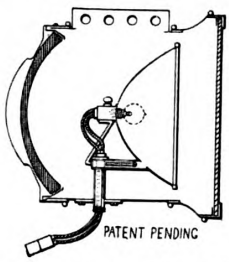
New C & S Auto Pump.

To an already well rounded line of air pumps and grease guns Codman & Shurtleff, Inc., of 120 Boylston street, Boston, Mass., has added a new automobile tire pump. This pump has a 16 inch stroke and 1 5-32 inch bore. Its heavy, mandrel drawn brass barrel is connected at the bottom to a flat steel base, and so located in the centre of the base that both feet may be employed for holding it down, if it is desired. The hose connection at the tire end is also new and is designed to fit the outside thread of the valve stem instead of the inside one. This pump complete lists at $4. It has double metal valves, double parachute packings on the pistons, steel piston rods and best rubber air tubing. The barrels are nickel plated.



Guide Electric Reflector for Gas Lamps.

One of the latest devices in connection with vehicle illumination to appear on the market is manufactured by the Guide Motor Lamp Manufacturing Company, of 2069 East Fourth street, Cleveland, Ohio. This consists of a reflector and its fittings for changing a gas lamp into an electric lamp at no great expense. This fitting will fit any lamp, as it is made to adjust to the gas tube or pillar of the lamp, which is the one standard part in all gas lamps. Its application to a gas lamp requires no alteration, as the parabolic lens or reflector will enter any style or make of lamp.



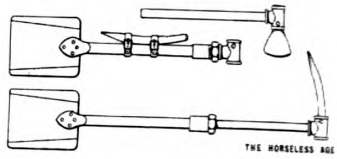
GAS LAMP WITH ELECTRIC BULB AND GUIDE REFLECTOR.

Nonkoroda, a Preparation for Radiators.

This is a preparation manufactured by the Nonkoroda Company, 25 Chambers street, New York city, for the removal and prevention of rust or scale from the radiator and water passages of a motor. It is claimed that after parts have been cleaned and freed of rust and corrosion by this compound, a small quantity used each time the radiator is filled with fresh water prevents further rust or corrosion .

Barnard Combination Pick and Shovel.

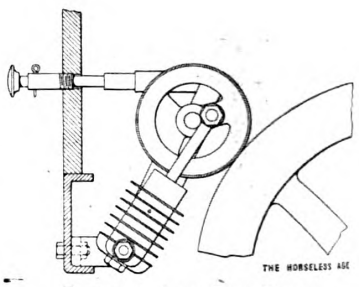
Among the many useful novelties for the convenience of motorists manufactured by the Barnard Specialty Company, Los Angeles, Cal., is a combination set of motorists' and campers' tools. This set consists of a shovel, pick, hammer and hatchet. The handles of these several implements are of steel tubing and are made to telescope, so that when closed for storing in the car their whole length is but 22 inches. All the parts are made to conveniently fit into one implement or to be easily detached for another. In addition to this tool the Barnard Company offers an auto toilet set consisting of water glass, soap, comb, brush, mirror and towels; also a lamp burner cleaner.



BARNARD AUTO AND PROSPECTOR'S IMPLEMENT.

Eberman Automobile Tire Pump.

This machine, which is manufactured by the Eberman Auto Appliance Company, 1205 Monadnock Block, Chicago, Ill., is driven by means of a friction wheel working against the face of the motor flywheel. The pump is constructed along the lines of an air cooled gas engine, and is made entirely of iron and steel, with the exception of the friction wheel, which is of fibre. It is designed to be bolted to the frame of an automobile adjacent to the flywheel, so that the friction wheel can be forced against the face of the engine flywheel by means of the spring push rod. The pump is only 9 inches over all and 5 inches wide. It is operated by forcing the friction wheel against the flywheel by the push rod and clamping it in place while the motor is running at low speed. The only valve in the pump is a 3/8 inch steel ball acting on a seat in the base of the cylinder. This ball is easily accessible.



EBERMAN AUTO TIRE PUMP.

Monitor Commercial Cars.

A line of commercial vehicles is being ffered by the Monitor Automobile Works, ormerly of Chicago and now located at anesville, Wis. Only a single model of hassis is made at the present time, fitted ith a double cylinder opposed 20 horse ower motor, but various types of bodies an be fitted, such as an open express agon, a closed delivery body or a sight-eeing body. The carrying capacity of the ar is 1,500 to 2,000 pounds, or eleven pas-engers.

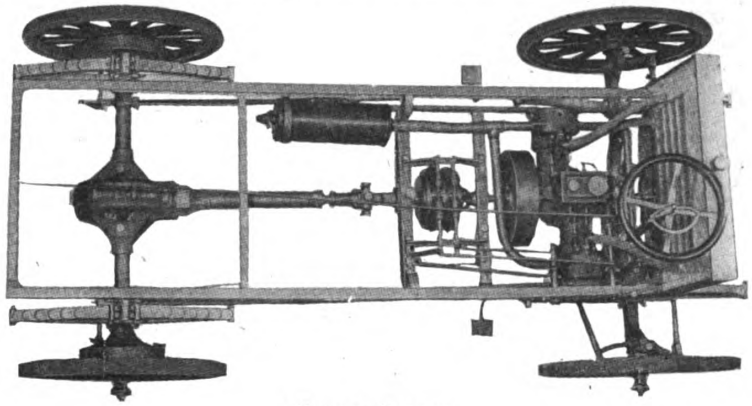
The chassis plan reproduced herewith learly shows the general arrangement of he power plant and driving mechanism. The frame is of pressed steel, of channel section, 4½ inches high, and made from hree-sixteenth inch stock. It is supported n front by semi-elliptic springs, and in the rear by full elliptic springs, 38 inches long. The motor has a bore of 5 inches and a stroke of 4 inches. The crank case is an iron casting, and has a separable top part which can be removed, together with the oiler, after removing four bolts. The usual arrangement of this type of engine, viz., crosswise of the frame at the front of the car, is adhered to. The valves are located in pockets on top of the cylinders, and adjusting means are provided for taking up wear in the valve mechanism. The valve cams act upon roller cam followers. The bearings of the motor are lined with white bronze.

An oiler is built in as part of the motor crank case, and oil is passed to the bearings in direct proportion to the engine speed. The cooling water is circulated through a cellular radiator on the thermo-siphon principle, thus doing away with a pump and fan, and insuring the utmost simplicity. A Schebler carburetor is used, and the Remy fuel system for ignition.

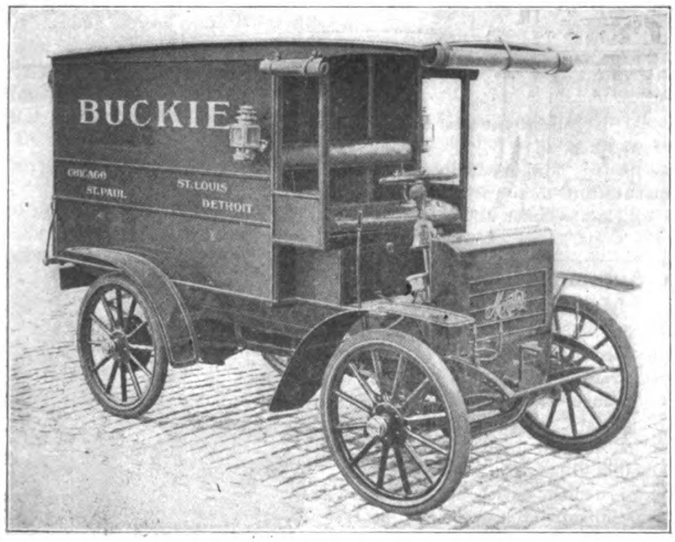
The power is transmitted through a planetary change gear, with a multiple disc clutch for the high speed. The pinions of this gear are made from imported chrome-nickel steel, case hardened. In addition to the high speed or direct drive, the gear affords a low forward speed and a reverse motion, the latter being obtained by applying steel band brakes to the respective drums, the brakes being lined with a special lining material. The drive to the rear axle is through a propeller shaft, with a single universal joint at the forward end. The rear axle is of the semi-floating type, and is fitted with Hyatt roller bearings throughout. The gear ratio for the direct drive is 61, and it is stated that a speed of 20 miles per hour is obtainable. A set of internal expanding brakes act on drums secured to the rear wheels. The front axle is a drop forging of 3 inch I beam section, and has imported ball bearings fitted to the spindles.

The car has a wheel base of 100 inches, and the standard tread. Artillery type wheels are 34 inches diameter, and are fitted with 1¾ inch spokes. Swinehart commercial solid clincher tires are used, of 2½ inch section in front and 3 inch in the rear. The steering gear is of the worm and sector type, and contains provision for taking up lost motion. The car is steered through a hand wheel at the top of a slightly inclined column. The control members consist of one hand lever and three pedals—the hand lever for the high forward speed and the pedals for the low forward speed, reverse and brake respectively. Spark and throttle finger levers are mounted on top of the steering wheel.

The chassis alone has a weight of 2,200 pounds. Its standard finish is red, with black striping. The equipment includes a Remy magneto and dry cell, three oil lamps, a horn and a set of tools. The closed delivery bodies are 42 to 43 inches in width, and 86 inches long back of the seat. The open delivery body is 43 inches wide, 78 inches between the driver's seat and the tail gate, with side panels 12 inches high and flare boards 8½ inches wide. The price of these cars ranges between $1,400 and $1,600.



PLAN OF CHASSIS.



MONITOR DELIVERY WAGON.

Se-ment-ol a Cure for Radiator Leaks.

This compound is one of several articles manufactured for the use of motorists by the Northwestern Chemical Company, of Marietta, Ohio. There is nothing in the compound, its makers claim, that can injure anything. Its whole action is a chemical one. When the powder dissolves in the warm water a vegetable oil is liberated. This oil is at once saponified by a chemical incorporated in the compound. This saponified mass is carried through the leak with the water, and by means of a binder, also in the composition, the mass is held in the hole by the cool air striking and hardening it. The air soon solidifies the whole mass in the hole and the leak stops. The radiator is then ready to be drained and refilled with clean water. Among the other articles marketed by the company are "Thermite," a compound which prevents freezing of the cooling water in winter, and "Tire-Lac," a compound for painting tires and sealing up cracks in their surface.

Wagenhals' Three Wheeled Delivery Wagon.

A novel type of three wheeled commercial vehicle has made its appearance in St. Louis, a product of W. G. Wagenhals, 4569 Washington avenue, that city, an inventor of note in the electrical field. Mr. Wagenhals reasons that the big field in the commercial car line is in the manufacture of a self propelled vehicle for the butcher, grocer, baker, laundryman, and other tradesmen who are limited in the amount of money they can spend for a car. In this line the first cost cuts as big a figure as the daily cost of operation and up-keep. The price at which the car can be sold must not be greatly in excess of what a first class horse drawn outfit will cost. Sizing up the proposition from this standpoint, the three wheeled car suggested itself to Mr. Wagenhals.

