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A. C. A. SEALED BONNET CONTEST.

Preliminary Preparations.

There was a busy time at the A. C. A. clubhouse on Tuesday afternoon, when all of the cars entered in the Sealed Bonnet Contest were brought to the club's garage and there turned over to Robert Lee Morrell, A. L. Riker and the contest committee of the club. The machines were presumed to be completely equipped for the contest, and seals were affixed to all operating parts. Trouble arose when members of the committee sought to bind down the covers of coil boxes by passing wires over and around them. The contestants complained that these wires were likely to cause short circuits, and after some argument the committee decided to use cord instead. Cars having their water and oil tanks under the bonnet were required to provide a special equipment, by means of which the tanks could be filled without raising the bonnet.

There was every indication of the contest becoming a record breaker in several respects. Primarily in the number of entries and the absence of withdrawals, and in the fact that at 5 o'clock on Tuesday afternoon all of the cars entered were in the club's garage properly sealed and with tanks filled ready for the first day's run. The delay and bickering which usually precedes a contest was pleasingly missing.

It was a noticeable fact that although under the rules there was no penalization for stops as a result of tire trouble, a great many of the contestants had fitted their machines with new tires to minimize the possibility of delays from this source.

All of the drivers of the cars and the official observers reported at the clubrooms at 8 o'clock Tuesday night for final instructions, and all questions they asked were answered. The observers were also given their first day's assignments; the observers being assigned to different cars on each day of the run. Observers were warned to note all stops made and the cause thereof, and were cautioned not to allow drivers to make up any time lost as a result of punctures, traffic delays or any other cause, but to add the lost time to the total driving time for the day and have the car finish that much later. In the event of anything happening which necessitated the breaking of a seal on the car, the observers were told to 'phone at once to the clubhouse and report the trouble, and then withdraw the car from the contest.

During the evening the report was circulated that it had been the intention of the entrants of the American Mors to have Miss Pauline Frederick, an actress, drive one of their cars. They undertook to do this, owing to the fact that there was no clause in the rules governing the contest specifically barring women from participating, and they thought it would be a good advertisement to have such a well known woman driving. The entrants of the car finally yielded to the suggestion of the committee, who thought it would be unwise to have Miss Frederick drive, and her name was withdrawn and a shop mechanic substituted in her place.

It was well on toward midnight Tuesday when the contestants turned in to enjoy a much needed rest in contemplation of the strenuous run of the morrow.

Before the Start.

A string of automobiles representing almost all of the well known makes and types, and each appropriately labeled with the insignia of the A. C. A., lined up shortly after 7 o'clock on Wednesday morning, and the drivers waited for the word to go. The weather was cloudy and most of the contestants donned their rain clothes, but the day eventually turned out to be an ideal one.

It had been the idea of those in charge of the run to start the first of the cars at 7:30 o'clock, and send the others off at one minute intervals, but this, like many another well laid plan, fell through, and it was 8 o'clock before the first car was given the word to start from the handsome new clubhouse and garage of the A. C. A. in Fifty-fourth street. In the meantime an admiring crowd filled the street and walked up and down and even around into Eighth avenue, where the cars were crowded into line, looking over and commenting on the various machines.

There was something missing, however, and the void seemed a great one to the man who had witnessed the start of other big contests. The crowd was there, as were the cars, and their begoggled and weirdly clad drivers and passengers, but the street was strangely quiet. There was no rushing around with extra parts and tools; no roaring of engines being tested, and no oil begrimed mechanics giving things a final tightening and greasing up. On the contrary everyone seemed to be at ease and confident, for the time for adjusting and oiling had passed, when the machines were turned over to the committee on Tuesday afternoon, and the bonnets, gear boxes, coils, and, in fact, all vital parts had been sealed, with a positive penalty of absolute disqualification for breaking any of the seals. The car must needs go through the coming 600 mile test without adjustment, or not at all, so the contestants just stood about waiting for the appointed starting time to arrive, and decided to trust to luck.

It may seem just a bit unfair to use the word luck in connection with an event of this sort, and yet any motorist will readily appreciate that some slight disarrangement of the mechanism might easily put a car out of the contest, for even though the adjustment necessitated occupied but a fractional part of a minute it would be necessary to break the seal to make it, and this

BEFORE THE FIRST DAY'S START.

would end the chances of that particular car. The record would show it to have been disqualified, but despite this it might be a far better car than some other machine which just happened to get through without such mishap. That the manufacturers appreciated the possibility of such an occurrence was demonstrated by the fact that some of them entered two and even three cars in the event.

In looking over the cars one could not help but note the wonderful progress made by the American manufacturers, whose products, to all outward appearances, sized up favorably with the finest creations of the foreign factories. The new and popular speed runabouts with rumble seats were much in evidence, there being a number of them entered in the test. Gasoline cars, of course, predominated, steam having but a slight representation in the two White cars entered. The machine which attracted the greatest amount of attention and comment was the Columbia 40-45 horse power gasoline-electric touring car driven by C. F. Barrett, of Hartford, Conn., who successfully piloted a Columbia 30 horse power touring car through last year's Glidden Tour, finishing as one of the thirteen perfect score cars. Mr. Barrett explained the working of the car to a large number of curious and interested persons. The machine is, to all appearances, a four cylinder gasoline touring car, but it is fitted with direct electric transmission and control. This is the first time in the history of automobiling, either in this country or abroad, that a gasoline car with anything but a mechanical change gear system of transmission has been entered in any contest.

It took only a glance at the line-up of cars and at the entry list to convince one that the contest was entirely a manufacturers' affair. According to the rules the object of the contest was "to afford the opportunity of demonstrating under severe touring conditions, without adjustments, repairs or replacements of any kind, excepting tires, the continuous running qualities of the modern stock touring car now offered to the public." With this idea in view, all of the cars were stripped of all tools, with the exception of those used in making tire replacements, and the string of machines was turned loose to sink or swim in the struggle for perfect scores and complete publicity.

It will be seen from a glance at the entry list that practically all of the big makers are represented and competing for the glory of a perfect record. There were forty-five American cars in the line-up and three foreign, the latter contingent being represented by two Darracqs and one Rolls-Royce.

The competing cars were classified according to the catalogue selling price. Class A were stock cars complete, without tops, listed at $3,000 or over; Class B, stock cars listed at over $1,500 and less than $3,000; Class C, stock cars listed at $1,500 and under. There were twenty-four Class A cars, twenty-one Class B and three Class C, and in these were found all powers, from the 60 horse power Thomas and De Luxe cars to the small but sturdy 12-14 horse power Maxwell runabout. For all cars but runabouts in Class A the daily runs were scheduled at 150 miles, they being required to go 175 miles.

First Day's Run.

When the hour of 8 approached the word was given for the contestants to get ready, and almost instantly the street was in an uproar from the exhausts of scores of cylinders. Great clouds of oil smoke rolled out of exhaust pipes and filled the street, and it was plainly evident that none of the contestants were going to take any chances on lubrication troubles. All was excitement and the street was in a hubbub, but the committee finally whipped things into shape, and at 8 o'clock the first car, a Corbin runabout, was sent off, and the others followed at half minute intervals.

The day's run had been scheduled to Patchogue, L. I., and return, via the Hoffman boulevard and Jericho turnpike to Mineola, thence north to Roslyn, east to Hicksville road, south to Massapequa and then along the shore to Patchogue, retracing the same route on the return. It was necessary for the contestants to drive to the East Thirty-fourth street ferry, and there was some confusion and delay there until the special boats secured by the A. C. A. were docked and the cars taken aboard. It took several trips to ferry them all across. Once on the Long Island side a wild dash was started for Newtown, a distance of 6 miles, where the official time of

ENTRY LIST.

Official No.	Class.	Type of Car.	Make of Car.	Selling Price.	Driver.	Entered by
1	A	40 H.P. Touring	Berliet	$7,500	P. J. Johnson	Amer. Loco. Auto. Co.
2	B	30-35 H.P. "	Stoddard-Dayton	2,500	E. C. J. McShane	Atlantic Motor Car Co.
3	B	30-35 H.P. Runabout	"	2,500	R. Newton	" " "
4	B	36 H.P. Touring	Glide	2,500	J. C. McCafferty	Geo. J. Scott Motor Co.
5	A	40 H.P. "	Lozier	5,000	H. Michener	H. A. & J. T. Lozier
6	A	40 H.P. "	"	5,000	R. Mulford	" " "
7	B	35 H.P. "	Elmore	2,660	A. M. Day	Arthur M. Day
8	A	30-35 H.P. "	Locomobile	4,500	H. Mitchell	Loco. Co. of America
9	B	15-20 H.P. "	"	2,800	J. Florida	" " "
10	A	40 H.P. "	"	3,000	A. J. Bants	" " "
11	A	15-20 H.P. "	"	3,000	T. Beck	" " "
12	A	60 H.P. "	Thomas Flyer	4,000	M. Roberts	Harry S. Houpt
14	A	45 H.P. "	Pierce Arrow	5,000	J. S. Williams	Harrolds Motor Car Co.
15	B	40 H.P. "	Aerocar	2,750	A. M. Robbins	Aerocar Co.
16	A	45 H.P. "	Royal Tourist	4,000	R. Tucker	Royal Motor Car Co.
17	B	40 H.P. Runabout	Continental	2,700	C. S. Johnston	Con. Auto. Mfg. Co.
18	A	45 H.P. Touring	Columbia	7,500	C. F. Barrett	Electric Vehicle Co.
19	B	25-30 H.P. "	Pope-Hartford	2,750	P. Hines	A. G. Southworth Co.
20	A	50 H.P. Touring	Pope-Toledo	4,250	Joe Judge	" "
21	B	35-40 H.P. Runabout	Oldsmobile	2,750	W. Folberth	Olds Motor Works
22	B	30 H.P. Touring	Knox	2,500	A. E. Dennison	Knox Automobile Co.
23	B	30 H.P. Runabout	"	2,500	W. A. Bourque	" " "
24	A	50-60 H.P. Touring	De Luxe	4,750	C. S. Beach	Motor Sales Co.
25	A	40 H.P. "	Berliet	7,500	H. C. Townsend	Amer. Loco. Auto. Co.
26	A	30 H.P. "	White	3,500	W. C. White	Walter C. White
27	A	30 H.P. "	"	3,700	H. K. Sheridan	Rollin H. White
28	B	30-35 H.P. Runabout	Stoddard-Dayton	2,750	R. Howard	B. F. Dawson
29	B	24 H.P. "	Corbin	2,400	J. Corbett	Corbin Motor Vehicle Co.
30	B	24 H.P. Touring	"	2,500	H. Treecker	" " " "
31	B	24 H.P. "	"	2,500	A. Bailey	" " " "
32	B	24 H.P. Runabout	Racytype	2,500	W. H. Birdsall	Mora Motor Car Co.
33	A	30-35 H.P. Touring	Studebaker	4,000	I. A. Holm	Studebaker Bros. Co.
34	A	30 H.P. "	Amer. Mors	5,000	N. M. Varney	St. Louis Car Co.
35	A	50 H.P. "	"	6,000	L. Potter	" "
36	A	24-32 H.P. "	Matheson	4,500	F. Lescault	Matheson Co. of New York
37	B	30 H.P. "	Haynes	2,500	C. B. Warren	C. B. Warren
38	A	50 H.P. "	Darracq	9,500	E. Griffith	Darracq Motor Car Co.
39	B	24 H.P. Runabout	Mora	2,300	F. Cimiotti	Cimiotti Bros.
40	B	24 H.P. Touring	"	2,200	Mr. Stickney	"
41	C	24 H.P. Runabout	Jackson	1,500	H. H. Cole	H. H. Cole
42	B	40 H.P. "	Deere	2,000	A. F. Camacho	Zim-Rock Motor Car Co.
43	A	40 H.P. "	Matheson	5,000	R. G. Kelsey	R. G. Kelsey
44	A	40-50 H.P. Touring	Rolls-Royce	8,250	L. R. Burne	Walter C. Martin
45	A	50 H.P. "	Welch	4,250	B. L. DeCamp	Welch Motor Car Co.
46	A	15-20 H.P. Runabout	Darracq	4,500	S. B. Stevens	S. B. Stevens
47	C	12-14 H.P. "	Maxwell	850	Charles Fleming	Maxwell-Briscoe Motor Co.
48	C	16-20 H.P. Touring	"	1,450	F. Offenhauser	" " "
49	A	Touring	Bianchi	6,000	G. Combet	Percy Owen

The last named car was the only non-starter, all of the other forty-eight getting off in good shape.

the cars was to be taken, and they were to be formally checked out and started.

OFFICIAL START.

It was my good fortune to be a passenger in the 30-35 horse power Stoddard-Dayton touring runabout driven by Mr. Newton, president of the Atlantic Motor Car Company, the New York agents. We got away with the early starters and shared with them the vexatious delays at the grade crossings of the Long Island Railroad, which lengthened the trip to Newtown several minutes. At the ferry a careless truckman collided with the car, but luckily no damage was done other than the scratching of the paint. We eventually reached the control at Newtown, and at 9:04 were checked out by Starter Wagner, of Vanderbilt Cup Race fame, and were on our way on what proved to be an uneventful but pleasant jaunt over "parlor floor" roads lined with beautiful trees and banked on either side with the summer home mansions of New York millionaires.