To reduce the manufacturing cost, the rear axle construction, with its differential, was dispensed with, and the cost of the extra tire and wheel was also eliminated. It is stated that a three wheeled car can be sold at from $300 to $400 less than a four wheeled car of the same horse power and carrying capacity. In the Wagenhals delivery wagon provisions are made for the complete removal of the rear drive wheel for tire renewal and repairs. By the removal of four bolts the entire wheel and axle can be taken from the frame without disconnecting the chain, and we are informed that this can be done in three minutes, which should be a satisfactory answer to any possible criticism regarding inaccessibility of the drive wheel for tire repairs.

The car is equipped with a double cylinder opposed 4x5 inch motor, rated at 14 horse power, lubricated by a compression oiler with five feeds. Ignition is by coil and dry battery, and the cooling water is circulated by the thermo-siphon system. The change gear is of two speed forward and reverse planetary device. The main frame is made of 4 inch channel steel, reinforced and provided with gussets at the corners. Artillery wheels are used, 30 inches in diameter and fitted with Goodrich quick detachable 3 inch front and 3½ inch rear tires. The drive to the central rear wheel is through a chain with a sprocket ratio of 4 to 1. Full elliptic front and three-quarter elliptic rear springs are used. The steering gear is of the worm and sector type, with spark and throttle levers on the steering column. The delivery body is of the open type, 36 inches wide, 66 inches long and 30 inches high, and is made of sheet steel. A closed body is furnished at an extra price. The load capacity is from 500 to 800 pounds, and the gasoline capacity 9 gallons. On the direct drive the car is capable of traveling at from 5 to 20 m. p. h.

Mr. Wagenhals is now organizing a company to manufacture these cars on a large scale, and will locate either in St. Louis or Detroit.

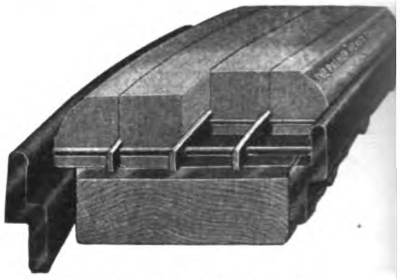
WAGENHALS DELIVERY WAGON.

Ronson Automobile Initials and Monograms.

These initials, which are manufactured by the Ronson Specialty Company, 7-15 Mulberry street, Newark, N. J., are made of solid, heavy gauge brass, hand cut and polished. They are manufactured in two outlines, Script and Old English. They are 7½ inches high and provided with a simple but positive fastening device for attachment to the radiator in a second's time. They are claimed to give a finishing touch to a handsome car.

Features of the Palmer Heavy Truck Tire.

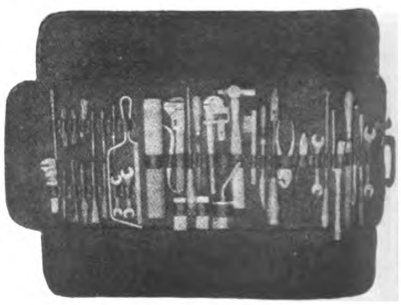
A truck tire with radical features is being manufactured by the Miller Rubber Company, Akron, Ohio. This tire, made up with an 8 inch face, is readily removed or applied to a wheel face, and is composed of four parallel sections of rubber which are separated by steel rings, and both are held in the heavy side flanges by fifty-six cross rods. By this construction it is possible to replace a whole rubber section or any part of one in a small space of time, as no machine is required to apply or remove it, the only tools needed being a monkey wrench and a hammer. The two side flanges are fastened securely to the felloe of the wheel by several bolts. Any desired width of tire can be obtained by varying the number of rubber sections used.



PALMER HEAVY TRUCK TIRE.

Vlchek Auto Tool Kits.

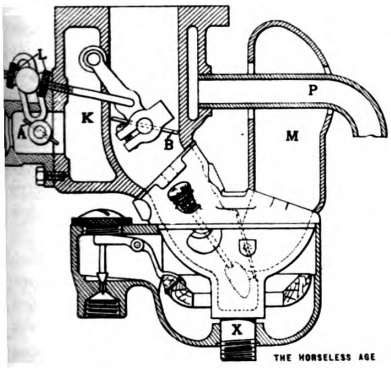
A line of automobile tool kits has been placed on the market by the Vlchek Tool Company, 10709 Quincy street, Cleveland, Ohio. These kits comprise sets of various descriptions and combinations, from a "Little Roadster" kit, with nine pieces and a canvas case, to a "Chauffeur's" set, with thirty-four pieces, and a "Mechanician's" kit, with forty pieces, in a waterproof case. These range in price from $2.50 to $15. The tools are claimed to be of the highest grade, and are fully warranted, while the cases are of heavy waterproof canvas, with leather retaining straps, which are sewed and double riveted.



VLCHEK TOOL KIT.

The Marvel Carburetor.

carburetor in the design of which spe- efforts have been made to secure per- vaporization of the fuel under all run- conditions, without the disadvantage unduly diminishing the quantity of ge taken in at full throttle, has been ught out by the Marvel Carburetor npany, of Indianapolis, Ind. It is a l known fact that the greatest difficulty thoroughly vaporizing the fuel is en- ntered when the engine runs at slow eds, and the flow of air past the spray zle is consequently slow. In the Mar- carburetor the mixing chamber is sur- nded by a jacket through which a part the exhaust gases is passed, the flow of se gases being regulated automatically means of butterfly valve A interconnect- with the throttle valve. This intercon- tion is so arranged that as the throttle closed the valve A opens in proportion. is opening of the valve A is subject to justment through the screws L, in order it just the exact amount of heat may be plied to the mixing chamber walls. After wing through the jacket K the heating ses flow out through the tube P, which sses through the auxiliary air passage M d tends to warm the ingoing air. The ape and location of the air inlet passages e so chosen that the air passes the spray ozzle at several different angles. This mbination of draughts aids in thorough- saturating the raw air with gas before enters the mixing chamber, where the aporization of the gasoline is completed



MARVEL CARBURETOR.

with the aid of the exhaust heated jackets. The constant air inlet is directly underneath the spray nozzle, which is so located that the incoming air removes gasoline from only one side of the nozzle. There is, however, a small opening in the bottom of the crescent shaped valve in the auxiliary air passage, which permits a current of air to pass across the top of the spray nozzle at right angles to the constant air current entering from below the spray nozzle. By the confluence of these two currents a current of air saturated with gasoline is obtained, which is diffused by a counter current of air entering the mixing chamber as the auxiliary air valve gradually opens through the force of the vacuum caused by opening the throttle valve. There are two adjustments, one to regulate the flow of gasoline from the spray nozzle, and the other to control the spring which governs the action of the automatic auxiliary air valve. The spray nozzle is located concentric with the float chamber, in which a cork float maintains a constant level of gasoline.

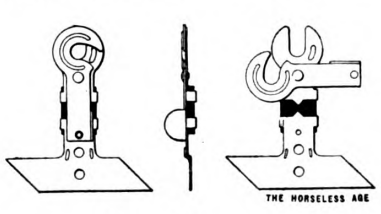
Glesenkamp's Light Coupe.

L. Glesenkamp, Sons & Co., of Pittsburg, Pa., have recently placed on the market a light coupé body for touring purposes which is designed for a medium priced car. The weight of this body is very little more than the regulation light touring or tour-about body. While much cheaper than a limousine the body is claimed to be equally comfortable. The company manufacture bodies of every description, especially limousine and landaulet types.

The Becco Terminal.

An ignition terminal with an auxiliary spark gap included has been placed upon the market by the Beck Company, Rockville Centre, N. Y. The manufacturers refer to it as a "trouble finder," claiming that it locates the cause of a cylinder dropping out very quickly. It shows at sight when the lever is opened whether the stoppage of a cylinder is due to lack of electricity or the spark plug. It also shows whether the spark is weak or strong, and is claimed to burn off oil or carbon from the firing points of the plug, if the lever is left open when the engine is in operation. A block of fibre (shown dark) is clamped between the front and back parts of the terminal, insulating these parts from each other, so that when the lever is opened the electricity, in case it has not failed, will jump the gap. This fact proves that the trouble is with the plug. If there is no electricity, it proves that there is either a short circuit or that the batteries are cut off or worn out.

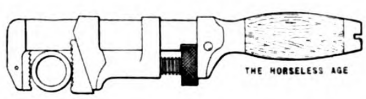
The terminal is quickly and easily attached and detached from the spark plug. The lever when closed locks it on the plug and makes good contact. It is also adapted for use with plugs with the nut to be screwed down on it. The bump in the path of the hook serves to prevent the screw from clamping the lever or switch.



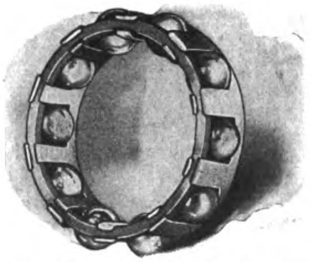
BECCO TERMINAL.

Brosnihan Pipe Wrench.

A new style pipe wrench has been placed on the market by the Brosnihan Wrench Company, 31 Hermon street, Worcester, Mass. In appearance it resembles the common monkey wrench and is adjusted with a knurled screw exactly as a monkey wrench. There are two tool steel jaws, which are

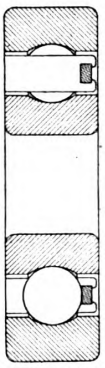


hardened and tempered in oil. One of these jaws is fixed to the bar of the wrench, while the other, which is wedge shaped, is movable and is held against the pipe with a spring and grasps the pipe instantly on the downward movement of the handle bar.



B. F. K. Radial Ball Bearing.

These bearings, made by Berliner Kugellager Fabrik, Berlin, Germany, are being distributed in this country by the J. H. Lehman Manufacturing Company, 500 Fifth avenue, New York. They consist of two rings or races made of high grade steel, hard as glass but very tough, and of balls made from high carbon crucible steel. They

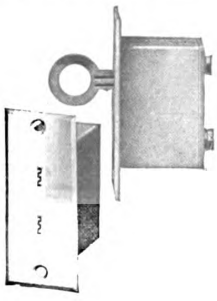


SECTION THROUGH B. K. F. BALL BEARING.

are intended for exceptionally heavy loads, and are provided with ball separators. These separators consist of a solid antifriction steel ring, which is machined to receive the balls, with a retaining ring on one side to prevent the falling out of the balls or separators.

Willard Safety Switch.

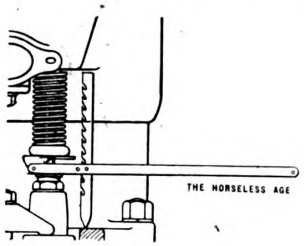
This little device has recently been developed by the Willard Battery Company, of Cleveland, Ohio, to meet the demand for a cheap cut-out switch which would prevent tampering with the electrical installation on an automobile. It is inserted into the dashboard, leaving only a plain escutcheon exposed, and is operated by means of a slotted key which disconnects



the entire system from the source of current. The switch is designed to carry six amperes.

Triumph Adjustable Valve Remover.

This simple little instrument is manufactured by the Mechanical and Electrical Manufacturing Company, 2227 Prairie avenue, Chicago, Ill. It consists of but two pieces. One of these, the standard, has a number of notches milled into one edge,

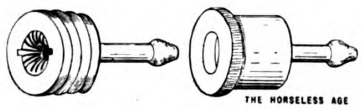


TRIUMPH VALVE REMOVER.

into which the pin which forms the fulcrum and the lever work. The lever is composed of two pieces of steel riveted together and forked at one end to receive the cup in which the valve spring is lifted.

Austin Patented Flexible Coupling.

A flexible air hose connection to fit all styles and sizes of tire valve stems is manufactured by H. K. Austin & Co., of Reading, Mass. This connection is very simple and slips on and off the valve stem very



AUSTIN FLEXIBLE COUPLING.

quickly and readily. A rubber nipple inside the shell of the coupling is guaranteed by the manufacturers to retain a pressure of 150 pounds per square inch.

"Knead-it" for Repairing Cuts in Tires.

A pasty substance for the repair of small cuts in tire cases has just been placed on the market by the M. & M. Manufacturing Company, of Akron, Ohio, the well known manufacturers of vulcanizing solution. When a nick or cut is found a pinch of Knead-it is taken between the thumb and fingers and kneaded to the proper consistency; then it is stuffed into the cut and given time to harden. Its makers claim that a cut repaired with this substance will not open again as long as the outer casing lasts.

General Motors Stock for Wall Street.

It is reported that the stock of the General Motors Company will shortly be introduced in Wall street, and in connection with this report the claim is made that the company, which is capitalized at $60,000,000 last year made profits of $12,000,000. It is said that Wall street bankers are figuring on a new scheme of capitalization, and are making elaborate plans for placing the stock of the corporation.

Coincident with the report comes the announcement of the election of four additional directors of the General Motors Company, including Wilfred C. Leland, Detroit, A. M. Bentley, Owosso; Edwin R. Campbell, Flint, and Schuyler B. Knox, New York.

Pamphlet on Metal Spinning.

A pamphlet on metal spinning has been published by the Industrial Press, 49-55 Lafayette street, New York. It is made up of three articles recently published in *Machinery*. The price is 25 cents.

Metal spinning is an art that was practically perfected long before press working of metals acquired commercial importance. As press working developed metal spinning declined relatively as a manufacturing method, being essentially a process requiring much manual dexterity and skill. It was never superseded, however, for making fine brass, copper and aluminum ornamental hollow ware. It is now being revived in modern lines for other than ornamental work because of certain advantages. Hence the timeliness of a treatise on the subject.

Taxicab Companies Merging.

Plans for the merging of the New York Livery and Auto Company, a subsidiary concern of the New York Cab Company, with the Taxi-Service Company and several other small taxicab and horse cab concerns, are gradually coming to a head, and a definite announcement of the new "trust" is expected at any time. The new combine will control nearly 500 motor cabs and 1,000 of the horse drawn type, but the promoters do not expect to take over the New York Taxicab Company. The Hudson Trust Company is said to be interested in financing the new concern.

Brush and Briscoe Company Now in U. S. Motors.

Announcement has been made by the United States Motor Company that this corporation has formally purchased the Brush Runabout Company and the Briscoe Manufacturing Company, both of Detroit, Mich. Frank Briscoe, president of both the Brush and Briscoe companies, has been elected a director of the United States Motor Company, and it is planned to double the factory facilities of the Brush Company. The other concern will continue to produce radiators and automobile parts at its two plants in Detroit and Newark, N. J.

Comments and Queries.

Traction and Air Resistance.

Editor HORSELESS AGE:

I am running a series of tests on a four cylinder automobile engine, and in order to get certain curves I would like to obtain some information with regard to how the power necessary to drive a machine on a level road varies with the speed. That is, I want to know whether the power varies directly as the speed, or as the square of the speed, or as a function of both, and approximately what form this function would take. There seems to be very little information on this point. I shall consider it a great favor if you can give me an idea of any work that has been done along this line. CHAS. J. BELDEN.

[The power required to propel an automobile on a level road is made up of two factors, used, respectively, in overcoming traction resistance and air resistance. The former factor is directly proportional to the speed (within practical limits, at least), while the latter varies approximately as the square of the speed. The traction resistance on good macadam pavement is generally taken at 25 pounds per thousand. Figures as to the air resistance vary. According to some English experiments it is equal to $v^2 A \times 0.0017$, where v is the speed in feet per second and A the forwardly projecting area in square feet. The resistance is in pounds, and by multiplying this by the speed of the car in feet per minute and dividing by 33,000 you get the horse power necessary.—ED.]

Stock Cars versus Special Racers.

Editor HORSELESS AGE:

Your editorial "Why?" is very much to the point, and the proof that you are right is that never in the history of twenty-four hour racing has there been so little interest shown by the trade (who, after all, are the people most interested, and to whom a race of this nature would be of most importance). Even last year during the week preceding the race everybody with whom one came into contact along Automobile Row talked race. I doubt very much if five people outside of those personally interested spoke to me this week about the race.

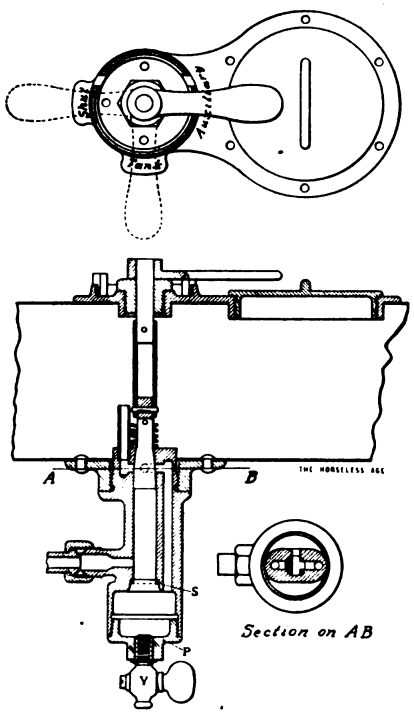
Automobile racing should be conducted so as to convince the general buying public that cars today are absolutely safe from structural and speed points of view. This object cannot be attained by racing special cars, but by racing bona fide stock cars. Then each owner who buys one of these stock cars knows that he has a duplicate of the car that made this or that performance. For the benefit of the automobile industry in general, I hope you will keep on hammering on along the line of your editorial. B. M. ASCH.

Improved Gasoline Reserve Valve.

Editor HORSELESS AGE:

We note in your issue of April 27, page 612, the article headed "Ingenious Gasoline Reserve," and in reference to your comment at the end of this article, viz., "This is probably the simplest gasoline reserve arrangement yet devised," we desire to suggest that when you made this remark you could not have been posted on the Midland gasoline valve which we have been using for some time, and on which there is a patent pending.

The Midland valve offers several advantages not obtained by the device you



MIDLAND GASOLINE RESERVE DEVICE.

refer to. In the device illustrated in your article, when the threeway valve is in the position shown in the centre cut and the gasoline tank is filled, there is nothing to prevent the gasoline from passing through the valve and being wasted, unless this is prevented by a valve or the carburetor, or at some other point in the subsequent passage of the fluid. Furthermore, in this device there is no provision for a clean out at the bottom of the valve, so that any impurities in the gasoline will tend to pass through the pipe and clog same.

We are handing you herewith blue print of our valve, which shows its operation in taking gasoline either from the main tank or the gasoline reserve, and we call your attention to the screen S in the lower part of the valve. All of the gasoline which passes from the tank down through the outlet is delivered to the bottom chamber in the valve and rising passes through the screen S before reaching the outlet to the carburetor. This tends to clean the gasoline from all impurities. In addition to this the pet cock Y can be taken out any time to drain the valve, or the valve plug P can be entirely taken out and the whole cavity be readily accessible for cleaning.

Another advantage which our construction has is shown in the plan of the valve handle. When this handle is set at the word "auxiliary" the gasoline is being used from the lower part of the tank, and the valve cover or plug cannot be taken off when the handle is in this position without turning the handle either to "tank" or "shut." In other words, the operator is reminded to shut the valve entirely when he is filling his gas tank, and this, of course, is an advantage that is readily appreciated.

MIDLAND MOTOR COMPANY,
C. H. Pope, President.

Manufacturers of Knight Engine.

Editor HORSELESS AGE:

Kindly advise me if any American manufacturer of automobiles is using the Knight engine, and, if so, furnish me with the manufacturer's address. Also furnish me with the address of the English auto company that has adopted the Knight sliding valve engine, and of its American representative.

I wish you would exert even more effort toward inducing auto manufacturers to build their six cylinder engines with strokes of about 7 inches, and never less than 6 inches, if the bore exceeds 3 inches. I think the short stroke gas engine has about served its apprenticeship of speed, noise and excessive wear. WM. HINDS.

[The Knight is not being manufactured in this country at the present time, but efforts are being made to induce American manufacturers to take it up, and it is confidently expected by those looking after Mr. Knight's interest in this country that American built cars with Knight engines will be on the market by the middle of 1911. The Knight engine is manufactured in England by the Daimler Motor Company, of Coventry. So far as we are aware, this company has no agency in this country. Mr. Knight's interest are being looked after in this country by F. E. Lonas, care of Kempshall Tire Company, 1777 Broadway, New York.—ED.]

Principle of the Block and Tackle.

Editor HORSELESS AGE:

In rescuing a car mire stalled with double block and tackle, does it matter whether the free end of the tackle is pulled toward or from the car? H. M. WHEELER.

[It does not.—ED.]

What Is a Back Fire?

Editor HORSELESS AGE:

Kindly inform me through the "Comments and Queries" columns of your paper what is a back fire; how caused, and how remedied? In a dual system of ignition, what becomes of the current generated by the magneto when the car is run on the batteries? W. G. WADE.

[A back fire is an explosion of explosive mixture in the inlet pipe which causes a flame to shoot out of the air inlet of the carburetor, or, at least, a loud report at this inlet. The usual cause of such a back fire is an over rich mixture which continues to burn in the cylinders all through the exhaust stroke and after the inlet valve begins to open, thereby igniting the fresh charge in the inlet pipe. A rich charge is very slow burning. The remedy obviously consists in adjusting the carburetor so as to give a properly proportioned charge. Sometimes a back kick of the motor in cranking is erroneously referred to as a back fire.