As we started we, as well as all of the other contestants, were handed a slip of paper containing the following additional instructions to drivers and observers:

ADDITIONAL INSTRUCTIONS.

Drivers of cars with overhead rocker arms who desire to oil same each day may do so at the close of the day's run, when the committee will open the bonnets and allow said oiling to be done rapidly.

All drivers must report at 6:20 a. m.

FLAGS AND ARROWS.

The route for each of the four days is marked with yellow arrows.

Green flags are used as a signal of approach to a locality where the speed regulations are rigidly enforced. Drivers upon arriving at a green flag should slow down until a second green flag is passed.

Dangerous railroad crossings at grade will be guarded by the committee's flagmen, who will display a white flag for safety, and the usual red flag for an approaching train.

The controls at Central Bridge and Newtown, L. I., will be indicated by a yellow flag with the word "Control" in black letters.

The turning points will be indicated by a yellow flag with the word "Turn" in green letters.

The committee must be notified in writing of any change in drivers or observers by 12 o'clock noon on the day preceding such change. In case of a substitution of observers the observer for whom the substitute is furnished must turn over to such substitute his badge and all papers.

Observers are cautioned to take odometer readings each day and fill in same on the reverse side of observer's card, at the following points: On leaving clubhouse; at the starting control; on the road if seal is broken; at the finishing control; on arrival back at clubhouse.

Drivers are cautioned that the committee will have checkers at various points on the course each day.

If at any time it becomes necessary for the operator to break a seal and withdraw from the contest the observer is cautioned and especially directed to go to the nearest telephone and call up the clubhouse, "Telephone No. 7000 Columbus," and report such withdrawal and the cause thereof.

RUNNING TIME.

Attention is called to Rule XIII, and it should be understood that the minimum and maximum time therein stated for the different classes is "running time"; in other words, that the running time will be determined by deducting from the total elapsed time the various stops for causes mentioned in Rule XIII.

Time lost on account of tire troubles or other stops must not be made up.

CONTEST COMMITTEE,
Robert Lee Morrell, Chairman.
S. M. Butler, Secretary.

Despite this last rule as to running time, which the committee felt confident would put a stop on racing, the contestants hit up a 30 and 35 mile an hour pace for the first part of the run, and later were straggling along the road, loafing at a 10 mile pace to kill time. The roads, although good, were dusty, and as the cars kept rather close together it was at times a sort of a dust eating contest. Everyone was dust covered and dirty, and all were glad for the little respite from the dirt eating when the route led over some of the oiled roads.

From an observer's standpoint, the first day's run was entirely uneventful, as I did not see a single car in trouble. Our own machine performed most consistently.

STOP FOR LUNCH.

The contestants were permitted to take an hour for dinner at Patchogue if they desired. This was optional, and many contented themselves with eating a few sandwiches, preferring to start back to New York rather than delay in eating, and so finish the day's run that much earlier.

The first car arrived at Patchogue at 12:06 o'clock. At 1:15 o'clock thirty-five of the forty-seven starters had completed the first half of the journey with all seals unbroken and perfect scores. It was remarkable that there was so little speeding, and the natives of Long Island were greatly surprised to see so many high powered machines loafing along.

WELL ORGANIZED.

The run had been well organized, the A. C. A. having placed its own flagmen at dangerous railroad crossings and on the outskirts of towns wherein the speed ordinances were strictly enforced.

This was probably the main reason that no arrests were made, for although there was no racing there was quite some fast driving at times. The contestants were limited to a minimum elapsed time of 7 hours and 45 minutes, and a maximum elapsed time of 8 hours and 15 minutes, and the majority of them checked in with the day's run completed at from five to ten minutes over the minimum elapsed time. The run was a most easy one, the roads being too good to make it any kind of a test.

NO PENALIZATIONS.

All of the forty-seven starters finished in good shape, and the committee had visions of the necessity of buying silver cups by the wholesale for presentation to perfect score contestants. There was little or no tire trouble recorded, the only two entrants who were delayed from this cause being one of the Maxwell cars and S. B. Stevens' Darracq runabout. The latter did not finish until 9:15 p. m. The great crowd of contestants were back in the A. C. A. garage by 7 o'clock.

S. B. Stevens' 20 horse power Darracq and R. G. Kelsey's 40 horse power Matheson were the only competitors in the high power runabout division of Class A, and both were required to travel 25 miles further than the contestants in the other classes. The only six cylinder cars in the run are the 50 horse power Rolls-Royce, entered by L. R. Burns, and the 50 horse power Darracq, driven by E. Griffith. L. H. Beck drove one of the new 1908 model Locomobiles. No reason was given by the committee for the failure to start of the Bianchi car entered by Percy Owen, which was to have been driven by G. Combet.

TECHNICAL OBSERVATIONS ON FIRST DAY'S RUN.

Judging from a reading of the rules and guided somewhat from general impressions gained during the first day of the test, the Sealed Bonnet Contest bids fair to prove, in certain respects, of more technical interest than any other contest of pleasure vehicles held in this country. In most of the important endurance runs and tours which have been conducted in the past a large amount of advertising has accrued to the successful contestants, and some general technical conclusions of value have usually been deducible; but the results have, from a technical standpoint, almost invariably been reduced in value by the fact that repairs and adjustments could usually be made en route without their being matter of official cognizance when the awards were made. On this account very little idea of the actual reliability of the competing cars was obtained from these tests. Attempts have been made to put upon the official observers carried by the cars the duty of reporting the nature and extent of the repairs, replacements and adjustments made during these runs, but it has been limited, and it is rather generally believed that in a good many instances the observers were "looking the other way" when the work was being done. In this contest there is added to the official observer system the practice of so "sealing" important parts of the car mechanism as to render it to a certain extent physically impossible to make repairs or adjustments without breaking a seal, and thus rendering such tampering obvious to the officials. This seems one of the best features which has ever been incorporated into the arrangements of a contest, and it may be taken for granted that the undetected re-

pairs which are made upon the cars in this test will be very few indeed. Of course, it is always easy to criticise contest rules—much easier than to frame better ones. So far as the regulations go it appears that a car might finish successfully which had, for instance, stripped its middle speed gears or put one cylinder out of commission, say, through valve breakage. It is highly probable that most of these high powered cars could make their time under these conditions and win the cup. On the other hand, if a lubricator belt should slip off its pulley or a carburetor draw-off plug should jar out, the car to which either one of these comparatively trivial accidents happened would be hopelessly out of the running. It is to be expected that a few of the very best cars in the run will be eliminated through absolutely trivial accidents, such as could be overcome in a few minutes in practice, while likely enough a number of cars will finish successfully but really be in very bad condition mechanically. It is to be regretted that the state in which a car is at the conclusion of the test is not to be taken into account in making the awards, but doubtless this has been decided to be impractical. It is hardly to be doubted that some time in the future a contest embodying this provision will be held.

One splendid feature of this test is the elimination of tire difficulties from the causes which can put a contestant "down and out." There is absolutely no sense in making an automobile manufacturer suffer for tire weaknesses or the character of the road surface.

The rules of the contest call for the maintenance of such a rate of speed as shall be within the legal limit, and, in a way, this rule ought to be self enforcing, and no doubt is to a certain extent. The driver who pursues as nearly as possible the prescribed average rate of speed at all times is taking the minimum chance of incurring those accidents due to the vibration of fast running which may "put him out of business." The driver who rushes at high speed nearly to the control point and then loafs away his time by running at a snail's pace the rest of the way has taken greater chances of working nuts loose, breaking a valve or a wire than has the moderate driver. Apparently there was a quite general intention upon the part of operators to keep as near to the schedule as possible.

It was a pleasure to the writer to be offered a seat with Arthur M. Day on his 30-35 horse power, four cylinder Elmore touring car. This car, as is well known, is the only one in the contest which employs a two cycle engine. On this account its performance will be of special interest. One thing is certain, that if the Elmore has to withdraw it will not be through valve troubles or difficulties with the cams, cam shaft or secondary gears, for it has none of these. This engine is of 4 inch bore and 4½ inch stroke, with cylinders set on the quarters. It is fired by a high tension Bosch magneto or battery and coil at will, with separate plugs for the two systems. Double ignition provisions ought to prove a considerable advantage in a contest of this kind. The carburetor has a needle valve adjustment mounted on the dash, which is a useful device in a run of this description.

My impressions of the Elmore, as derived from one day's experience as a passenger upon it, relate to the almost absolute silence and smoothness of its motor, its flexibility as to speed and as to the very easy riding qualities of the car itself. There was absolutely nothing to mar the performance of the car in today's run, the schedule being conscientiously lived up to and the prescribed course being completed on time without a "hitch" of any kind.

Judging by the good sound of the contesting cars as a whole, it will take several days' running to materially diminish their number. Today's run over the "sandpapered" roads of Long Island was so easy that it is not strange that it did not prove the downfall of a single car.

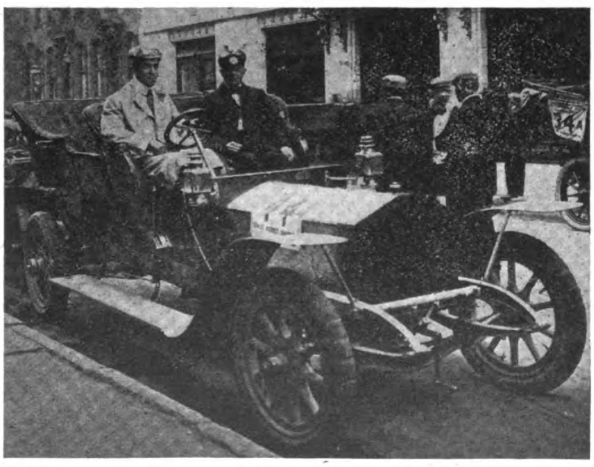
The Second Day's Run.

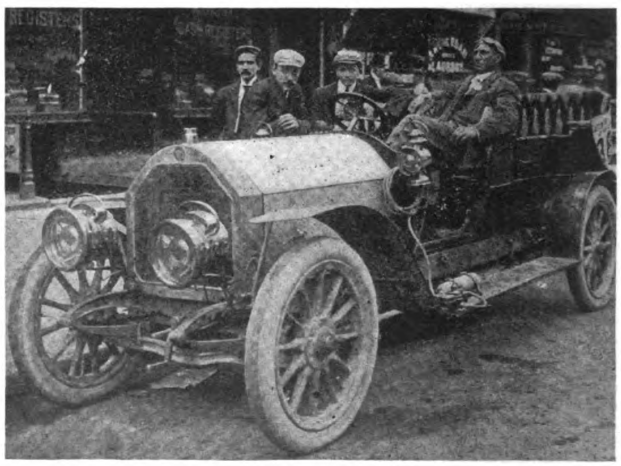
The Sealed Bonnet contestants were early risers sure enough, and despite the fact that it was showering on Thursday morning, some of them were over at the A. C. A. garage as early as 5 o'clock, intent upon getting their cars out early in order to secure a good place on the line and get an early start.

The route laid out was to Maplewood Inn, a point about 5 miles beyond Danbury, Conn., and return, and was through a rolling country and over roads varying from good to poor. There were any number of hills, as the route led through White Plains, Kensico Reservoir, Ormond, Newcastle Corners, Bedford, North Salem and Millplain. At a point 57.9 miles from the start the cars retraced their route for 3.4 miles over a poor road, full of dangerous curves. The machines raised terrific clouds of dust, and there were several narrow escapes from collisions.

But not to get too far ahead of my story, the first of the cars was sent off at 8 o'clock, and the others followed at half minute intervals. All of the machines went direct to Huber's Hotel, across the Central Bridge, and were officially checked out there. Personally, I did not observe any cars in trouble, as the little Stoddard-Dayton kept well to the front and finished early without mishap, but it developed that there had been troubles along the road. The only car which finished the first day's run and did not start for Danbury was B. F. Dawson's Stoddard-Dayton runabout. A nut that had worked loose on the steering gear and been lost was replaced. It was dangerous to drive the car without this nut, and it was not necessary to break any of the seals to replace it, but nevertheless the contest committee decided to disqualify the car, and it was ordered withdrawn from the contest.

The Pope-Toledo touring car, driven by Joe Judge, started on the second day's run, but under protest. It was ascertained that on the first day its pedal controlling the





THE TWO FOREIGN CONTESTANTS.

gasoline supply to the carburetor became disconnected in some way, and it was necessary to use a pair of plyers to fix it up, but no seals were broken. The committee, after considering the matter, reserved decision, and the car was allowed to continue in the run, although under protest.

TIRE RIM BROKE.

The Glide car, driven by J. C. McCafferty, was delayed for two hours on the run to Danbury as a result of tire troubles of a rather peculiar sort. One of the quick detachable rims broke when the car was about 50 miles out of New York, and it was necessary to send to Danbury for a new one. The car managed to reach the clubhouse just before the expiration of its maximum schedule.

POLICE TRAP EXPERIENCE.