All sources of electric current have two terminals or poles, and they can produce current only when these poles are connected by a continuous conductor (wires, etc.). In the dual ignition system when the battery is used for ignition, the magneto circuit is opened; it is then impossible for a current to flow from one magneto terminal to the other, and no current is prduced. The magneto will produce an electromotive force or electric pressure, but there is no outlet for this pressure.—ED.]

Gear Ratios.

Editor HORSELESS AGE:

What would you regard as the proper ratio of gearing between the engine and road wheels for a motor delivery wagon of the following specifications: Load capacity, 1,500 pounds (maximum); weight, 2,200 pounds; motor, double cylinder, opposed, water cooled, four cycle, of 5 inch bore and 4 inch stroke; drive, by two side chains; rear wheels, 36 inch diameter? Is there any formula by which such gear ratios may be figured? F. L. SIEBERT, JR.

[We know of no formula applicable to this problem, but should think that the gear would be satisfactory if the car ran 15 m. p. h. when the engine was running at its normal speed, which is probably about 1,000 r. p. m. The car would then be moving—

$$15 \times 5{,}280 = 79{,}200 \text{ feet per hour, or}$$
$$79{,}200 : 60 = 1{,}320 \text{ feet per minute.}$$

The driving wheels being of 36 inches or 3 feet diameter, their circumference is 9.42 feet, and in order to progress 1,320 feet per minute they must make—

$$1{,}320 : 9.42 = 140 \text{ r. p. m.}$$

Since the engine turns at 1,000 r. p. m. the reduction must be in the ratio of 1,000 to 140, or about 7 to 1. It is desirable to vary the gear somewhat in accordance with the topography of the district where the car is to be used.—ED.]

Query.

Editor HORSELESS AGE:

Can you tell me if there is any automobile known as the "Wolverine Flyer"?

R. KRAUSMAN.

[We believe that a car of the above name was made at one time by a concern located in some Wisconsin town, but are unable to say by whom and where. At any rate, it is not being marketed at the present. As you are probably aware, the Wolverine Flyer is the name of a train.—ED.]

Factors Determining "Liveliness" of Engine.

Editor HORSELESS AGE:

Will you please answer through your columns the following query, if possible, citing authorities on the subject: Does the weight of pistons or connecting rods bear any relation to the liveliness or logginess of a four cylinder motor of, say, 4½x4½ inch cylinders? R. J. G.

[We presume that by a "lively" motor you mean one which responds quickly to the throttle, and by a "loggy" motor one which responds to the throttle only slowly. It is well known that the main factor determining the "liveliness" or "logginess" is the flywheel capacity. The piston has a reciprocating motion only, storing up a considerable amount of energy during the first half of each stroke, and giving it out again during the last half. The connecting rod has both a reciprocating and a rotary motion; its upper end moves up and down with the piston, while its lower end rotates with the crank pin.

The "logginess" of a motor is entirely due to the inertia of its moving parts. If it was not for this inertia the motor would pass from a lower to a higher speed instantly upon opening the throttle. However, in passing from a speed of, say, 500 revolutions to a speed of 1,000 revolutions, the energy stored up in the flywheel (and other rotating parts) must be quadrupled, and this necesarily requires time. The weight of the piston has absolutely no effect upon the logginess of the engine, because, as stated, the energy stored in the piston during the first half of a stroke is given out again in the second half, and any appreciable variation in engine speed extends over considerably more than a single stroke, or else it would be unnoticeable. The weight of the connecting rod has a slight effect upon the logginess of the engine, because a portion of the connecting rod weight has a rotary motion which increases and decreases with the speed of revolution of the engine, consequently energy must be added to the connecting rod when the motor is speeded up. This, however, is neglible, as compared with the effect of the flywheel. For instance, in the engine referred to in your query the rotating parts of the four connecting rods would weigh probably in the neighborhood of 20 pounds, while the flywheel might weigh as much as 100 pounds, and the linear speed of the flywheel rim would be about three times as great as the linear speed of the connecting rod heads. Consequently the kinetic energy stored in the flywheel when the speed is increased a certain amount is $5 \times 3 \times 3 = 45$ times as great as the energy which must be stored in the connecting rods.—ED.]

Cornering of Rubber Denied.

The *India Rubber World* flouts the idea held in some quarters that the present high price of crude rubber is due to the cornering of rubber in Brazil, as the result of a law passed some time ago which permits Brazilian banks to make loans on rubber stocks. It says:

"Whatever may be the ultimate effect of the new regulations, it is a mistake to suppose that rubber is being stored on the Amazon today, with the aid of bank advances or otherwise. The price of $3 a pound is so alluring that every producer in the world is hurrying his rubber to market, in order to realize on it before a decline comes. It may be that rubber will go still higher, but it would be superlatively foolish to pay storage charges and interest on bank advances to hold rubber from the market under present conditions.

"Another point against the idea that rubber is being stored in the countries of production is the fact that the imports of consuming countries were never before so large as at this time. On the whole, it appears safe to assert that rubber prices today are as fully controlled by conditions of supply and demand as at any other time in the history of the trade."

Gets $500 for Illegal Arrest.

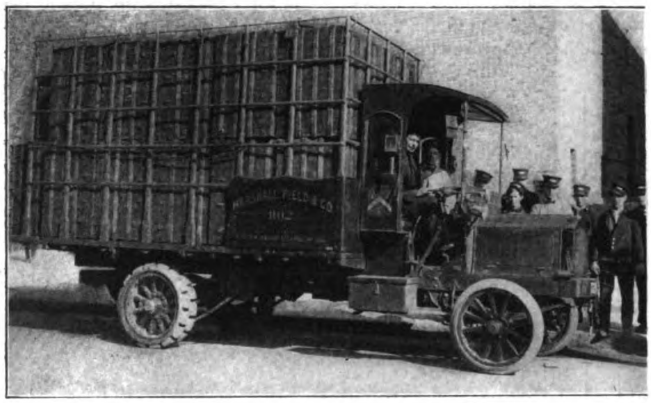
Owing to an error in judgment of picking the wrong man for arrest, De Witt Romaine, an automobile salesman of Jersey City, has been ordered to pay $500 damages to Robert E. Howarth, of the same city, as the outcome of a suit in the Hudson Circuit Court. Howarth alleged that he had been maliciously prosecuted and illegally imprisoned.

It seems that last January two sailors visited Romaine's garage and selected an automobile, for which they offered in payment a check for $1,000. Romaine doubted the genuineness of the check, but he permitted the men to leave it with him. The following day he discovered the check was no good and immediately started a search for the men. Some days later Romaine saw Howarth on the street in conversation with the chauffeur who had driven the car away from the garage with the sailors, and calling a policeman he had Howarth arrested. Howarth had no difficulty in establishing his innocence in the First Criminal Court, Jersey City, and he instituted the suit for damages at once.

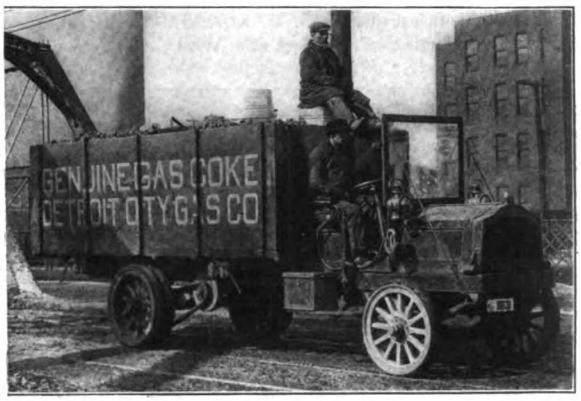
Judge Speer charged that the evidence indicated that Romaine was guilty of malicious prosecution, and the jury coincided with him.

Packard Trucks in Various Lines of Work.

A number of photographs are reproduced below, showing Packard 3 ton trucks hauling various kinds of merchandise. The firm of Marshall Field & Co., of Chicago, uses these trucks for transportation between its retail store and its outlying distribution stations. Other trucks of the same make are used for the direct delivery of furniture. The Detroit City Gas Company uses a Packard truck in the retail distribution of coke. The Adams Express Company uses twenty Packard trucks in both day and night service in New York city. The trucks run between depots and the different distributing stations in Manhattan and Brooklyn. Seeman Brothers, of New York city, use a Packard truck for the rapid wholesale delivery of groceries from their downtown warehouse to store in the upper end of Manhattan. The Anheuser-Busch Brewing Company uses Packard trucks both for beer distribution and for hauling ice. M. Steinert & Sons, of Boston, use a Packard truck for city and suburban delivery of pianos. We have already referred in these columns to the use of Packard trucks by the well known department stores of John Wanamaker in Philadelphia and New York. The Mosler Safe company uses one of these trucks, fitted with a special hoisting apparatus.



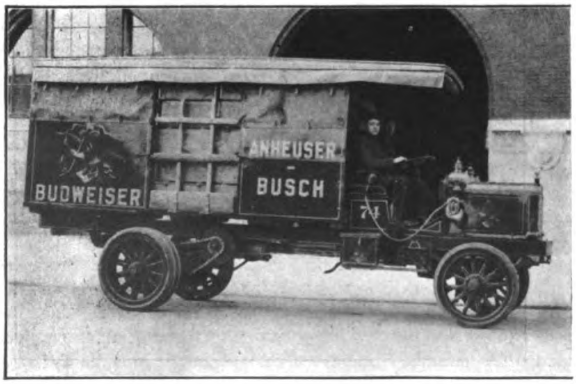
Dry Goods Transportation.



Coke Delivery.

Express Service.

Grocery Delivery.



Beer Delivery.

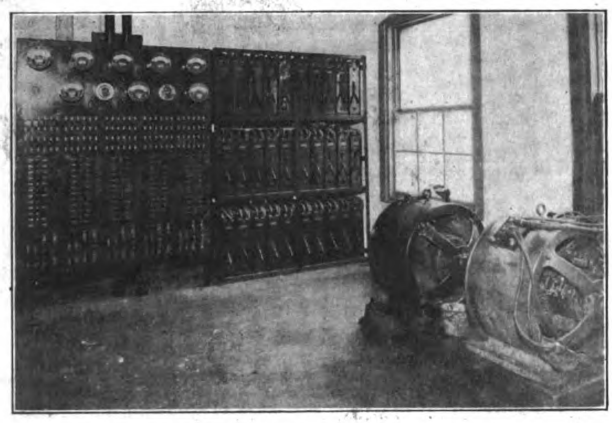
Piano Delivery.

Garage and Salesroom.

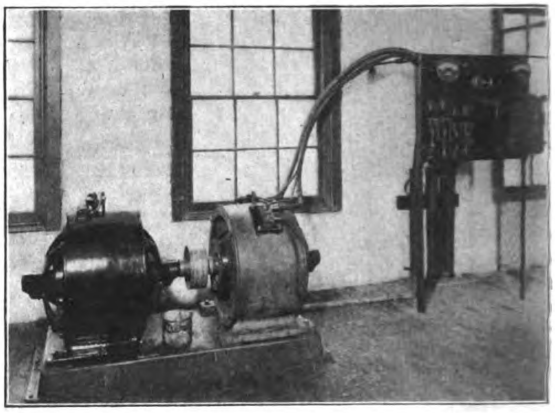
Commercial Garage of H. C. & A. I. Piercy Contracting Company, New York.

An indication of the proportion to which the contract delivery business has grown in at least two cities of the United States is afforded by the large building used to house the vehicles of the H. C. & A. I. Piercy Contracting Company, 422 West Fifteenth street, New York. While this business was originally established with horse drawn vehicles in 1870, and as many as 400 head of horses were at one time employed to carry on the operations, the demand for quicker transportation has led to the adoption of motor cars. The above company ordered 25 Studebaker electric delivery wagons of 850 pounds capacity, fitted with closed panel bodies. As soon as these are delivered other orders are to be placed for cars of various capacities. These electric cars are to be used for short hauls, and later it is expected to place in service gasoline cars for long hauls.

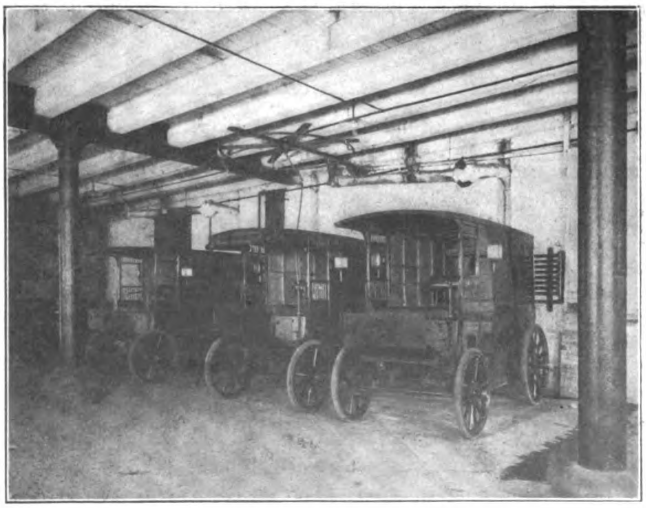
To accommodate this business a large six story and basement building, 50x100 feet, was located next to their six story horse stable. In addition to the six floors of the garage a space 30x100 feet on the top floor of the horse stable has been turned into a paint shop, where the delivery cars are painted and finished to please the ideas or whims of the company for whom the delivering is being done. This building is constructed of brick laid in cement to above the ground line. The floors and roof are supported by iron pillars and steel I-beams. Between the lines of I-beams are 10x12 inch joists placed 4 feet from centre to centre next to the roof and on closer centres beneath the floors. All the floors are of concrete and are 6 inches thick. On all the storage floors the concrete is laid so as to promote perfect drainage. Culverts are laid in the floor about 8 feet apart, which drain to a main sewer at one end of the room. This arrangement makes it possible to wash a car anywhere on the floor, but it was designed principally to permit the easy washing down and draining from the floor of all dirt and drippings from the cars. An 8,000 pound capacity electric elevator connects all floors and the basement, and provides means for transferring cars from one floor to another. A hot water heating plant in the basement furnishes heat for the whole building as well as hot water for tempering the water used in washing cars in the winter. There are washstands on all floors, except those on which are located the repair shop and the battery repair room. Each floor is well



Motor Generator and Charging Board.



Motor Generator and Switch.



Washstand.

Garage of the H. C. & A. I. Piercy Company.

equipped with fire fighting apparatus, such as water and sand pails and hand chemical tanks. There are also high pressure water standpipes arranged along the walls. The building is lighted by electricity, but has also been piped for gas, and the fixtures have been removed so that the gas can only be used in case of emergency.

The machine shop, which occupies the entire top or sixth floor, is well lighted and equipped with one engine gap lathe, a milling machine, a 24 inch back geared drill, a surface planer and a hand forge with hand vise mounted on benched located in front of the windows at each end of the room. The fifth floor is devoted entirely to charging and has twenty plugs arranged at intervals around the room. At the front end of this room are located the motor generator and charging switchboard. Ten charging plugs are also located on the fourth floor and occupy about one-half of the space, the rest being devoted to car storage. Since the acid fumes from the batteries have a serious effect on varnish, the third floor is devoted entirely to the washing, refilling and repairing of batteries. A 40x40 foot room on this floor is separated from the rest and sealed up tightly. This enclosure is painted all over on the inside with asphaltum and the outside is covered with heavy tar paper and also painted with asphaltum. In this room or enclosure the cells are washed and cleaned and all lead burning is done. There is a large tank or tub for washing the batteries, at which two men can conveniently work, one on either side. The second floor is used entirely for storage, as is the first floor, with the exception of a small space in front, where the offices are located. These offices are on both sides of the driveway from the street. On one side are the private offices and on the other the general offices. The basement is devoted to the storage and charging of large electric trucks and also contains the heating plant.

Garage Notes.

Los Angeles, Cal.—The Pico Automobile Company, agent for Paterson cars, and Coleman & Bentel, distributors for Michelin tires in southern California, have consolidated, and both agencies will be handled from the salesroom of the Pico Company, where alterations are now under way to accommodate the change.

Los Angeles, Cal.—The Williams Automobile Company has taken over the garage on the corner of Twelfth and Main streets, and will hereafter display the Moon, Petrel and Schacht cars at that address.

Bridgeport, Conn.—The Matthews Auto Company, a recently incorporated concern, has located at 57 John street, where it has a floor space of 10,000 feet. The company is agent for Atlas cars, and will also conduct an automobile school in the same building.

Wilmington, Del.—Harry F. Otten, manager of the Delaware Automobile Company, will erect a large garage on Washington street, near Fourth street. Work to begin immediately.

Washington, D. C.—The L. P. Dorsett Company last week filed a petition in court asking permission to change its name to the Carpenter Automobile Company.

Eustis, Fla.—J. Igan will shortly build a concrete garage, in connection with which he will conduct a general repair business.

Jacksonville, Fla.—The Clouser Auto Company is erecting a 50x100 foot fireproof artificial stone garage, to be ready for occupancy next month.

Jacksonville, Fla.—Edward Porter, automobile dealer, at 335 East Bay street, has closed a contract with the Duval Trust Company, for the erection of a modern garage on the corner of Laura and Union streets. The structure will be 60x105 feet, of brick and concrete.

Chicago, Ill.—The Michigan Automobile Company has moved to a new location at 1426 Michigan avenue.

Chicago, Ill.—F. C. Wilbur & Co., agents for the Metz car, have opened salesrooms at 113 South Clark street. The firm will maintain downtown salesrooms at 1233 Michigan avenue, as in the past.

Freeport, Ill.—Meyers & Rosenstiel, who conduct a garage at 54-56 Galena street, have taken over the Mernitz Brothers garage at Jastram place, and for the present will operate both establishments.

Rock Island, Ill.—The Yeggy-Trevor Motor Company, a new concern, has taken over the Robert A. Smythe garage at 316-20 Eighteenth street, where it will handle a line of automobiles and conduct a general supply and repair business.

Detroit, Mich.—Mrs. L. F. Stevens has let the contract for the erection of an $8,000 garage on Woodward avenue, between Bagg and Sproat streets.

Detroit, Mich.—The Taxicab Company of America took possession of the Henkel livery stables on Congress street, last week, relegating horses and carriages to the background. The new concern is under the management of J. J. O'Connor.

Leland, Miss.—Ground has been broken for the erection of a garage and warehouse for the Leland Hardware Company. The building will one story, 80x140 feet, and will be ready to take possession of by June 18.

Clayton, Mo.—The Clayton Auto Company is making improvements to its garage, having taken on the Fal car agency.

St. Louis, Mo.—The Haynes Automobile Company has leased the Acme garage at 3944 Olive street and will open salesrooms as soon as alterations to the building can be made. The Acme, with the Kissel Kar agency, will move to a downtown location.

St. Louis, Mo.—The Priesmeyer-Stevens Automobile Company has leased the premises to be vacated by the Johnson Automobile Company at 4390 Olive street. The new tenant will install a complete outfit for the repairing and charging of electric pleasure vehicles and trucks. The Johnson Company will remove to its new building at 4380-2-4 Olive street, about the same date.

St. Louis, Mo.—The Vancoh Realty Company have a contract for the erection of a one story garage at 5800 Delmar boulevard, to cost $13,500.

Miles City, Mont.—H. W. Titus, agent for the Velie car, has taken possession of his new garage on Eighth street.

Hastings, Neb.—Stephen Schultz has commenced work on a new 50x125 foot two story brick garage between Lexington and Burlington streets. The structure will have a plate glass front for display purposes, and in the rear will be a garage and repair shop. It will be finished by June 1.

Omaha, Neb.—Louis Schmitz and Otto Nestman have formed a partnership to conduct a supply and repair business at 2330 Farnam street. No cars will be handled.

Chelsea, N. J.—S. C. Clark is building a garage on Dover avenue, near the beach. A general repair business will be conducted.

Long Branch, N. J.—Seeney & Ladacra, proprietors of the Columbia Garage, have added motor livery to their present business. They have also installed a battery charging plant, a new milling machine and other machine tools, which will enable them to do a general repair business.

Newark, N. J.—William G. Lehman is preparing plans for the erection of a $10,000 two story garage at Halsey and Pearl streets.

Summit, N. J.—R. M. Collins is building a garage on Bank street.

Brooklyn, N. Y.—The Prospect Park Realty Company will shortly commence the erection of a three story 30x100 foot, brick garage on Sixth street, east of Eighth avenue, to cost $20,000.

Buffalo, N. Y.—Thomas B. Jeffery & Co. have established a branch at 745-7-9 Park avenue, under the management of Fred R. Luescher.

Gloversville, N. Y.—The Johnstown Motor Car Company has removed from the Bannister block to 31 South Market street.

Olean, N. Y.—The James Taylor Garage on North Union street has been purchased by R. McDonald, of Fredonia, and L. M. Whitton, of this city. The firm will hereafter be known as the Fredonia and Olean Garage Company. Mr. McDonald will continue in charge of the Fredonia business.

New York City, N. Y.—The Central Garage and Machine Works, 238 West Fiftieth street, has made an assignment for the benefit of creditors to Edwin A. Haaker. Mr. Haaker is secretary of the concern.