The only excitement developed during the run occurred at Newcastle Corners, a few miles this side of Hartford. This village is very poor and in need of funds, and an officious constable saw a good opportunity to reap a fat harvest of fines. He had measured off a course over which he timed the cars from behind a tree, and then if they were exceeding the limit he stretched a rope across the road and held them up. John Van Kleet, a farmer aged ninety-two years, who, strange to say, is a great admirer of automobiles, heard of the trap and notified the A. C. A. committee car when it came along. A man was at once sent down the road with a green flag, and stopped the contestants as they came along and warned them. Another flagman was stationed at the other end of the trap to give warning. Van Kleet said that if any arrests were made he would go bail for the whole party if necessary. When the contestants heard this they cheered him loudly.

The constable was much incensed when he saw the cars coming along so slowly, and decided to make an arrest whether the law was being violated or not. He put his resolution into effect by stretching his rope across the road and holding up three cars, viz., the Maxwell touring car driven by F. Offenhauser, the Mora runabout driven by F. Cimiotti, and the Mora touring car driven by W. Stickney; another officer assisted him, and as the cars were stopped the drivers were notified that they were under arrest.

An argument ensued, the men in the car protesting that they had not violated the law, and while this was at its height Mr. Stickney coolly threw in his gears, and despite the threats of the constables and their apparent wrath drove off down the road.

The other drivers were taken without delay to a justice of the peace, who was conveniently near, and were immediately adjudged guilty and sentenced to pay fines of $10 each.

Mr. Cimiotti protested most strenuously, and showed his observer's time book in support of his argument that he was not exceeding the legal limit. He finally convinced the justice that he was right, and the fine was remitted in his case. The Maxwell driver was not so lucky, and paid the $10 fine under protest. An appeal will be taken. Under the rules of the contest a car that exceeds the speed limit is liable to disqualification, but the committee was satisfied that the arrests were unjustifiable, and the score of the cars will not be affected.

BROKEN VALVE SPRING.

It was learned with general regret that the Columbia gasoline-electric touring car which had been making such a good showing was out of the run. When about 67 miles out the big four cylinder motor began to lose power as a result of a broken valve spring. It was necessary to break the seal on the bonnet in order to make repairs, and this put the machine out of the running. This was generally regretted, as all of the contestants were deeply interested in the car's performance. Mr. Barrett, the driver of the car, was greatly disappointed, but had to drop out. The car was repaired in a few minutes after the seal had been broken, and continued the day's run, although officially out of the contest.

The big Matheson car had tire trouble, the result of skidding the machine by locking up the rear wheels with the emergency brakes in order to avoid a collision with a cow that walked directly in front of the machine on a narrow road at Bedford. The cow escaped, but the Matheson's tires suffered. The American Mors, driven by N. M. Varner, and the Rolls-Royce cars also had tire trouble. All of the cars finished in good time and were duly locked up at the club's garage.

All motordom is talking about the contest, and the wonderful showing made by the American cars is the subject of much favorable comment. The arrangements made by the A. C. A. committee for giving news to the press were meagre, and this fact caused some dissatisfaction among the press representatives. Mr. Armitage, of the club, had this work in hand, and he was not overanxious to be accommodating when asked for information.

TECHNICAL OBSERVATIONS ON SECOND DAY'S RUN.

Today's run to Danbury, Conn., and return has been decidedly more arduous than the route of yesterday. Although practically all of it was over improved stone or gravel roads, the very hilly country traversed included highways which, though smooth and well laid out, exhibited a number of 10 per cent. grades, and one or two slightly over, by the gradometer. The only exception to improved roads were the natural dirt roads near North Salem. These were badly rutted and very sandy, and included a hard hill of bad surface and full of water bars, which measured at least 14 per cent. for a considerable distance, and considerably more over the "bumps." All the roads of today were characterized by sharp and complicated curves, and had the weather been rainy it is highly probable that a substantial number of the competing cars would have been eliminated.

At the very slow rate at which the contestants are dropping out it certainly looks as though the A. C. A. would have to put in a wholesale order for silver cups, but no one knows what the morrow may bring in the way of broken seals and disqualified cars. It is to be remembered that the causes which produce the accidents which can cripple a car are cumulative. The nut which is going to drop off begins to work loose, perhaps, on the first or second day, but it does not finally let go and complete its "deadly work" until the third or fourth day. The clutch begins to wear on the first day, doubtless, but it may not have worn sufficiently until the last or next to the last day to slip to such an extent as to become inoperative. The stresses upon all parts of the mechanism begin with the beginning of the contest, and before, but it is only after a certain number of repetitions of the stress has been suffered that fatigue becomes advanced to the point of failure of the stressed part. The chance of a breakdown increasing as it does in a sort of ascending curve with time, one may be pretty safe in saying that the rate of elimination of contestants will be considerably

START AND FINISH—SECOND AND THIRD DAY.

greater in the next two days than it has been in the two days past.

The two cycle Elmore car, 7-B, upon which the writer rode for the second time today, made the run on schedule time and without difficulty of any kind. It is a rather novel sensation to ride in a car the motor of which is making four equally spaced power strokes in each revolution. Eight cylinder, four cycle engines have not become common enough so that the ordinary automobilist has become familiar with the exceeding smoothness of operation of such an eight impulse engine. The six cylinder, four cycle engine falls considerably short of this four cylinder, two cycle motor in "sweetness" of running, so far as the experience of the present writer is concerned. Under running conditions there is no vibration or torque variation whatever, due to the engine, perceptible, and, of course, there is none of the clicking sound which is to a certain extent inseparable from the operation of a four cycle motor. The only sounds perceptible in the operation of this car on the direct drive are the extremely close spaced and very much deadened muffler sounds and a slight hum due to the bevel gear drive. When the muffler cut-out is opened the exhaust reports resemble in frequency the sounds produced by a four cylinder racing car when at top speed.

The impression created in the mind of one unfamiliar with this car, and judging by the exhaust, is that it is moving at a speed about double the actual.

A very excellent speed range on the high gear is possessed by this car, as it operates with perfect smoothness at rates of from 8 to 35 or more miles per hour, and picks up rapidly.

It is current belief that all engines having side port exhaust show considerable oil smoke from their mufflers. This is not true of the motor of this car, the exhaust of which is not perceptible to the eye. Oil for the cylinder walls is furnished by a mechanical lubricator directly to the intake pipe, and is carried into the cylinders in a finely divided state, forming a thin film on all working parts. Oil feeds also go to the bearings.

The Third Day's Run.

Dust covered and showing plainly the effects of their 300 mile run, forty-five of the contestants lined up for the start on Friday morning. It had rained Thursday night, but the morning was clear and there was every prospect of a pleasant ride over dustless roads. The remarkable freedom from punctures and small engine troubles was the subject of much comment. "Commanche," driving the Deere car, did a part of the Danbury run on three cylinders, and thought for a time he was down and out. The engine finally came around all right, however, and was running in good shape as the car crossed the starting line. It was really remarkable, for that matter, how well all of the motors were running. There were no missing cylinders, and the prospect looked good for another batch of perfect scores.

The first car left the clubhouse at 8 o'clock, and the others followed, all going direct to Huber's for the official start. There were a number of motor parties gathered at the starting point, and they cheered the contestants heartily as they started away.

The route laid out was over a rolling country on roads varying in condition. Several small detours were made necessary as a result of road repair work which was going on. The contestants hung together for the first hour or so, and at times the dust was almost unbearable, but eventually they drifted away from one another and the people in the cars had a chance to see and enjoy the scenery. The little Stoddard-Dayton kept well in advance of the main crowd, and continued its perfect work, so there was little to be observed along the road. The route led from the clubhouse to Central Bridge, to Fordham road, Pelham parkway, Bartow Bridge, New Rochelle, Larchmont, Mamaroneck, Rye, Port Chester, Glenville, Conn.; Greenwich, Mianus, Stamford, Darien, Norwalk, Westport, Southport, Fairfield, Bridgeport, Stratford, Milford and Woodmont. The first car left Huber's at 8:37 o'clock, and the others followed directly after. Most of the contestants had provided themselves with lunches and drinkables, preferring to make the entire run without stop, and so finish an hour earlier at night.

Mr. Dow, the inventor of the tube which bears his name, followed the run in his Peerless runabout. His car came to be known as the "beer wagon," as he was most generous in supplying the tourists with bottles of that beverage. He would stop at a roadhouse and get a fresh supply of bottles, and then hand them out to the thirsty contestants as they ran along. There were several cars in the run, including the Stoddard-Dayton, fitted with these unpuncturable tubes, and all of them finished without delay from tire troubles.

ONE MORE DROPS OUT.

A 'phone message received at the A. C. A. clubhouse shortly after noon announced the fact that one more of the contestants had fallen by the wayside, and car No. 24, a 50-60 horse power De Luxe, driven by C. S. Beach, had been forced to break a seal to make repairs. It seems that when near the Bartow Bridge, 14½ miles out from the city, the engine began to miss fire, and finally stalled. Repeated efforts to start it proved unavailing, and it was finally necessary to raise the bonnet to make repairs. It was then found that one of the ignition wires had broken loose from its connection and fallen on the exhaust pipe, causing a short circuit. It was a very simple matter to remedy, but the seal had been broken and the car was out of the contest. This car had been doing a great deal of fast running with the idea of being first at controls, and the driver had not spared his engine.

The contestants were warned against several speed traps, the club, as usual, placing men with green flags at either end of these towns to warn the drivers as they came along. There were no enterprising constables looking for easy money, however, and no arrests were made. Arthur Robbins, driving the Aerocar, was stopped by a "bike cop" on the Pelham parkway, but the latter was good natured, and after explanations had been made let the car continue on its way.

CAUSES OF FAILURE TRIVIAL.

It must have been exasperating to the members of the A. C. A. touring committee to see forty-four perfect score cars safely in the garage after a run of 450 miles over all sorts of roads. This trip a few years ago would have been considered a great endurance contest, and yet only four cars had dropped out of the running, and all of them for causes so trivial as to be scarcely worth mentioning. There were no cracked cylinders, broken connecting rods, fractured steering knuckles or sprained axles. The result of the run was certainly a great tribute to the excellent construction and design of modern automobiles, and the test will no doubt go a great way toward convincing the general public of the stability and reliability of the auto of today.

There was a good sized crowd at the finish line and at the clubhouse, and they cheered the dusty and sun tanned contestants. Percy Owen, whose Bianchi car was entered for the run and did not start, made a statement concerning the machine. He said that a customer had insisted on immediate delivery, and as this car was the only one he could possibly get hold of he was forced to withdraw it from the contest, although he regretted exceedingly the necessity of so doing.

COMMITTEE SURPRISED.

The outcome of the third day's run was a great surprise to the committee and to the framers of the strenuous conditions of the contest. They little expected that 450 miles of running over the courses they had mapped out would force so small a number of cars out of the contest. The club had agreed to give a silver cup to all cars finishing with a clean score, and there is every indication that there will be a goodly number of cups distributed.

TECHNICAL OBSERVATIONS ON THIRD DAY'S RUN.

The route of today, to West Haven and return, was, on the whole, rather harder than that of yesterday. While it included a large proportion of improved stone road, which in almost any other part of the country would be called fine, there was also a considerable mileage of quite uneven and "bumpy" road and street, and a good deal of city and town highway where frequent trolley tracks, sewer trenches, paving operations and the natural congestion of traffic made driving quite strenuous, and gave tires, springs and steering gears a hard test. It was a far less enjoyable day for the passengers than either of its two predecessors

on account of the roughness of the road in places and the more prosaic country traversed. On the whole, the route would be called hilly, with most of the grades around 5 per cent., generally with good surface. Occasionally hills of 10 or 11 per cent. were met with, and on the return trip, in the town of Greenwich, was encountered a 14 per cent. hill of considerable difficulty.

It should be realized that this entire contest, with very unimportant exceptions, is being run over improved stone roads and paved city streets, and this fact should be taken into account in judging of its value. As a test of the staying powers of cars it, of course, possesses by no means the degree of severity which one run over the average country roads of New England or the Middle States would possess. There are some good reasons, however, for including only good roads in the itinerary.

Considering the very moderate number of cars which have dropped out up to the end of this, the third, day's run, and taking into account the fact that tomorrow's run, as scheduled, is a very easy one, over the smooth and level roads of Long Island, it is hardly conceivable, even though the last run had to be made in the rain, that a very large number of contestants would be disqualified. The indications are that most of the contestants will come through with perfect records, although, of course, some derangements may make themselves manifest tomorrow which have been coming on during the past three days. In a contest like this it is likely to be the "little foxes that spoil the vine," and no one can tell when these pestiferous little animals will creep in.

If nearly all or an overwhelming majority of the cars should finish, it would seem that the advertising value of the test to the competing manufacturers would prove very slight, for there is little distinction for the individual in a crowd.

This contest seems to be admirably managed. There is no confusion at the start or at any of the controls, and the safety of the contestants is being well looked after. Dangerous railroad crossings are guarded by A. C. A. flagmen, and districts which enforce special low speed ordinances are marked at both ends by club flagmen. The allowance of a regular period of time for lunch adds greatly to the comfort of the participants.

The Elmore two cycle car continued its good behavior of the two preceding days, and kept its schedule very accurately, operating in a faultless manner. Mr. Davis, the entrant and operator, is a very judicious driver, and is not "driving a willing horse to death."

The Last Day's Run.