Cleveland, Ohio.—J. E. Crabbe has let the contract for the erection of a 50x150 foot, one story garage on East Fifty-ninth street, near Euclid avenue. Work will start at once.

New York City, N. Y.—George W. Perkins filed plans of remodeling the three story stable at 26 Fortieth street into a garage. Alterations will cost $7,000.

Dayton, Ohio.—The Riversdale Motor Car Company has opened its new garage at 719-21 North Main street.

Lima, Ohio.—The Majestic Auto Company has passed into the hands of Victor Hammond, who will continue the business along the same lines.

Medford, Okla.—A. L. Sommers has disposed of his garage and machine shop to Hull & Knopp, who also take over the agency for the Ford car.

Eugene, Ore.—R. T. Veltum & Co. are enlarging their garage on Olive street by an addition of 40x40 feet.

Pennsburg, Pa.—V. H. Steckel, of the Pennsburg Auto Company, has commenced the erection of a large garage.

Pottstown, Pa.—John G. Kugler and Harry B. Kulp have formed a partnership, to be known as the Pottstown Motor Car Company, and are making extensive alterations and an addition to the premises at Apple and Washington streets.

Ridgeway, Pa.—J. Russell Curry has purchased a lot on North Broad street, near the Sweet-Thorn Building, upon which he will build a 25x100 foot, two story garage. A well equipped repair shop and an automobile livery will be features of the new establishment.

Scranton, Pa.—J. P. Needham, agent for Columbia and Maxwell cars, has taken possession of the premises 219 Wyoming avenue, and in conjunction with the garage business will conduct a general repair department.

Memphis, Tenn.—J. M. Goodbar will shortly build a one story, brick garage on Fourth street, near Monroe avenue. The building will cost $10,000.

Salt Lake City, Utah.—Harry Karr and Fred Barnett have secured the agency for Locomobile cars, and for the present will make their headquarters at 109-11 West South Temple street. They contemplate erecting a garage.

Richmond, Va.—A permit was issued to Mrs. A. R. Laurence to build a brick garage at 924 West Broad street, to cost $4,000.

Morrisville, Vt.—The Morrisville Foundry Company is building a 24x48 foot addition to its garage, to be used as a repair shop for automobiles.

Seattle, Wash.—Fred A. Wing, manager of the Broadway Automobile Company, announces that work has commenced on an exclusive 50x128 foot electric garage for the Detroit electrics, on Broadway, between Olive and Howell streets.

Wenatchee, Wash.—The Metropolitan Motor Car Company is erecting a two story, 120x160 foot, reinforced concrete garage, to cost $36,000. Capt. G. Griggs is manager of the Wenatchee branch.

Eau Claire, Wis.—P. J. Holm & Co. are now in possession of the building formerly occupied by the Burdick Motor Company, and will remodel the premises to suit the needs of the company in the manufacture of gasoline engines.

Green Bay, Wis.—Frank J. Briquelet, formerly with the Green Bay Motor Car Company, has opened a garage and repair shop at 215 Stuart street. He will handle the Kline car.

Milwaukee, Wis.—The contract has been let for the building of a garage at 582 Summit street for Julius Rohn.

Milwaukee, Wis.—The Milwaukee Motor Car Company will build a $1,500 addition to its garage at Thirty-second avenue and Burleigh street.

New London, Wis.—Schmidt & Herres, proprietors of the New London Iron Works, have begun the construction of a garage adjoining their machine shop. They are agents for Overland cars.

New Agencies.

SACRAMENTO, CAL.—E. H. Tyron, Haynes.
SACRAMENTO, CAL.—A. Meister & Sons, Kelly motor delivery wagons.
WASHINGTON, D. C.—The Paterson Sales Co., 732 Thirteenth street, Paterson.
WASHINGTON, D. C.—Sims Motor Co., 1310 New York avenue, Haynes.
WASHINGTON, D. C.—Emerson & Orme, Regal.
ATLANTA, GA.—The Georgia Motor Car Co., National.
CHICAGO, ILL.—F. C. Wilbur & Co., 113 South Clark street, Metz.
EVANSVILLE, IND.—Korb & Stewart, Jackson, Ford.
INDIANAPOLIS, IND.—American Garage, Royal Tourist.
BOSTON, MASS.—H. C. & C. D. Castle, Inc., 893 Boylston street, Rauch and Lang electrics.
MINNEAPOLIS, MINN.—J. E. Dougherty, K-R-I-T and Continental.
BILLINGS, MONT.—I. C. Speers, Maytag.
ST. LOUIS, MO.—The Heir-Royster Auto Co., 3432 Shenandoah street, De Tamble.
BROOKLYN, N. Y.—The Borough Automobile Co., 679 McDonough street, White.
ALBANY, ORE.—Barret Bros., Overland.
GANDY, ORE.—White & Scheer, Overland.
SEATTLE, WASH.—Metropolitan Motor Car Co., Lancia.
SEATTLE, WASH.—Samuel Polscheck, 305 East Pike street, Brush runabout.
SEATTLE, WASH.—Frank J. Flanigan, Simplex.
SEATTLE, WASH.—P. S. Steenstrup, Columbia.

Trade Literature Received.

Boston Gear Works, Norfolk Downs, Mass.—Catalogue E3 of Standard gears.

Daimler Motoren-Gesellschaft, Stuttgart-Unterturkheim, Germany.—1910 catalogue of Mercedes automobiles.

The Firestone Tire and Rubber Co., Akron, Ohio.—Folder on the Firestone quick detachable demountable rim.

Chalmers Motor Company, Detroit, Mich.—Poster showing views from the Glidden pathfinding tour of the Chalmers "30."

H. W. Johns-Manville Company, 100 William Street, New York.—Booklet entitled "Practical Pointers on the Care of Automobile Brakes."

The Croxton-Keeton Co., Massillon, Ohio.—Catalogue of the company's type of motor car, and also a folder of the German type of cars built by it.

The Fisk Rubber Company, Chicopee Falls, Mass.—Booklet entitled "A Story in Four Chapters," showing how when a puncture is discovered the deflated tire is removed and a new inflated one substituted by means of the Fish demountable rim.

N. S. U. Motor Co., 206 West Seventy-seventh street, New York City.—Catalogue of N. S. U. motorcycles.

W. S. Sheppard, 21 Lawrence street, Newark, N. J.—Catalogue describing uses and composition of Ideal oils.

Goodyear Tire and Rubber Company, Akron, Ohio.—Pamphlet entitled "Little Things to Save Big Tire Bills."

The Templeton-Du Brie Car Co., Detroit, Mich.—Circular of the Templeton-Du Brie runabout and business wagon.

Dyke's Correspondence School of Motoring, St. Louis, Mo.—Booklet entitled "Automobile Engineering and Operating."

Empire Metal Co., Syracuse, N. Y.—Booklet entitled "As to Babbitt," relating to the Empire babbitt and babbitt bushings.

Metzger Motor Car Company, Detroit, Mich.—Catalogue descriptive of Everitt "30"; also catalogue of Hewitt motor trucks.

H. H. Franklin Manufacturing Co., Syracuse, N. Y.—Booklet on the "Training of Automobile Repair Men, Drivers and Salesmen."

Charles E. Miller, 97-103 Reade street, New York City.—Annual catalogue No. 16 of automobile, motor boat and motorcycle supplies.

Frank Mossberg Company, Attleboro, Mass.—Folder entitled "Growing," giving a description of the increased facilities of its factory.

Ward Leonard Electric Company, Bronxville, N. Y.—Catalogue, "Automobile Electric Lighting by the Ward Leonard Automatic System."

Jones Live Map Meter Co., Broadway at Seventy-sixth street, New York City.—Booklet concerning the uses of the Jones Live Map.

Economy Manufacturing Company, Pittsburg, Pa.—Folder, "Perfection Automatic Battery Charger," describing construction and uses of the magneta.

H. H. Franklin Manufacturing Co., Syracuse, N. Y.—Circular entitled, "How Can You Expect Comfort in an Automobile That Is Rigid in Construction?"

The Hess-Bright Manufacturing Company, Twenty-first Street and Fairmount Avenue, Philadelphia, Pa.—Folder showing cross sections of H-B and B-W-F ball bearings.

The United States Graphite Company, Saginaw, Mich.—Booklet entitled "Graphite Mining in Mexico," and General Catalogue No. 20 of U. S. graphite products.

Stark Rolling Mill Co., Canton, Ohio.—Leaflet entitled "Alumaloyd Bulletin," describing the use of Alumaloyd in the construction of automobile bodies and fenders.

Consolidated Rubber Tire Co., 20 Vesey street, New York City.—Folder, entitled "Two Ways of Getting Across," relating to the Kelly-Springfield solid and pneumatic tires.

The K-W Ignition Co., Whitney Building, Cleveland, Ohio.—Bulletin concerning K-W low tension magnetos, spark coils, master vibrators, spark plugs, searchlights and lighting supplies.

Patents Issued April 5, 1910.

953,698. Steering Gear for Automobiles.—George Laning, La Salle, Ill. Filed July 19, 1909.

953,704. Reversing Gearing.—Frank E. Pace, Jr., Detroit, Mich., assignor, by mesne assignments, to Packard Motor Car Company, Detroit, Mich., a corporation of Michigan. Filed October 1, 1907.

953,723. Wind Shield for Vehicles.—Charles Tolman, New Haven, Conn., assignor to the Hercomb Company, New Haven, Conn., a corporation. Filed December 17, 1908.

953,735. Tire Trunk.—Hyman Cohen, New York, N. Y. Filed October 12, 1909.

953,750. Vehicle Spring.—Ralph W. Mott, Lansing, Mich. Filed January 27, 1908.

953,831. Safety Device for Cranking Explosive Engines.—Charles W. Hillenbrand, Kansas City, Kan., assignor to Nathaniel C. Barnes, Kansas City, Mo. Filed August 12, 1909.

953,873. Metal Tire Shield.—Arthur J. Wicker, Hooker, Okla. Filed July 28, 1909.

Notes of the Industry and Trade.

St. Louis Representation.—The W. & W. Sales Company now represent B. M. Asch of New York in St. Louis, Mo., handling Eames wrenches, Miller grease guns, MotoRope, etc.

Runabout for Omaha Official.—The Omaha, Neb., City Council has passed a resolution to buy a runabout for the street commissioner from H. E. Frederickson, a local dealer, for $1,200.

New Supply Store.—W. C. McNabb, formerly president and general manager of the McNabb Iron Works, Atlanta, Ga., has opened an automobile supply store at 702 Chandler Building.

Healy Changes Name.—The Healy Leather Tire Company has changed its name to the Healy Rim Company, and has removed from its New York quarters in Gold street to 285-87 Jay street, Brooklyn.