Saturday dawned bright and clear, and everything was most attractive for the final 150 mile run to complete the necessary 600 miles of the contest. There were forty-four cars ready for the trip, and there was considerable rivalry among the drivers to get their cars out of the garage first in order to get an early start, and some of them were on the job as early as 5 o'clock. By 7 o'clock all of the contestants were ready. A large crowd turned out and cheered the various drivers, wishing them luck. It was surprising to note how well the engines sounded, and there seemed to be no reason why the entire forty-four cars should not be back at night with perfect scores.

The cars were sent away earlier than usual, and by 8 o'clock the street in front of the clubhouse was cleared, and the last day's run was on. The route was the same as that of the first day, the cars being sent to the Thirty-fourth street ferry, where they were taken on special boats to Long Island City and then to Newtown, the checking point. A large number of Long Island motorists had gathered here to see the cars off, and Starter Wagner got them under way without loss of time. The trip was over sandpapered roads, ending at Patchogue, and most of the competitors hit up a lively pace, did not even stop for lunch, most of the contestants having provided their own eatables, which they disposed of while under way.

There was considerable tire trouble. The Welch car and the six cylinder Darracq both went out on the last day. The Welch car was said to have had ignition trouble, and the Darracq was reported with a broken axle. One feature of the run was the excellent showing of the air cooled cars, there being three Corbins and two Knox machines in the contest.

As soon as the drivers had checked in at Newtown they continued at once to the A. C. A. garage, where their time was taken and the cars were inspected as to the seals. The machines were then released from all restrictions and allowed to depart on their respective ways. The drivers and the observers and passengers were all badly sun burned, and were tired out and glad that the contest was over. The contest was more tiresome than strenuous. Altogether the affair did not prove anything conclusive, except, perhaps, the fact that all of the well known machines are reaching that stage of perfection where they are reliable for pleasure use, and that with good luck they can go 600 miles without making an adjustment, but they must have good luck.

TECHNICAL OBSERVATIONS ON THE FOURTH DAY'S RUN.

The run of today was again over the very easy Long Island course which was followed on the first day of the contest, with perfect stone or shell roads, largely oiled to prevent dust, and with very easy grades for the most part.

The four cylinder, two cycle Elmore operated all day with its wonted smoothness and excellent power. No incidents occurred to mark the pleasant monotony of the trip except that near Babylon one of the front tires, which had suffered a blowout before the contest, and which had been repaired by patching the tube and placing a rubber fabric sleeve between the tube and shoe, blew out again. Some slight trouble was experienced in removing and replacing the locking ring, which had rusted considerably through the entrance of moisture, but we were soon on the road again. Near Roslyn, on the return trip, a rear tire went down on account of a small split in the tube, but was very quickly replaced.

Despite these delays we arrived at the clubhouse in very good time, with the realization that the Elmore had made a perfect record and was in line for a cup.

The running of this car has been remarkably consistent and satisfactory throughout the contest, and absolutely no trouble outside of tires has been at any time experienced. Beyond the ordinary operations of driving and filling gasoline and oil tank the only act which has been performed in connection with the machine has been the changing of the mixture by means of the dashboard adjustment a few times during

MAPLEWOOD INN, MIDDAY CONTROL, SECOND DAY.

A CONNECTICUT ROAD.

the first part of the run. After once being correctly set no further changes were made. The Bosch magneto, which has been used throughout the test, has not missed a charge, the oiling system has operated with the utmost regularity, and no water has been required to be added to the radiator, although about one quart was unnecessarily supplied by a garage attendant. The clutch, which is of the metal ring type, always operated smoothly, and seemed to be operating as well at the finish as at the start. Gear changes were always made smoothly and readily without clashing. Excellent front springs and a particularly effective platform spring in the rear, together with a tonneau possessing ample seat and leg room, conduced to comfortable riding. At the close of the contest every appearance seemed to indicate that the Elmore was in a perfectly fit condition and capable of operation for a much extended mileage without attention. No unusual sounds developed in the mechanism during the trip, and it was evident that none of the working parts of the engine or transmission had loosened up to an audibly perceptible extent. The impression left of the motive power of this car is one of exceptional smoothness and quietness and a high degree of flexibility. Considering its power, the ability possessed by the engine of picking up its load from nearly a standstill and on grades is very marked. As was quite natural, more cars were eliminated on this last day of the test than on any other single day. Automobile defects in general are the result of cumulative causes, which eventuate with greater frequency as the causes of failure are protracted.

General Conclusions.

By Albert L. Clough.

The Sealed Bonnet Contest of the A. C. A. must surely be accounted a success in more than one direction. In the first place, it was organized to determine a certain thing, and this was done in a perfectly straightforward and definite manner. Some automobile contests of the past have shown so little distinctness of purpose that at their conclusion nothing clean cut and of substantial import of a technical character has been learned. In such tests the contestants grabbed what they could in the advertising line and went away with it, leaving everything as deeply shrouded in doubt as before, so far as the technical side was concerned.

WHAT THE RESULTS SHOW.

This contest raised for settlement a perfectly simple question, namely, How many of the entering cars could be driven a total of 600 or 700 miles, over good roads, at a certain maximum average speed without suffering any derangement of a crippling nature—no part of the car mechanism being subject to any other kinds of attention than those involved in the acts of driving or replenishment of supplies? The answer given to this query in the four days of the contest is also perfectly definite so far as it goes. Forty-one out of the forty-seven entrants accomplished the feat successfully, or slightly over 87 per cent. This is indeed a splendid showing, and should prove a magnificent demonstration of the reliability of modern motor cars. It is a result which it is believed would have been unattainable one year ago, and which two years ago would have been absolutely out of the question. It represents the results of very careful recent attention to details upon the part of manufacturers. The official mileage made by each of these cars probably represents that which the average privately owned car covers in an entire month, and is far in excess of the mileage which a locomotive or trolley car covers without being laid off for expert attention. It is hardly safe to generalize to the point of asserting that 87 per cent. of all modern motor cars are capable of covering 600 miles of good roads without adjustment or repair, for the cars concerned in this test were of higher grade and cost than the average, comparatively few of the lower priced cars or those of obscure reputation being in the contest. It would seem that while the contest must prove in a stronger manner than ever before that automobiles in general have arrived at an amazing point of reliability, it can hardly confer any particular glory upon any special make or makes of cars. To be one out of forty-one contestants who receives a cup in a contest involving but forty-seven participants is of course very creditable, but it can hardly be said to be a marked distinction. It would seem that the result, in its effect upon the industry, while a splendid advertisement for the automobile in the abstract, is likely to prove of very little special value to the individual manufacturer.

THE ELEMENT OF CHANCE.

One cannot help feeling sorry for most of the contestants who were forced to withdraw. It is almost impossible to escape the impression that it might have been another car next time that suffered. It would be interesting to see the contest repeated with the same makes of cars and note whether the same ones would be eliminated. It is hardly to be expected. There must indeed have been a very large element of what cannot be discriminated from pure chance involved in this contest. Of course, everybody went into the gamble with his eyes open and no one can find any fault. One high grade car, which appears to be of most excellent design and construction, suffered from an ignition difficulty and was disqualified. It is rather difficult to believe that the ignition system of this car is any less excellent or would prove any less serviceable in practice than the sparking systems of most of the successful cars. So far as one can judge without knowing every detail, such an ignition difficulty would have been prima facie just as likely to happen to many other cars. Ignition apparatus is, it should be remembered, seldom constructed by motor car builders.

Another car, built by a company of established reputation, suffered the breakage of an inlet valve spring. It is hardly likely that the inlet valves upon this engine were inferior to those upon many other cars, or that this engine in 10,000 miles of running would break any more valve springs than many other motors would do in the same period of service. The fact of the whole matter is that the test was of too short length to allow the law of probability to work itself out. In time the poorest engine in any contest will show its inferior quality by suffering the most breakages and derangements, but it takes a long time for the law of chance to average matters up, and the first breakage is almost as likely to occur on the good as on the poor mechanism.

NOT CONCLUSIVE ON MERITS OF CARS.

It will be unjust, indeed, if anyone draws the hasty conclusion that because a particular car has been unsuccessful in this contest it is necessarily inferior to any of the successful ones. A very poor car, of very inferior wearing quality, could, it is believed, have been so carefully inspected and adjusted before starting as to have enabled it to pull through successfully, while a good car if put into the test in unkept condition would have been likely to have suffered some derangement before the test's conclusion. One very good car was put out of the running by sheer carelessness in failing to get it into good trim at the beginning. It is to be hoped that this incident will not count against the popularity of this excellent make. Another car of first class build was started in the contest in such bad shape, as judged by the sound of its operation, that almost everyone predicted its failure. The expected happened, and those responsible for its entry ought to realize that they were instrumental in helping to give "a good dog a bad name." It is to be feared that the ignoble distinction of being among the six unsuccessful contestants may prove of more harm than in fairness it should. Personally I do not believe that the test gives the slightest dependable information as to the relative reliability of one make over another. It reminds one of the little verse in "The Mikado": "Thus do the fates their gifts allot, A is happy, B is not; yet B is worthy, I daresay, of more prosperity than A." The makers were playing a fair gamble with fate, and if some blanks had to be drawn—why, *somebody* had to get them—that is all. If the test had been of 6,000 miles instead of 600 and the cars had been inspected at the end as to their condition, comparisons as to merit might justly be drawn from the results.

ROADS EASY.

Of course, the test was run over very easy roads. Had it been run over rough, sandy dirt roads of an entirely unimproved character, with severe grades of considerable length, the chances are strong that more cars would have been eliminated. As it was, the relatively easy road conditions allowed the motors to be run very lightly loaded nearly all the time, very few gear shifts were required, and easy work was given

gears, clutches and brakes, as few bad grades were encountered.

The good road surfaces in general met with made easy work for springs and for steering and running gears. Dry weather also prevented the bad stresses which arise from heavy traction and skidding, and probably reduced the likelihood of carburetor derangements and possibly of ignition defects.

MORE DIFFICULT CONTEST REQUIRED.

If another test of this sort is ever run the obvious way to reduce the number of successful contestants will be to choose very much harder routes and to prolong the test in point of mileage. Increasing the pace would indeed be the most effective manner of hastening the development of crippling derangements, but it is to be hoped that the A. C. A., considering its strong stand in favor of legal speeds on the common roads, will not consent to any proposition involving any sanction of illegal speeding, unless on a private track.

In only two instances, so far as can be learned, were cars crippled by the breakage of any essential part, and in one of these cases the breakage appears to have been by no means without warning. This is indeed a good showing. Almost without exception the cars at the finish seemed to be running practically as smoothly and sweetly as at the start. It was very seldom that an engine was heard missing, very rarely that gears seemed to work harshly, and there were no signs of boiling radiators or rattling engines which have characterized earlier runs. Some very bad cases of smoky exhaust were noticed, however, a few of them apparently chronic. No doubt many operators were using more oil than they ordinarily would, as a precautionary measure, but some few of the cars could be traced for a half mile by their trails of oil vapor. The dust nuisance is bad enough, but is to a certain extent inevitable. Smoky exhausts can and ought to be prevented.

LITTLE SPEEDING.

On the whole there was less speeding on the part of the contestants than has generally been the case in these events. There were some bad examples of speeding by outsiders noted along the road. Long Island seems to be badly beset by high powered runabouts and "gents'" roadsters, which are being industriously employed in tearing up the road surface and powdering the finely kept lawns and shrubbery with it.

It is a splendid commentary upon the inherent safety of the automobile that these competing cars were driven, in the aggregate, about 27,000 miles, a considerable part of the way through congested traffic and for long distances over very winding road, without an accident of any kind to life or limb, or even to the vehicles themselves.

In conclusion it may truthfully be said that the Sealed Bonnet Contest has proved the most definitely fruitful of any general test of pleasure vehicles which has been held in this country, because it had a definite purpose in view and was carried out under improved methods of surveillance, honestly applied. It furnishes the strongest vindication of the dependability of motor cars which we have ever had, even if it throws no certain light upon the reliability of the different makes.

It may be hoped that a sealed bonnet contest over much more arduous roads, covering a longer mileage and with an inspection of cars at the finish, may be planned for some time in the near future.

Results of the Contest.

While the contest committee of the A. C. A. has not yet met to compare its final report on the results of the Sealed Bonnet Contest, certain particulars have been unofficially announced. Of the forty-eight cars entered there were forty-seven which started, the Bianchi (49) being the only one which failed to begin the run. The following cars were the only ones which failed to finish with perfect scores: Glide (4), was disabled on Friday by rim troubles; Columbia (18), was withdrawn from the contest on Thursday by breaking the seal of the bonnet to replace a broken valve spring; De Luxe (24), was put out of commission on Friday by ignition troubles; Stoddard-Dayton (28), was obliged to withdraw for repairs to the steering gear on Thursday; Welch (45) and Darracq (46), were obliged to withdraw on Saturday for reasons which we have not been able to ascertain. This leaves perfect scores for the remaining forty-one cars.

Calculations and Points in the Design of Front Axles—III.