A B C Castings in New Foundry.—The A B C Castings Company, Cleveland, Ohio, is now installed in its new foundry at 6515 Carnegie avenue, S. E., where it has the latest equipment for producing castings under ideal working conditions.

More Room for Chase Branch.—The New York branch of the Chase Motor Truck Company, has recently doubled its floor space at 1876 Broadway, and a complete stock of all styles of the company's wagons will henceforth be kept on hand.

Michelin Spreads in Chicago.—The Michelin Tire Company, 1344 Michigan avenue, Chicago, Ill., has outgrown its present headquarters and has removed to 1449 Michigan avenue, taking over the building which was formerly occupied by the Tennant Motor Car Company.

United States Motor Dividend.—A first quarterly dividend of 1¾ per cent. has been declared on the $8,000,000 preferred stock of the United States Motor Company, comprising the Maxwell-Briscoe Motor Company, Columbia Motor Car Company, Alden Sampson Manufacturing Company, etc.

Remy Boston Branch.—The Remy Electric Company, of Anderson, Ind., has opened a branch distributing office at 214 Pleasant street, in the Motor Mart, Boston, Mass. M. H. Pearson, who has been transferred to Boston from the Remy Electric Company's Kansas City branch will have charge of the new concern.

After Terre Haute—Two prospective automobile companies are making propositions to the Commercial Club, of Terre Haute, Ind., for the erection of factories in that city. One of the concerns, which now exists only on paper, will locate there if it can obtain a site and subscriptions to $150,000 worth of stock, while the other company wants to unload $300,000 worth on citizens, and obtain a site of not less than twenty acres. Secretary Duncan, of the Commercial Club, and other members are balking at the stock proposition, but expect to land both companies by offering a bonus.

Amplex Factory for Detroit.—The Simplex Motor Car Company, of Mishawaka, Ind., makers of the Amplex car, have purchased a factory site in Greenfield township, just north of Detroit, and it is said that they will begin the erection of a new factory on that location in the near future.

Fisk Building for St. Paul.—The Fisk Rubber Company, of Chicopee Falls, Mass., is making preparations for the erection of a $10,000 building on West Sixth street, St. Paul, Minn., next summer. Harry T. Dunn, president of the Fisk Company, was in St. Paul recently looking over the tire situation there.

Dart Company Selling Stock.—$13,000 worth of stock in the Dart Auto Truck Company, Anderson, Ind., was subscribed for recently at a meeting of the Chamber of Commerce, of Waterloo, Iowa, and efforts are being made to dispose of $10,000 worth of additional stock in the company in order to secure the factory for Waterloo.

May Buy Lansing Plant.—One of the many merger reports emanating from Detroit recently, states that the General Motors Company has made a deal with the Seager Engine Works, of Lansing, Mich., whereby it will purchase the plant of the latter company, which has been manufacturing a large number of engines for the General Motors Company recently.

Building New Ford Factory.—Work on its new $50,000 factory, at Sheffield, Mo., has been begun by the Ford Motor Company, of Detroit. Some time ago the company decided that trade in the Missouri territory can be supplied to better advantage by opening an assembling plant. As soon as the new quarters are completed car parts will be shipped from Detroit in carload lots for assembling.

Primo Motor Company of Atlanta.—The Primo Motor Company is being organized to manufacture cars at Atlanta, Ga., by E. Van Winkle, of the E. Van Winkle Gin and Machine Company, who will be president. Offices have been established in the Forsythe Building. Other officers of the company are: J. F. Askew, vice president; W. O. Field, secretary and Ed. A. Cerf, treasurer.

Reo Additions.—The Reo Motor Car Company, of Lansing, Mich., plans to make a number of additions to its plant the coming summer. An extension of 100 feet will be made to building No. 6, of brick, one story high and 145 feet wide, which will be occupied by the outside testing department. A new two story, brick building, 400x50 feet, will also be erected and will be used for storage purposes. The company now employs 2,000 men.

Goodrich Cleveland Store.—The B. F. Goodrich Company has removed to its new building at 1743 Euclid avenue. The new store occupies two floors and a basement covering 12,000 square feet.

Auto Factory for Bucyrus.—The Sommer Motor Car Company will locate at Bucyrus, having come to terms with the Industrial Association. Several types of motor cars will be produced. L. A. Sommer is president of the company.

Factory for Anoka.—A committee of citizens of Anoka, Minn., has signed a contract with the Veerac Motor Company, according to which the latter will locate in Anoka, and local residents will subscribe for $25,000 of the company's stock. The company will manufacture a light delivery and general utility car selling at $750.

Austin Stock Subscription.—It is reported from Waukegan, Ill., that citizens have subscribed $50,000 worth of stock in the Austin Automobile Company in an effort to get that concern to locate in Waukegan. The company asks that $75,000 worth of its stock be taken up by local business men before it will agree to locate in that city.

Taxicab Stock Reduced.—According to W. B. Callaghan, president of the New York Taxicab Company, Ltd., of London, Eng., operating in New York, the capital stock of this corporation will shortly be reduced from $2,894,000 to $1,680,000, "to cut down expenses and provide a higher return on the capital invested." This was voted on at a directors' meeting in London last week.

Michigan Motor Specialty Company.—The Hastings Motor Shaft Company, recently organized at Hastings, Mich., has begun the erection of a factory, and will manufacture solid cam shafts, crank shafts and motor specialties. It has an authorized capital stck of $50,000, of which $28,000 has been subscribed for. Arthur E. Mulholland is president, J. L. Allen, vice president and general manager, John T. Lombard, treasurer and John F. Goodyear, secretary.

Club Notes.

The Board of Trade of Nashville, Tenn., has appointed an automobile committee, with Leland Hume as chairman, to organize an automobile club in that city, with the special object of making arrangements for welcoming and entertaining the Glidden tourists in Nashville. A preliminary meeting was held on the day Pathfinder Dai Lewis passed through the city.

One of the first things to be undertaken by the recently organized Indianapolis Auto

and Aero Club will be the placing of guide signs on all roads leading out of Indianapolis. Among other things the club will place signs half way to Chicago, while the Chicago Motor Club will place the signs for the remainder of the way to Chicago. These signs will be of iron, and will be 9 feet high.

The Chicago A. C. will celebrate the opening of the new addition to its clubhouse with a house warming on the evening of Friday, May 27.

A lecture on the subject of graphite was given by Edward G. Acheson, D. Sc., May 17 at the A. C. A., illustrated by samples, experiments and charts showing the results of tests of different lubricants and abrasives.

The A. C. of St. Louis held its annual meeting on May 2, and elected the following officers: Sam. D. Capen, president; Roy F. Britton, vice president, and Samuel Plant, secretary and treasurer. According to the annual report the club has 427 members, as against 356 last year. The cash balance on hand is $5,391.89 as against $4,517.12 on May 3, 1909.

Trade Personals.

L. A. Van Patten, formerly a Chicago newspaper man, has been appointed publicity manager of the Hudson Motor Car Company, of Detroit, Mich.

A. R. Pardington, vice president of the Long Island Motor Parkway, Inc., has been laid up with an attack of acute indigestion. He is said to be improving.

D. Kelley Roberts, until recently a Nashville, Tenn., newspaper man, has assumed duties as sales manager of the Nashville Motor Car Company in that city.

C. C. Hildebrand, who for a number of years has been sales manager of the Stevens-Duryea Company, has resigned to accept a position as assistant general manager of the Chalmers Motor Company.

J. S. Draper, of the Mora Motor Car Company, is temporarily in charge of the metropolitan branch of the company at Broadway and Fifty-second street, until the appointment of a permanent manager.

George S. Delaney has been promoted from the office of general superintendent to general manager of the Chalmers Motor Company. He will be succeeded in the former capacity by George Braithwaite, who is also factory manager.

D. P. Thorpe, of Detroit, Mich., has associated himself with the F. S. Carr Company, of Boston, manufacturers of automobile top materials. Mr. Thorpe was for many years connected with H. Scherer & Co., of Detroit, and is well known in the carriage trade in the Middle West.

F. W. Sinram has tendered his resignation as secretary and director of the "Long-Arm" System Company, Cleveland, Ohio, effective June 1, to take an active interest in the Van Dorn & Dutton Company, also of Cleveland, with which he will be connected in a similar capacity.

Portland Chauffeurs' Club Reorganized.

At a meeting of the Portland Chauffeurs' Club the following officers were elected: President, W. B. McDowell; vice president, F. C. Robinson; secretary, Charles Worth; treasurer, Fred Simonton. The club has been completely reorganized, and it will be the policy of the organization to raise the morals of the members as much as possible, and to establish the proper relations between the people and the chauffeurs.

The clubrooms are at 173 Eleventh street, and have recently been fitted up at an expense of $4,000, the cost being met by the club. At present there are 200 members in club, but it is expected that 200 more will join within the next year. The regular dues of the club are $1.50 per month, and the membership fee $5. The fee for associate members is $10 per annum, and many Portland dealers have already become associate members.

Oscar Lear Receiver's Final Report.

The final report of Receiver Charles L. Bauer, of the Oscar Lear Automobile Company, Springfield, Ohio, was filed in the Common Pleas Court, of that city on May 7. The report shows substantial earnings since the beginning of the year. The complete report follows:

ASSETS AND LIABILITIES.

Assets, fixed	$76,566.26
Assets, quick	190,293.80
Deferred charges	4,426.76
Total	$271,283.84
Direct liabilities	61,681.87
Indirect liabilities	157,389.75
Total	$219,071.62
Total assets	271,283.84
Total liabilities	219,071.62
Net gain for year	$52,212.22
Net gain for January, 1910	6,494.49
Net loss for February, 1910	4,523.63
Net gain for March, 1910	6,775.45

Bonnell Assistant to Reeves.

Horace A. Bonnell, treasurer of the A. A. A., has joined the forces of the Association of Licensed Automobile Manufacturers. He will act as assistant to Alfred Reeves, the general manager, taking the place made vacant by the resignation of C. F. Clarkson, who is now associated with the Society of Automobile Engineers. Mr. Bonnell has been in the trade and industry for some time. He is one of the pioneer automobilists, and for several years was secretary of the New Jersey Automobile and Motor Club of Newark. He has been manager of the Newark show for the past three years. Largely through his efforts the Associated Automobile Clubs of New Jersey were reorganized.

Damage Suits Against Chauffeurs' Union.

Three suits for $20,000 damages, each for breach of contract, were started in the Superior Court at Chicago on May 6 against the officers and members of the Chauffeurs' Union. These suits are an outcome of the recent taxicab strike in Chicago. The complainants are the Walden W. Shaw Auto Livery Company, the Auto Taxicab Company and the W. M. Trout Auto Livery Company. The contract of the union with the Shaw concern expired May 1, nearly a month after the strike was ordered, and that with the Auto Taxicab Company on the same date. Agents of the Employers' Association, who investigated the property holdings of the union and its officers and members, reported that damages could be collected if judgments were obtained.