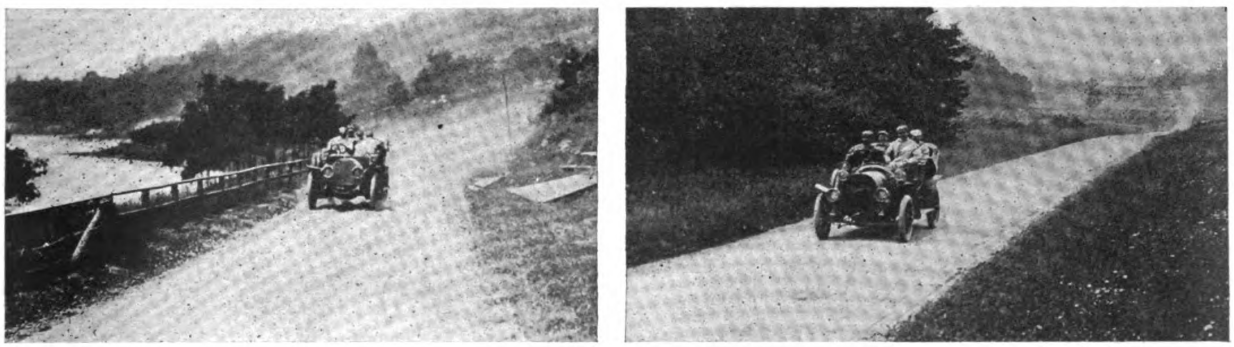
By P. M. Heldt.

In the first two instalments of this article an attempt was made to give an idea of modern practice in axle design, so far as the question of strength is concerned. The writer would like to here add a few words as to how this practice could possibly be improved upon. In the first place, where semi-elliptic springs are used, with a very rigid joint to the axle, there seems to be very little horizontal bending effect on the central portion of the axle, between the two spring seats. The springs hold the axle rigidly and take up all horizontal forces applied to the axle through the wheels. Consequently the section of the central portion of the axle does not require much strength in a horizontal plane, and the sections which have a relatively great height to width are the best. It was shown before that the average ratio of the vertical resisting moment to the horizontal resisting moment of the section at the centre of the axle was 3 to 1. Now, if we leave the vertical resisting moment the same—that is, ten times the vertical bending moment—and reduce the horizontal resisting moment so that it will bear to the vertical one the ratio of 1 to 4, the axle should be equally strong, and quite a little weight would be saved. This section is to be used the entire distance between the two spring seats.

There is no need for any very large fillet at the joint between the central portion of the axle and the spring seat. From the spring seat on, both the horizontal and vertical moments can decrease uniformly so as to become zero at the centre of the wheel—provided the axle proper does not approach too close to the centre of the wheel to make the shearing stress more important than the bending stress, which is not the case in the usual designs.

As the spring saddle is a part of the top flange, and practically all horizontal stresses on the axle end there, it is undoubtedly advantageous to make the section of the ends of the axle unsymmetrical, making the top flange wider. It may be best to illustrate the suggestion by a numerical example.

Suppose an axle with 750 pounds on



THE CHARACTER OF THE ROADS—SECOND DAY.

each spring seat, a distance of 13 inches from the centre of the wheel to the centre of the spring seat, spring seat 3½ inches wide, and 9¾ inches from the centre of the spring seat to the centre of the axle pivot. The vertical bending moment in this example is $13 \times 750 = 9{,}750$ pounds-inches, and the vertical resisting moment of the section of the central portion must therefore be $10 \times 9{,}750 = 97{,}500$ pounds-inches. The horizontal resisting moment must be $97{,}500 \div 4 = 24{,}400$ pounds-inches. Let us assume that oil-treated carbon steel of 90,000 pounds per square inch is used.

The requirement that the vertical resisting moment shall be four times the horizontal resisting moment is satisfied by various sections depending upon the proportions chosen for the thickness of web and flanges. A section which has a fair thickness of metal in both the web and the flanges and satisfies the above condition is of the following proportions:

$$d = 1.67\,b.$$
$$t = .25\,b.$$
$$t' = .25\,b.$$

The vertical bending moment of this section is $.345\,b^3 \times$ T. S. Substituting the value of T. S. and equating to the bending moment required in our example we have

$$.345\,b^3 \times 90{,}000 = 97{,}500.$$
$$b^3 = 3.14.$$
$$b = 1.465 \text{ inches.}$$
$$d = 1.67 \times 1.465 = 2.44 \text{ inches.}$$
$$t = .25 \times 1.465 = .388 \text{ inches.}$$

The area of this section is 1,782. The horizontal resisting moment is $.0864\,b^3 \times$ T. S., which is exactly one-quarter that of the vertical resisting moment.

If we had used the diagram published in the second instalment for determining the required dimensions we would have found

$$b = 1.60,\ d = 2.24,\ t = .416.$$

The area of such a section is 1.917 square inches, or 8 per cent. more than the above.

The next problem is to find the necessary section just outside the spring saddle. At this point the moment is $750 \times 11.25 = 7{,}875$ pounds-inches. The vertical resisting moment must therefore be $10 \times 7{,}875 = 78{,}750$ and the horizontal resisting moment, in accordance with average practice, $4.12 \times 7{,}875 = 32{,}445$. The writer believes, however, that this factor might well be made 5, inasmuch as insufficient resistance to horizontal bending moments at this point is one of the most prolific sources of axle failure, and of the most dangerous kind of axle failure, too. It is a significant fact that several of the axles, of which drawings were obtained, were strengthened at this point some time after the design had first been completed, which would indicate that the original designs were found to be too weak there. Using the factor of 5 the necessary resisting moment is $5 \times 7{,}875 = 39{,}375$ pounds-inches.

This is much more than the horizontal resisting moment of the section used for the central portion of the axle, and the section must therefore be strengthened in the horizontal plane. This is best done by increasing the width of the upper flange which joins to the spring saddle, and also slightly the thickness of the flange. To get at the approximate size of the upper flange required we may proceed as follows:

The lower flange need not be altered, nor the width of the web, but as the upper flange will be considerably heavier and the vertical bending moment is even slightly less than between the spring saddles, the height d of the section can be reduced. In calculating the horizontal resisting moment the web may be neglected, as it contributes only very slightly to this factor. The lower flange has a horizontal bending moment of

$$\frac{.388 \times 1.465^3}{12 \times .732} \times 90{,}000 = 12{,}500$$

The total bending moment required is 39,375, hence the upper flange must provide $39{,}375 - 12{,}500 = 26{,}875$ pounds-inches. It is at once obvious that this flange must be considerably wider than the lower one, and we may therefore choose its thickness somewhat greater than that of the lower one, say $\frac{7}{16} = .437$ inch. Let x be the necessary width of this flange, then

$$\frac{.437 \times x^3}{12 \times \frac{x}{2}} \times 90{,}000 = 26{,}875 \text{ pounds-inches.}$$

$$x^3 = 4.10.$$
$$x = 2.025 \text{ inch.}$$

The next thing to do is to find the necessary height of the section at this point. We have

$$\frac{Mr}{T} = \frac{78{,}750}{90{,}000} = .875 = \frac{I}{c}$$

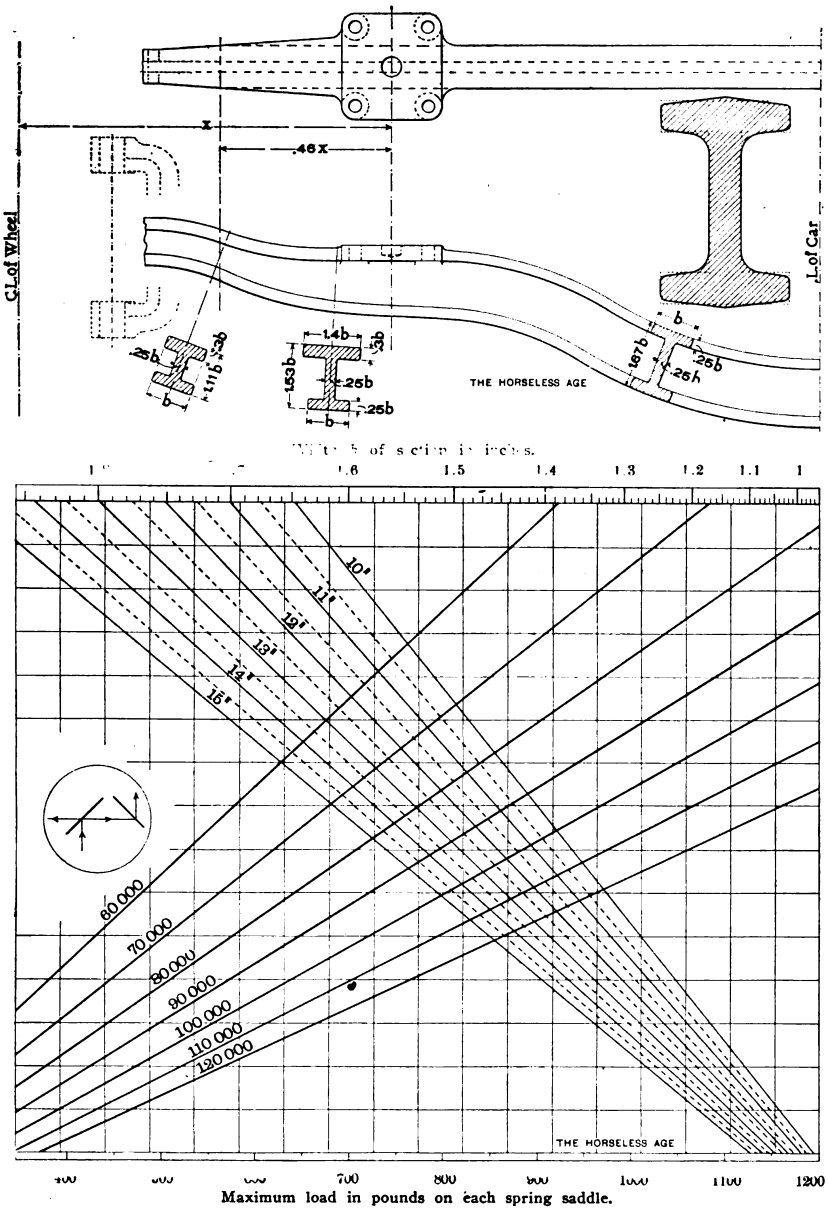
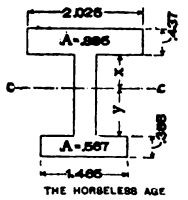


DIAGRAM FOR DETERMINING FRONT AXLE DIMENSIONS.

(Inclined lines from lower right hand corner represent distance from centre of wheel to centre of spring saddle.)



In the sketch herewith let *c-c* denote the centre of gravity of the required section; let the distance from this centre line to the top flange be called x and that to the bottom flange y; then, as the cross-sectional area of the top flange is .885 square inch and that of the bottom flange .567 square inch, the condition of balance around the centre line requires that

$$.567\ (.194+y)+.194\,y=.885\ (.218+x)+.194\,x.$$

From which we find

$$y=1.42\,x+.109.$$

The moment of inertia around the centre line of that portion of the section of the axle which is above the centre line is equal to the moment of inertia of the lower portion around the centre line; hence, if we find the moment of inertia of the top portion and multiply it by 2, we have the moment of inertia for the whole section. The moment of inertia of the top portion around a horizontal centre line through the centre of gravity is

$$\frac{2.025\times .437^3}{12}+.885\,(.218+x)^2+\frac{.338\,x^3}{3}$$
$$=.0561+.885\,x^2=.386\,x+.129\,x^2.$$

Multiplying this value by 2, to get an expression for the moment of inertia of the whole section, and rearranging the terms, we have

$$I=.258\,x^3+1.77\,x^2+.772\,y+.1122.$$

Now, the distance from the centre line to the outermost fibre is evidently equal to the distance from the centre line to the lower flange plus the thickness of the flange:

$$c=y+.388.$$
$$=1.42\,x+.109+.388.$$
$$=1.42\,x+.497.$$

We have therefore

$$\frac{I}{c}=\frac{.258\,x^3+1.77\,x^2+.772\,x+.1112}{1.42\,x+.497}=.875$$

From which we derive the cubic equation

$$.258\,x^3+1.77\,x^2-.468\,x=.323,$$

which, solved, gives

$$x=.54''$$
$$y=1.42\,x+.109=.88'',$$

and the total height d of the section at this point is

$$.388+.876+.54+.437=2.241''.$$

It will be advisable to taper only the top flange and let the bottom flange remain of uniform width, especially if the fork is so near that the width of the top flange need not become smaller than that of the bottom flange. When both flanges are the same width the moment of inertia around the vertical centre line is

$$\frac{(.437+.388)\,1.46^3}{12}=.214,$$

and the resisting moment at that point

$$\frac{.214}{.73}\,90{,}000=26{,}400$$

Dividing this by 5, our factor of safety, we have for the permissible bending moment at this point

$$\frac{26{,}400}{5}=5{,}280\text{ pounds-inches.}$$

The reaction on the support being 750 pounds, this moment obtains at $\frac{5280}{750}=7.04$ inches from the centre of the wheel, or at $11.25-7=4.25$ inches from the spring saddle.

At this point the vertical bending moment is, of course, also 5,280 pounds, and as the vertical factor of safety is 10, the vertical resisting moment here should be 52,800 pounds-inches. Bearing in mind that both flanges are 1.465 inches wide, the lower one is .388 inch thick, the upper one .437 inch and the web .388 inch, we readily find that the height d must be 1.62 inch to give this resisting moment.

The results found in this example may be generalized by expressing all dimensions in terms of the width of the section at the centre of the axle and distances along the axle from the centre of the spring seat in terms of the distance between the centre of the spring seat and the centre of the road wheel. Thus, the width of the top flange just outside the spring seat should be

$$\frac{2.025}{1.465}\,b=1.40\,b,$$

and the height of the section at this point

$$\frac{2.241}{1.465}\,b=1.53\,b.$$

The thickness of the upper flange outside the spring seat should be

$$\frac{.437}{1.465}\,b=.3\,b$$

The distance from the centre of the spring saddle, where the top flange can taper down to the width of the lower flange was found to be $4.25+1.75=6$ inches, which is $\frac{6}{13}=.46$, the distance x between the centre of the spring saddle and the centre of the wheel, and at this same point the height of the section is

$$\frac{1.625}{1.465}=1.11\,b.$$

To be strictly in accordance with theory, the resisting moment should decrease uniformly from the spring saddle outward. Now, it would hardly be advisable to vary the thickness of the flanges and the web, and with uniform thickness of flanges and web and uniformly decreasing resisting moment the outlines of the flanges and web would form convex curves. It will satisfy all practical requirements, however, if the sections just outside the spring saddle and at a distance $.46x^2$ from the centre of the spring saddle are laid out to the above proportions, and the width and height of the section are decreased uniformly, as has been done in the diagram herewith.

(To be continued.)

Proportioning the Ports of Two Cycle Engines—III.

By F. E. Watts.

EFFECT OF HEIGHT.

The effect of the height of ports will now be considered in relation to changes in the length of stroke. The effects of a change in the height of a port upon its capacity are somewhat complicated, owing to the fact that piston speed varies at different parts of the stroke. Fig. 3 shows this variation in speed graphically. In Fig. 4 the solid rectangle represents the development of a port, while the dotted lines show successive positions of the piston 10 degrees apart. As these spaces A, B, C, D, E, F are uncovered in the same length of time it is evident that a given height of port is much more effective near the end of the stroke. For it remains open longer and hence can pass more gas. However, when we add to the height of a port it is an entirely different matter, for the addition remains fully open while the original port is opening and closing, and in this longer period more gas has a chance to pass through than in the same height of the original port, open a shorter time. If we double the height of a port we more than double its capacity.

Thus in Fig. 4 suppose the top of the original port to have been along the line G H, which is practically one-half the height of the port shown. The capacity of the port G H K L is only about one-sixth that of the port I J K L, although its area is nearly one-half as large. This may be seen in Fig. 5, as will be explained later.

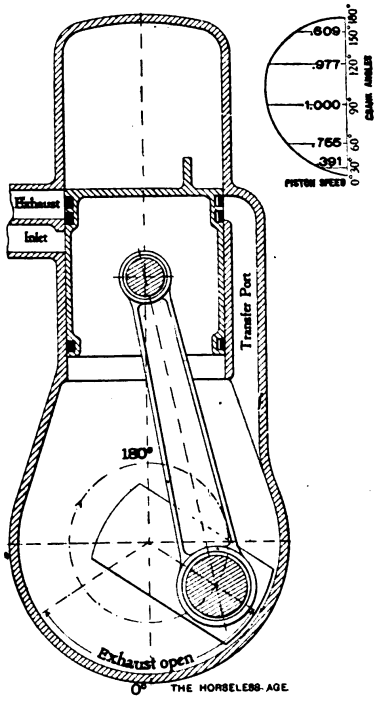


FIG. 3.—DIAGRAM OF MOTOR AND CURVE OF INSTANTANEOUS PISTON SPEEDS.

CHANGE OF HEIGHT WITH STROKE.

At first thought it might seem as though, if two engines had equal bores and their ports had the same effective lengths, that the heights of corresponding ports should bear the same ratio as the strokes. That is, if we had two engines of 5 inch and 4 inch strokes, respectively, the heights of their ports should bear the ratio of 4:5. More careful consideration will show that practically the same limits for the piston speed are possible in the two engines, as these limits depend almost wholly upon lubrication, inertia and compression. So the 4 inch stroke takes place in four-fifths the time of the 5 inch. And if its ports are only four-fifths as high, they open and close in four-fifths of the time taken by those of the other. Their capacity, therefore, is $4/5 \times 4/5 = 16/25$ as great, instead of the four-fifths demanded by the ratio of the cylinder volumes. It is evident that the ports of the engine with the 4 inch stroke should be made higher if those of the other engine are correct. The reason that the capacities of the ports just discussed can be compared so readily is that the angle which the crank passes through between the opening and the closing of the ports is the same in both engines and the range of piston speeds is the same. When the limiting angles differ another method of comparison must be used.

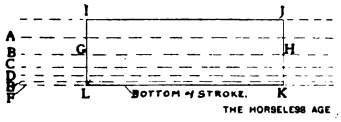


FIG. 4.—DEVELOPMENT OF PORT.

The curve of piston speeds shown in Fig. 3 is for the accompanying engine, which has a connecting rod twice as long from centre to centre as the engine stroke. The values given for the piston speeds are fractions of the crank pin speed, and are the same for all engines having this ratio of stroke and rod length. Values for different ratios of these parts are given in standard works on engine design or may be computed graphically. For a graphical treatment, which also covers offset cylinders, the reader is referred to pages 21 to 27 of "Kinematics of Machinery," by Forrest R. Jones.

To calculate the effect of these speed variations on the capacity of a port, the graphical method shown in Fig. 5 may be employed. If the average piston speed is the same for both engines their crank pin speeds will be the same. If these speeds are equal the time taken by the crank of the 4 inch engine to travel through an arc of one degree is four-fifths of the time taken by the crank pin of the other to make the same angular movement. In Fig. 5 distances along the path of the crank pin are laid off horizontally and represent intervals of time on each of the perpendiculars through the 10 degree points the corresponding vertical travel of the piston is laid off. The curve O A B is drawn

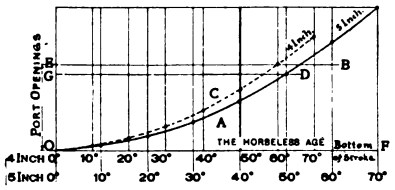


FIG. 5.—CAPACITY DIAGRAM OF EXHAUST PORTS FOR 4 AND 5 INCH STROKES.

through the points thus found for an engine with a 5 inch stroke, and O C D is similarly drawn for an engine with a 4 inch stroke. Suppose the first engine had an exhaust port which opened 13/16 of an inch before the bottom of the stroke was reached and extended to the bottom. The horizontal line E B would represent the beginning of the port opening, and its length would represent the time required by the port to fully open. If the figure E B A O is divided into narrow figures by parallel lines drawn horizontally, each one of these figures may be considered a trapezoid whose height represents a part of the port opening and whose mean length represents the time this part of the port remains open. The product of these two dimensions gives the area of the trapezoid, and if this is multiplied by the effective circumferential length of the port the resulting product will represent that part of the capacity of the port due to the portion of the port height under consideration. But if these horizontal lines are drawn an infinitesimal distance apart the sum of the areas of the trapezoids will equal area E B A O. So area E B A O multiplied by the effective length of the port will represent its capacity. A similar figure between some horizontal line and the curve O C D, multiplied by the effective port length, will give a comparison with the capacity of the port for the engine with the 4 inch stroke. But as these port lengths were taken the same in both engines they may be neglected in the comparison, and the two areas compared directly. So if we draw a line parallel with E B from E O to O C D at such a height that the area inclosed between it and O C D is four-fifths of the area O A B E, the distance from this line to O F is the height of port required. These areas are readily calculated by taking a strip of paper, marking off a series of ordinates along its edge and measuring their combined length. Dividing the sum thus found by the number of ordinates plus one will give the average height. Multiplying this by the longest abscissa, as E B, will give the area. Of course, the closer the ordinates are taken the nearer the value found will be to the true area. This method is much shorter than the analytical treatment, as the relation between the crank angle and the space traveled by the piston is quite involved because of the angularity of the connecting rod, being,

$$S = r\left[(1 - \cos\theta) + \tfrac{1}{2} a_1 \sin^2\theta\right] \ldots\ldots\ldots (1)$$

Where S is the distance of the top of the piston from the top of the stroke; r, the crank radius; θ, the angle of the crank with the upper dead centre; a, the crank radius divided by the length of the connecting rod.

Three trials at most should give a very close result by the graphical method, with but little chance of error, since the areas may be drawn one over the other for comparison, as in Fig. 5. In this case G D was found to be the line required, the height O G being .73 inch.

AN APPROXIMATE RULE.

It is possible to work out a short rule for the ratio of port heights, which will give fairly accurate results if the difference in the strokes is not too great. Referring to Fig. 5, $OE/OG = .8125/.73 = 1.113$. If we take the ratio of the square roots of the radii we shall get

$$\frac{\sqrt{2.5}}{\sqrt{2}} = \frac{1.581}{1.4142} = 1.1204.$$

It will be seen that this ratio is pretty close to that previously found, in fact if we had

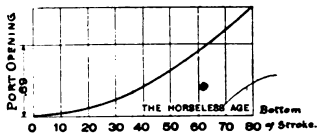


FIG. 6.—CAPACITY DIAGRAM OF EXHAUST PORT FOR 3 INCH STROKE.

used it for calculating the port height for the engine with the 4 inch stroke we should have obtained $.8125/1.1204 = .723$ inches—a result equally good as the one we actually arrived at. This relation holds approximately for all values of r where there is not too large a ratio between the strokes of the two engines. So we may state the following rule, being careful always to remember its limitations. Rule: In two-cycle engines having equal bores and corresponding ports of the same effective circumferential lengths, the heights of these ports should vary approximately as the square roots of the crank radii. It will readily be seen that if the pistons of the two engines moved between exactly the same limits on the curve of the instantaneous piston speeds, from the time their ports opened until they closed, the following ratio would hold true:

$$A : A' = c\ t\ s : c\ t'\ s' \ldots\ldots (2)$$

Where A, t and s stand for the areas in Fig. 5, the average time and the full port opening, respectively, and c is a constant.

$$\text{But } A : A' = r : r' \ldots\ldots\ldots (3)$$

when the areas are what they should be.

$$\text{So } r : r' = t\ s : t'\ s' \ldots\ldots\ldots (4)$$

Now if $A = A'$ $\sqrt{r} : \sqrt{r'} = s : s'$, and in no other case. So the rule is only exactly true where the variation in stroke is zero, that is, where there is no variation. It gives results farther and farther from the true value as the limits for θ vary for the engines compared. In the engines we have been comparing the difference in the limits of θ is only about 3¼ degrees, so the approximation is very close. In Fig. 6 is

shown the capacity diagram for an engine with a 3 inch stroke, and here the rule is of no service whatever. If we apply it we get $\sqrt{2.5} : \sqrt{1.5} = .812 : x, x = .629$ inches. Computing the relative areas of the curves, we find that the true value of x is .69 inches. In this case the limits of θ differ by nearly 10½ degrees.

By comparing areas, as in Fig. 5, and multiplying these areas by the effective lengths of the ports, when these lengths differ, it should be possible to get a fair comparison of the port capacities of any two automobile engines. Of course, this multiplication may be performed directly on the diagram by increasing each ordinate, if preferred. Similar methods may be used with four-cycle valve movements, using valve lift in place of piston travel; in this case, however, an additional factor must be considered, for account must be taken of the movement of the piston and its varying suction effect.

The foregoing thoughts on port design are offered for what they are worth, and if any reader differs from the ideas expressed it would please the writer to see these exceptions to his conclusions printed in THE HORSELESS AGE.

Suggestions for Working Motor Omnibuses—II.

By Roy Lindsay.

THE POLICE TAKE A HAND IN THE GAME.