Callan Bill Amended to Suit Governor.

Following a conference held with Governor Hughes at Albany during the past week, his objections to the Callan automobile bill were met with amendments, and the measure is now in form to meet executive approval. Bearing the scars of its long struggle since first being presented to the legislature, the bill is still before the Senate and will likely be passed any day. It is understood that the proposed law will bring about $1,500,000 additional revenue to the State.

Tire Suit Dismissed.

A suit filed in the United States District Court at Indianapolis in January by the Single Tube Automobile and Bicycle Tire Company of New Jersey against the Kokomo Rubber Company, of Kokomo, has been dismissed at the request of the plaintiff, it being understood that an amicable agreement was reached. The suit was brought to recover $5,606.78 held to be due the plaintiff for royalties.

Business Troubles.

Winfield T. Durbin, former Governor of Indiana, has been appointed receiver for the Anderson Carriage Manufacturing Company, of Anderson, Ind., one of the largest and apparently one of the most prosperous concerns of the kind in the State. Harvey J. Blacklidge, treasurer of the company, asked that such action be taken. Assets are said to amount to about $150,000, with liabilities of about $200,000. Some time ago the company spent about $30,000 in equipping a motor buggy department, and these vehicles did not meet with the sale anticipated.

Robert B. Currie, dealer in automobile supplies, under the tradename of Currie Supply Company, 912 Sixth avenue, New York city, has made an assignment to Alex. H. Hamilton, who will carry on the business at the same place and under the same name.

New Incorporations.

Liberty Auto Company, Pittsburg, Pa.—Capital stock, $5,000.

Auto Central Company, Philadelphia, Pa. Capital stock, $25,000.

Smyrna Automobile Company, Smyrna, Del.—Capital stock, $25,000.

Rotary Valve Motor Company, Detroit, Mich.—Capital stock, $100,000.

The Parker Motor Company, Hartford, Conn.—Capital stock increased from $50,000 to $100,000.

The Philadelphia Motordrome Association (incorporated in New Jersey). Capital stock, $2,000.000.

Oneida Garage Company, Utica, N. Y.—Capital stock, $1,000. Incorporators: H. S. Powell, Frank Bowen and Hugh Foulks, all of Utica.

The Kissel Automobile Company, Hartford, Wis.—Capital stock, $5,000. Incorporators, G. A. Kissel, H. K. Butterfield and W. L. Kissel.

Robinson Motor Car Construction Company, Detroit, Mich.—Capital, $20,000. Incorporators: N. M. Robinson, O. C. Currie and Wm. Elsie.

The Campus Auto Garage, Rochester, N. Y.—Capital stock, $1,000. Incorporators: Eugene A. Stein, James Barry and Henry D. Shedd.

The Martinsville Auto Company, Martinsville, Ind.—Capital stock, $10,000. Incorporators: K. I. Nutter, W. E. Clark and Blanche M. Nuter.

Factory Auto Supply Company, Chicago, Ill.—Capital stock, $10,000. Incorporators: George W. Stephens, William A. Conover and Spencer Ward.

Delaware Motor Company, Wilmington, Del.—Capital stock, $100,000. Incorporators: W. W. Knowles, C. E. Burchenal and S. D. Townsend, Jr.

The Acme Box and Shook Company, of Kenton, Ohio, has changed its name to the Acme Automobile Company, and increased its capital to $25,000.

Owosso Motor Company, Owosso, Mich.—To manufacture light delivery wagons. Capital stock, $200,000.

Alsten & Goulding Company, Worcester, Mass.—To deal in automobile tires. Capital stock, $75,000. Incorporators: J. A. Alsten and H. C. Goulding.

Martine Motor Car Company, Westfield, N. J.—Capital stock, $25,000. Incorporators: Levi Douglass Darby, George W. Frederick and Harry C. Darby.

Automobile Owners' Association, Inc., Philadelphia, Pa.—Capital stock, $250,000. Incorporators: J. C. Niles, F. J. Niles, W. Wilson, Alan Carson, H. J. Kunkle.

White Spot Safety Signal Company, Manhattan, N. Y.—To deal in automatic signals for automobiles and vehicles of all kinds. Capital stock, $100,000. Incorporators: L. O'Brien, E. E. Davis, Montclair, N. J.; J. T. Bunt, New York city.

Clark Motor Company, Buffalo, N. Y.—Capital stock, $50,000. Incorporators: S. B. De Long, J. W. Van Allen, H. J. Rente.

Benz Motor Company, Chicago, Ill.—Capital stock, $2,500. Incorporators: Emil C. Wetten, Chas. H. Pegler and Chas. V. Clark.

Albany Automobile Exchange, Albany, N. Y.—Capital, $5,000. Directors: John A. O'Connor, Harry W. Nutter, Richard C. O'Connor, all of Albany.

Farrington-White Company, Chicago, Ill.—To deal in automobiles. Capital stock, $10,000. Incorporators: Wm. P. Farrington, Frank B. White and William B. White.

The Peninsular Gear Works, Detroit, Mich.—Capital stock, $60,000. Incorporators: John B. Myers, Elmer D. Greenamyer and Fritz Offenhauer, of New Castle, Ind.

Horseshoe Auto Tire Company, Manhattan, N. Y.—Capital stock, $25,000. Incorporators: W. E. Holloway, W. Huber, New York city; H. D. Foster, Tompkinsville, S. I.

American Rapid Transit Company, Boston, Mass.—To engage in a general automobile business. Capital stock, $200,000. Incorporators: G. A. Smith and F. L. Townsend.

Adirondack Auto and Livery Company, Albany, N. Y.—Capital, $2,500. Directors: Albert H. Perkins, Fulton; B. F. Vandervoort, New York; Anson H. Higley, Albany.

The Coryell Automobile Sign Holder Company, Trenton, N. J.—Capital stock, $10,000. Incorporators: Harry S. Provost, J. D. Coleman, George H. Poulson and Theodore Backes.

The Akron Inner Tube Company, Akron, Ohio.—Capital stock, $10,000. Incorporators: Jesse E. Dice, Thomas E. Erally, Frank J. Mishler, Charles J. Alpeter, and John D. McCoy.

Fry Brothers Motor Company, Columbia, Tenn.—Capital, $5,000. Incorporators: W. A. Dale, Horace Rainey, G. E. McKennon, John W. Fry, J. C. Parks, Charlton Fry and C. H. Fry.

The Sandusky Auto Parts and Truck Company, Sandusky, Ohio.—Capital stock, $150,000. Incorporators: Daniel E. Storms, J. M. Woods, Owen T. Snyder, E. M. Freeman and Simeon Nash.

Cortland Motor Wagon Company, Cortland, N. Y.—To deal in automobiles and accessories. Capital stock, $100,000. Incorporators: R. H. Jadwin and C. H. Pond, of Scranton, Pa.; L. O. Meacham and H. Duffey, Cortland, N. Y.

Crafts & D'Amora Company, New York City.—To deal in automobile accessories. Capital stock, $3,000. Incorporators: J. C. Leuze, 43 Cedar street; Howard T. Graves, 120 Broadway, and Jos. A. Michel, 203 Broadway, New York city.

The Glens Falls-Bolton Auto Stage Line, Glens Falls, N. Y.—Capital stock, $5,000. To operate automobiles in and about Glens Falls and Lake George. Incorporators: Frank D. Miller, J. Ernest Miller and Alta M. Miller, all of Glens Falls.

The Cleveland Automobile Spring Company, Cleveland, Ohio.—Incorporators: Christian Girl, John B. Hull, Ernest W. Farr, C. E. Clemens, Edward H. Runde and William I. Lawyer.

Universal Motors Company, incorporated in Delaware.—Capital stock, $5,000,000. Incorporators: Chas. G. Guyer, Wilmington; George G. Schroeder, Washington, D. C., and S. E. Beck, of Wilmington.

The Connery Transportation Company, Inc., Clinton, Mass.—To engage in a livery and automobile business. Capital stock, $10,000. Incorporators: James F. Stratton, of Milford, Mass., and Wm. H. Connery, of Clinton, Mass.

The Dusseau Motor Car Company, Toledo, Ohio.—Capital stock, $30,000. To operate a sales agency and garage at Toledo, Ohio. Incorporators: S. W. Dusseau, M. G. Dusseau, A. J. Marleau, F. X. Dusseau and R. Dusseau.

Tremont Motor Car Company, Bronx, N. Y.—Capital stock, $1,000. Incorporators: Seymour Mork, 609 Oak Tree place, Bronx; Harry Block, 6 West 115th street; Emanuel M. Kaiser, 60 East Sixty-seventh street, New York city.

Fort Wayne Auto-Motor Company, Fort Wayne, Ind.—Capital stock, $50,000. Incorporators: F. L. Jones, A. D. Cressler, H. P. Scherer, G. H. Loesch, S. S. Bowersox, J. B. Reuss, A. J. Vesey, M. E. Veaver and D. B. Douglass.

The English Motor Car Company, Massillon, Ohio.—Capital stock, $25,000. To engage in a general automobile and garage business. Incorporators, F. A. English, W. P. English, H. W. Loeffler, George W. Krotsch and Homer A. Hoftzeger.

Taxiflyer Company, Bronxville, N. Y.—To deal in and rent automobiles. Capital stock, $6,000. Incorporators: A. H. Johnson, Bronxville, N. Y.; Earl Beyer, 52 William street, New York; and Harry A. Bemis, 25 Liberty street, New York city.

The Williamson Garage Co., New Brunswick, N. J.—Capital stock, $50,000. Incorporators: Walter M. Williamson, New Brunswick, N. J.; Norman H. Smith, 345 Bergen Avenue, Jersey City and John B.

The Auto Motor Castings Company, of Cleveland, Ohio.—Capital stock, $50,000. To manufacture castings and other accessories for motor cars. Incorporators, Adelbert J. Miller, Charles H. Gunkleman, Wm. Schofer, Wm. Baisch and A. L. Applby. Buckslow, 363 Forrest Street, Jersey City.

The Studebaker Automobile Company, an Indiana corporation, has filed a statement with the Secretary of State of Wisconsin, with the object of doing business in that State. The capital of the company is $100,000, and it has a $3,500 interest in Wisconsin.

Long Island Automobile Machine and Plumbing Company, Amityville, N. Y.—Capital stock, $15,000. Incorporaotors: Thos. Blyth, 126 East End avenue, New York city; Wm. E. Hulse, Amityville, N. Y., and Wm. F. Conran, Jr., 36 Tompkins place, Brooklyn, N. Y.