We have now arrived at a stage in the story when some 500 motor buses had been purchased and were in regular service. To be truthful the service ought to be described as irregular, because some new route would be opened one week, found not to be a paying one, and the buses transferred to some other route the week after. The want of frequent overhauling was becoming apparent, for the badly worn wheels in the gear boxes screeched and howled with a din that was positively painful to hear. Chains rattled, rods and steering connections groaned unceasingly, and all the machines except the very newest made their presence heard a quarter of a mile away. The main streets in the central and western parts of London became a veritable pandemonium, and when the companies, in the hope of opening up untapped routes, invaded quiet residential thoroughfares that had previously been free from heavy traffic, letters of complaint filled the correspondence columns of the newspapers. Public meetings were held, at which the speakers denounced the mechanical juggernauts in language that freely reflected the feelings of the shopkeepers and residents of the thoroughfares through which the buses passed. Terrible noise was not the only trouble, for from the early stage of insufficient lubrication and seized bearings the drivers now went to the other extreme, swamping the engines so vigorously with oil that clouds of pungent smoke marked the passage of every machine. Just prior to the time when the noise and smoke troubles became really unendurable the chiefs of police had realized that mechanical street locomotion was not a passing craze but had come to stay, and realizing at last that none of their own officials possessed sufficient knowledge for the purpose they appointed a well known technical gentleman as consulting adviser. A couple of inspectors were engaged whose sole duties were to test the capacity of the drivers' abilities and to see that every new machine complied with certain regulations previously issued. Meanwhile, the companies pursued the even tenor of their way by carrying more passengers than they could comfortably handle, trying to convert the costly machines into scrap metal as fast as was humanly possible, and generally turning the city into a fair imitation of a boiler factory on a big scale. The British public is long suffering, and will put up with all sorts of inconveniences, because what is everybody's business is nobody's business. This bus matter aroused people to such a pitch of exasperation that a deputation waited upon the Home Secretary (under whose control is placed the whole of the London police force), and the pressure of public opinion was so insistent that eventually the head of the police issued a warning notice, giving the companies a short period in which to abate the nuisances complained about, and courteously intimating that after a certain date offending machines would not be permitted to ply for hire. This warning circular was thought to be a huge joke by the managers of the operating companies, and as something intended to pacify the press and public without any serious intention of its suggestions being enforced. Black Monday, as it has since been designated, duly arrived, and the bus companies discovered with astonishment that the police were in deadly earnest, for every noisy or smoking vehicle was stopped, ordered back into the garage, and a written notice served upon the owners of every one of the offending machines to abate the nuisance. Further, it was intimated that when the owners considered any machine was again fit for service it would have to be submitted to a rigid inspection, just as if it were an entirely new vehicle. A number of gentlemen were constituted into a "noise committee," before whom every new or old machine had to be driven on Wimbledon Common, an open space outside London, and failure to pass this test any machine was rejected, however perfect it might be mechanically. The various bus companies, who had hitherto been fighting each other tooth and nail, were drawn together by the common interests when they saw all their dreams of unlimited wealth shattered at one blow. Powerful influences were set to work to endeavor to induce the chief police officials to modify their decisions, but, fortunately for the peace of mind of London's vast population, the efforts were unavailing. The endeavor to organize a press campaign with the argument "a British industry was threatened with ruin" was equally futile, for the public were as well aware as the directors of the companies that all the rejected buses, so far as the chasses were concerned, had been built abroad, consequently this anti-police agitation flickered out as soon as it was started. Submission was inevitable, and as in all similar cases that have occurred in England, the health and welfare of the inhabitants overwhelmed the financial scheming of the company promoters.

REPAIR SHOP ORGANIZATION.

Those best qualified to judge estimate that from the causes just indicated the various London motor bus companies have lost at least $500,000, and most all of this could have been saved had expert automobile engineers been placed in charge and permitted to have a free hand. The first essential stage in the development of a bus service is the equipment of a proper repair plant in the same range of buildings as that in which the vehicles are garaged, and containing a sufficiency of modern machine tools to deal at one time with 15 to 20 per cent. of the vehicles in service. To all intents and purposes such a repair shop is really a factory, requiring similar ranges of tools capable of dealing with all manufacturing operations, except cylinder castings and the boring of the same. Whether five or 500 machines are owned, the tools required will be the same, with a necessary difference of quantity in the two cases. The repair shop is the pivot upon which all else turns, for if a bus company only itself undertakes small running adjustments, and relies upon outside engineering assistance for the larger repairs, it must end its career in the bankruptcy court. For this reason alone, and irrespective of the usual competitive conditions in securing passengers, the larger the number of vehicles owned the greater the chances of ultimate success.

The tools necessary to deal with twenty machines will cost nearly as much as those for 100, and the proportion of initial cost added to the cost of the smaller number of vehicles cannot earn interest on outlay, quite apart from necessary annual profits. In suggesting that the repair shop ought to be capable of building a car from end to end, it may be conceded that certain of the operations will only call for attention at rare intervals, and can, therefore, be safely left to the factory from which the vehicle was purchased. The main frame and the springs, being the products of a special business, are outside the scope of a repair shop, and the same may be said of cylinder castings and machining, crank chambers, gear box castings and axle casings in live axle transmission. Ignition details can

be safely left to the makers of the various specialties. But the repair shop ought to be capable of dealing with everything else, including shaft turning, gear cutting and every one of the multifarious operations normally undertaken in an engineering repair shop. Ordinary business considerations would lead one to suppose that, as the manufacturer of the vehicle is turning all the required parts out in quantities, it would be far cheaper to send to the factory for renewals rather than go to a heavy expenditure for machine tools. This is true only in relation to certain of the smaller portions of the mechanism, of which a stock can be kept in the stores department. Now the whole essence of dividend earning for passenger carrying—the medium may be a railway, a steamboat or an automobile—is regular service at stated times, for the public will not patronize a means of conveyance upon which absolute reliance cannot be placed, barring accidents or exceptional causes. The business of a manufacturer is to sell complete vehicles, and while he may be anxious to satisfy the reasonable requirements of customers for new parts, it is unfair to expect him to upset the elaborate organization of a part of the factory for a $50 job. Factory superintendents endeavor to overcome this difficulty by making stock of all the parts of a particular model; frequently there ensues an inexplicable demand for a certain part and the stock is depleted. After the stock is exhausted an order may come in for one piece only of that particular car, but it would be committing financial suicide if on every such occasion a tool was stopped, "set," and when the special job was completed reset for the original operation. The order, therefore, remains unexecuted until a tool can be spared. The owner of a pleasure automobile may be exasperated by the delay, but it is a far different matter when a bus has to be laid aside for a time, as every hour so lost is a definite loss of money.

A MATTER OF AVOIDING DELAY.

It is not a question of saving money, but saving delay, because just so long as an omnibus is idle the capital cost of that particular machine is dead money, quite apart from the actual loss of earnings. There is no suggestion that parts of machines made in small quantities will be anything like as cheap as those purchased from a manufacturer, and it is fairly safe to assume that the machine cost alone would be at least 10 per cent. more, and might be greater than that, because the money spent on machine tools has to earn a dividend equally with the money spent on rolling stock. Waiting for a part to materialize from the factory may involve a delay of anything from a week and upward, whereas with proper facilities on the spot for manufacturing purposes the part can be made and the omnibus be again on the road in half the time. Nor does the weight of experience apply this argument solely to small parts, for the system is of vastly greater importance for the principal portions of the power plant and transmission gear, crank shafts, connecting rods, gear wheels and shafts, propeller shafts, etc. It must always be remembered that, within the limits of reasonably quick production of new vehicles, interchangeability is nearly as essential as the quality of material employed, but the conditions of running motor omnibus services more often than not may entail an infinity of trouble and expense if a replacement is the exact replica of the worn out or broken portion. This may appear paradoxical to manufacturers whose business has lain entirely with the pleasure side. Nevertheless, when it comes to a question of taking down an engine and fitting a replacement, innumerable reasons could be adduced, based upon the experience in various omnibus garages, why it is cheaper in the end to make something to fit in position by the ancient "trial and error" method rather than use a dead-to-size piece that will require a dozen other things being altered before it can be properly positioned.

REPAIR SHOP ORGANIZATION.

Conceding the necessity of an adequately equipped repair shop, the usual engineering foremen and superintendents would be appointed, and they must take their orders from the technical engineer and not from the general manager or directors. The technical engineer's duties are of so opposite a character that the right sort of man is worth all the salary he cares to ask, and in a sense his position is of far more importance and worthy of much greater financial remuneration than that of the general manager. By whatever name his office be designated, this chief engineer has to try and keep every machine on the road to earn money, and simultaneously must be carrying out the essential periodical repairs and adjustments on such machines so that the minimum of earning capacity only is sacrificed. The ordinary routine work of the chief engineer of an automobile factory is child's play in comparison with the never ending duty and worry of the man who undertakes the technical superintendence of a motor bus service. He ought to be invested with autocratic powers of engagement and dismissal of his staff of mechanics and helpers, to decide the exact moment when a machine must be taken off the road for repair, and yet by judicious and frequent minor adjustments to defer that period until the repair shop staff can undertake the job expeditiously. With most all corporations and companies who have the handling of goods or passenger traffic the usual custom is to install some good commercial man as general manager, and permit him to control all other of the employees. With motor bus companies the positions ought to be exactly reversed, for a general manager commercially strong but technically inefficient is useless. Acting with the best intentions, he can in a few minutes upset the well ordered plans that may have been the result of months of endeavor on the part of the chief engineer. If the repair shop is the pivot of the business, it is in no sense an exaggeration to call the chief engineer the energizing influence, without which the whole must inevitably end in failure.

TIRES.

Although it is outside the scope of the present article to deal with mechanical construction, the tire question plays such an important part in the profit and loss account as to call for some reference. Taking for granted that only the best possible quality will be purchased, the organizers of any bus service will be faced right at the commencement with a problem that can be solved in two ways: to purchase their own tires and renewals as and when required, or to enter into a contract for a term of years for all supplies of this nature. At first sight the desirable proposition appears to be to purchase outright, it seeming quite reasonable that the user should run a tire to destruction and obtain all the benefit of the erratic variations in wear that solid rubber provides. Were it possible to absolutely determine beforehand the life of a certain diameter and section of tire it would be just as easy to buy tires as it is to buy oil, but the difference in mileage obtained from tires that are the product of one factory, and even from a batch made on the same day, are so enormous as to militate largely against buying tires. The practice of a manufacturer selling tires and guaranteeing so many thousands of miles' life has been tried on a big scale in England, with results that are alike unsatisfactory to both parties. Endless friction, bickerings and final resort to the law courts have been almost invariable; however straightforwardly the parties to a contract guarantee may desire to act, suspicion of motives strains the otherwise friendly relations. The maker has to be continually on the qui vive to assure himself that so called "worn out" tires have not been damaged by oil, misusage or neglect, and the operating company is ever of opinion that the maker is trying to wriggle out of the guarantee.

The mileage basis system has proved to be the best all round method, because the financial risk is equally distributed between the maker and the user, and it is to the interest of both parties to loyally adhere to the conditions of the contract. The usual plan is for the contract period to run for at least two years, the tire maker receiving so many cents per mile for every mile the vehicle covers, he undertaking to supply new tires whenever those in use are worn down to a minimum depth from the original size or when damaged from any cause whatsoever. Every wheel has a number stamped upon the rim and a corresponding number painted upon the inner side of the wooden felloe for the purpose of identification.

(To be continued.)

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Conservative Engineering.

It will have been noticed by the observant reader of the automobile press that several of our leading makers have made only unimportant changes in their models during the past several years. They have succeeded in evolving a design which gives satisfactory service, and which at the same time appeals to the fancy of the public, and if a firm has reached this point it is evidently to its advantage to stick quite closely to its model, except where there is obvious room for improvement. The resulting stability of design engenders confidence in the prospective purchaser, and is also a satisfaction to the owners of cars of this make, as their machines will not so soon be out of date, and will depreciate less rapidly. This applies where there is no obvious chance for improving the design of the car, but if there has been some new development in design, which has been clearly proven in advance, it should, of course, be adopted, else the manufacturer runs the risk of falling behind his more progressive competitors. What should be discouraged is the unhealthy search for novelty at any price, without much regard to whether the innovation is an improvement or not. These "special features" or "latest improvements" may give the salesman a point to expand upon, but they will hardly be of much help to a firm which is in business to stay, and consequently must expect to make good all its claims. It will not add to the general reputation of a car if the lauded innovation of one season is discarded the next and is succeeded by some other improvement for which equally exaggerated claims are made.

Is the Automobile a Dangerous Machine?

Judging from the vast amount of automobile legislation which has been enacted in this country, and also from the numerous arrests which are daily made on account of violating speed regulations, taken together with the prominence which the newspapers give to automobile accidents which occur on the public highways, one would naturally conclude that the automobile constitutes a machine of danger; but is this supposition true? Several years ago there came before the courts for determination the question whether the railroad train constitutes a dangerous means of transportation; dangerous in the sense that its operation necessitated certain laws controlling the speed of trains, and the enactment of other rules, such, for example, as requiring gates to be placed at street crossings. The railroads contested this legislation on the ground that they were unjustly discriminated against, in that they were required to do certain things not demanded of others somewhat similarly situated; but the courts held and it is now the law that those who transport passengers and freight by means of a railroad are engaged in a hazardous employment, consequently they are held up to a very strict degree of care for the safety of passengers and the protection of freight.

Does the automobile occupy a position similar to that of railroads in reference to the safety of the public? This is the question which is being asked, and especially is it a question of more widespread interest when the street car is compared with the motor vehicle. Automobilists are demanding to know why they are arrested for violating the law when following directly behind a street car, while the latter vehicle is traveling almost twice as fast as the former. Then, again, why should not motormen who operate street railway cars be licensed? They are engaged in a public employment, and for that reason there is more sound argument in favor of requiring them to be licensed than automobile drivers. However, the legislatures have not seen fit to compel these employees of street railway corporations to possess any qualifications at all, and it is because of this fact that we find our large street railways maintaining expensive legal departments for the purpose of defending negligence suits. If we could compare the number of accidents which are caused by the operation of street railway cars with those resulting from the driving of automobiles we would be able to get some idea of the relative dangerous characteristics of both classes of vehicles.

We know that there are thousands of accidents happening each year caused by the operation of the electric street car. The calendars of our courts are congested with these cases, and there are numerous lawyers who do nothing else than carry on negligence practice, consisting of litigation against street railway companies. Do we find any such condition existing in regard to litigation over automobile accidents? No. Very true, automobile accidents happen, and they frequently find their way into the courts, but the number of accidents arising out of the operation of automobiles, as compared with the street car accidents, are comparatively few, and this fact should be largely controlling in determining whether the automobile is or is not a more dangerous machine than the street railway car. Then, again, we must consider that there are more automobiles than there are street cars, which is a point decidedly in favor of the motor vehicle. The great prominence which newspapers are prone to give to automobile accidents is apt to instill in the mind of the public great apprehension. Moreover, the usual prominence of the parties who are ordinarily concerned in accidents arising out of the operation of autobiles also serves to bring to public attention, through the press, the collision or whatever else might have caused the injuries, if any. Again, popular prejudice against automobiles, which is more or less reflected through the judiciary, has been created by the acts of a few, and this prejudice has its influence on the popular mind in regard to the dangerous character of the automobile; but it can be asserted with truth that, considering other vehicles operated upon the public highways, such as the street car, the automobile is not a dangerous machine. Whether its operation is or is not dangerous depends upon the driver, the personal element entering into automobiling;

for it is quite certain that because of the motor vehicle's unconfined sphere of action, its ability immediately to stop, and its quick response to guidance, tend to make it one of the least dangerous of vehicles driven upon the public avenues of travel.

The Drop Frame.

For any type of closed body a frame with a drop in it at the floor of the rear seat presents important advantages. It reduces the maximum height of the body by an amount exactly equal to the drop, and consequently lowers the centre of gravity and increases the stability of the car. This is a feature of no mean value in any type of closed car, as it lessens the danger of skidding, to which both the heavy fast touring car and the smaller town car, which must often travel on exceedingly greasy asphalt pavement, are exposed. Besides this, a drop frame makes ingress to the rear seat easier and consequently renders the car more comfortable.

In view of these advantages, the drop frame is extensively used on cars where its adoption presents no difficulties, as on electric vehicles which carry the motors directly at the front or the rear wheels. In a gasoline car the exigencies of the drive, whether it be shaft or chain, usually do not admit of much of a drop, unless the rear suspension is by full elliptic or platform springs, as the propeller shaft in a bevel gear drive must under all conditions clear the floor of the body, and the countershaft in the case of a chain driven car must be underneath the floor of the rear seat or where the drop should come, and with a direct drive on the high gear it must be in line with the engine shaft. Placing the countershaft ahead of the drop in the frame would make the chains unduly long, and placing it behind the drop would make them entirely too short. The drop frame seems therefore to be rather more practical in combination with the shaft drive, and certain special constructions, such as that in which the change gear is mounted on the rear axle or where the longitudinal shaft drives to a countershaft directly in front of the rear axle, allow of even more dropping than the conventional shaft drive arrangement. The greatest freedom in the matter of frame drop is allowed by a worm drive to the rear axle, with the worm located at the bottom of the worm wheel (where it may constantly run in oil), and this drive has been actually used to some extent for cars of the landaulet and brougham types, but it is hardly to be expected that designers will discard the more efficient bevel gear drive in favor of the worm gear simply to be able to use a drop frame. Nevertheless the drop frame and the resulting low carriage floor are most attractive features in motor cabs and closed touring vehicles.

Glaring Defects in Auto Laws.

According to the New York State motor vehicle law, and the several other State laws which have been patterned after it, every owner of an automobile must register his car with the Secretary of State upon acquiring possession of it, but needs no personal license as a driver; every chauffeur, defined in New York as a person operating a motor vehicle as mechanic, employee or for hire, must obtain a personal driver's license and always wear a registration badge when driving a car on the public road. The law makes no reference to any other than these two classes of drivers, but it is evident that they do not comprise all persons who drive automobiles on public highways. It is easy to imagine, for instance, an automobile owner lending his car to a friend who is neither an owner nor a chauffeur within the definition of the law, and who would be absolutely free to operate the car without registering or taking out a license from the State authorities. Similarly, a man who had learned to drive a car, or who imagined he possessed the skill, might rent a car from a garage and drive it for pleasure without permission from the authorities.

Of the three general classes into which the great public is divided by the terms of the motor vehicle law, namely, owners, chauffeurs and those who are neither owners nor chauffeurs, the first and last may drive an automobile without license, without the least inquiry as to their competency as drivers and without a badge, while the second class, which includes all who drive automobiles belonging to others as a means of gaining their livelihood, are required to pay a license fee and to wear a badge. The law thus virtually provides that if a person drives an automobile as an employee he must pay a certain tax, while if he drives for his own pleasure or profit he is exempt from this tax, and the question naturally arises whether a law which makes such a distinction would stand the test of its constitutionality. Mr. Huddy, legal editor of THE HORSELESS AGE, who, as counsel of the Chauffeurs' Club of America, has made a special study of this particular provision of the New York law, is of the opinion that in a test case the law would be declared unconstitutional.

It might be held that the owner pays a tax in form of a registration fee for his vehicle, but even if this be conceded as equivalent to a fee paid for a driver's license, the fact remains that a person neither owner nor employee is at liberty to drive without paying any fee whatever, and this is evidently a decided "slip" in the law.

German Contests.

A remarkable feature of the present contest season is the enormous interest which is being displayed in automobile competitions in Germany. Of the two leading German events of the year, the Herkomer Contest had an entry list of 191 names and the Emperor's Cup Race 92. Two other important endurance contests will be held in that country the present season, one by the clubs of southern Germany and the other by the clubs of western Germany, for each of which something like 100 entries are said already to have been secured. An endurance contest for light cars through central Germany a short time ago was also well patronized.

It is hardly possible that these various events, with their big entry lists, are supported solely by the German automobile industry and trade. The fact that in some of the events more than twenty cars of one and the same make are entered shows conclusively that the private owner plays a considerable part in these competitions. Of course, these private owners often have commercial interests at stake in the competitions, and it appears that German manufacturers encourage their customers in every way to participate in them. Some of these so called "Herrenfahrer," or amateur competitors, are no doubt stockholders in the company whose product they drive; others, in the purchase of their cars, received a special discount from the catalogue price with the understanding that they drive the car in a certain competition for their own account, while still others are manufacturers of automobile parts, and have business relations with the manufacturer of the car.

While a great many of the amateur contestants thus seek to further their commercial interests by participating in the con-

tests, there is no doubt that they are also prompted to a considerable extent by the sporting spirit. The newspaper notoriety which attaches to success in an international competition is coveted by many, and the price of this success in the way of physical exertion and often of exposure and privation is not fully realized among automobile owners in Germany, it would seem, where competitions and extended club runs have not been as numerous in the past as here. A typical tale of woe is told by one of the competitors in the light car contest above referred to, who, driving an untried car fresh from the shops, starting late and experiencing considerable trouble with his magneto, drove till he was overcome by sleep and crashed into a tree at the roadside, entirely wrecking his vehicle and suffering personal injuries. He concludes by stating that he has no further ambition to win sporting contests. After reading of the hot pace maintained in the Herkomer Contest, in which over 200 miles were covered by the contestants on several of the six days of the run, we can imagine that many of the amateur drivers in that event feel the same way.

Police Violations of the Auto Law.

Our automobile laws say that motor vehicles shall not be operated over a certain rate of speed per hour at certain places. These speed limits are mandatory, and cannot under any circumstances be lawfully disobeyed. There are no exceptions in the laws permitting any person or class of persons to drive automobiles at any faster rate, so we ask under what authority do policemen and officers of the law assume to capture a speeding automobilist, who is traveling at the rate of 40 miles an hour, for example, by using another automobile for the purpose of making the arrest. It is as unlawful for a policeman to travel on our public highways at a prohibited speed as it is for any other person to do so. Because one is an officer of the law is no reason why he may violate the law; he should rather be held to a stricter accountability than the layman. One infraction of the law does not warrant another violation., Two wrongs cannot make a right. A policeman traveling through the streets of a city at a rate of speed over that prescribed by law creates just as much danger to the public as any other person who does it. Moreover, the policeman himself does not do the driving, and is compelled ordinarily to depend upon the caution of a chauffeur.

It may be well for some of our police officials, when they operate an automobile through the streets of a city over the prescribed speed limit, to seriously consider, whether chasing an automobile or not, that they themselves may be arrested for violating the automobile law, and in the State of New York any layman who happens on the highway may make an arrest under such circumstances. To arrest a speeding automobilist by speeding after him at prohibited speed is certainly bad practice, for it creates a double danger on the highway.

Carriage Builders Enter the Field.

It is of interest to note the advent of the manufacturers of buggies and of farm machinery into the automobile industry. Years ago, when the automobile industry was in its infancy in America, the carriage builders and others whose business brought them into close touch with the farmers and other residents of the rural sections looked upon the motor vehicle as an evanescent toy of the rich, and did not hesitate to say that they saw no commercial possibilities in the field for themselves.

Since that time conditions have changed remarkably. Automobile manufacturers who then were feeling their way cautiously with light moderate priced runabouts have to a large extent concentrated their energies upon the production of the more imposing and costly touring car, high powered runabout and limousine. Thus have been left unsatisfied the wants of a class of citizens that comprises a very large proportion of our population—that is, farmers, rural mail carriers, country doctors, traveling salesmen and others whose business requires much traveling over our common earth roads. The conditions called for a type of machine that would be of low first cost and inexpensive to operate and maintain; that would go through deep sand, mud and snow, climb steep grades, pass unhindered over boulders and stumps in the middle of the road, and that would be perfectly simple to operate and as nearly as possible proof against derangement of the machinery.

Because of the drift of automobile makers to the higher priced foreign type car it has been left largely to the carriage and farm implement manufacturers to supply this want, and in studying the situation they have evidently realized at last the commercial possibilities which formerly they could not see. This year the largest producer of harvesting machines in the world has come into the market with a power vehicle especially intended for use by farmers; two carriage and buggy builders having large factories in Chicago are now producing very low priced motor runabouts and surreys with running gear and bodies of the horse drawn type; another in an Indiana city, operating three plants, and a Cincinnati concern engaged in the extensive production of road vehicles for all sorts of utilitarian purposes have entered the same field of late.

No doubt it will be a surprise to many to learn that there are at least sixteen separate builders of buggy type self propelled machines, and that fully one-third of them are not hampered by any lack of capital and facilities for the production of a very large number of such vehicles. In a short time, therefore, we may expect to see them cutting a considerable figure in the industry. The home of the motor buggy is in the Middle West, all of the manufacturers of them being located in the five Central States of Ohio, Indiana, Illinois, Iowa and Missouri. The farm machinery and buggy builders who have taken up the new branch of work as a side line are responsible concerns that have thousands of rural customers, whose confidence has been gained through the purchase of horse drawn vehicles. These companies are therefore in an exceptionally advantageous position to dispose of the motor driven vehicles that they are producing.

Whether or not the automobile manufacturers who several years ago had the low priced runabout business almost entirely in their own hands made the most of their opportunities may, in view of the present development, be a subject of debate.

Industrial Motors in Japan.

There is a scheme for running industrial motors in Japan. By the amalgamation of six different syndicates the Tokio Motor Car Company has been formed, with a capital of 10,000,000 yen. The objects of the undertaking are to establish means of communication in and between the principal towns. It is the intention of the company to employ the best type of petrol motor, particular attention being paid to the suppression of smoke and smell, and to the dust question. The company propose to make a first call for 2,500,000 yen, which it is expected will be sufficient for the purchase of 200 motor buses, 150 of which will be employed in Tokio and fifty between that city and neighboring towns.

Engine Laboring.

By Albert L. Clough.

Every driver of an automobile is familiar with the running condition of an engine which is familiarly known as "laboring," but it is not always kept in mind as to just what the phenomenon means or what is its effect upon the motor and the car as a whole.

When an engine runs jerkily from overload it is said to "labor," and under such circumstances the peculiarity of its action is that its rate of rotation is widely different in different parts of the cycle. It is necessary to emphasize the word *widely*, for, as a matter of fact, there is in all engines, even when running under moderate load, a slight fluctuation in the rate of rotation during different parts of each revolution. This is very slight in multicylinder engines and greater in single cylinder motors. The flywheel, which is intended to smooth out these fluctuations, is never large or heavy enough to quite nullify this tendency to fluctuations of angular velocity of the crank shaft at different portions of the strokes of the cycle. It does, however, practically wipe them out by reducing them even at their maximum to a few per cent. of the average angular velocity.

It is the tendency in a single cylinder, four cycle motor for the crank shaft to possess the smallest angular velocity during the latter part of the compression stroke just prior to the explosion point, and for its greatest angular velocity to be attained some time during the explosion stroke. In other words there is a tendency for such a motor to slow down when it is doing the work of compression and to accelerate while the explosion is imparting energy to its piston. With a four cylinder engine one stroke is the same as another, in that some one cylinder is performing compression and some other is active under the influence of the explosion therein. Different portions of the stroke in such an engine show different conditions, however. During the very first portion of any stroke the rate of doing compressive work is rather low, while the explosion pressure is high, and the rate at which energy is given to the piston is relatively high; but toward the end of each stroke the rate at which compressive work is being done is at a maximum, while the explosion pressure in the other cylinder being low, it is doing relatively little useful work upon the piston. The balance wheel of the four cylinder engine is mainly concerned, so far as its action on the engine itself is concerned, with smoothing out the fluctuations of angular velocity due to these differences.

Single cylinder engines show the phenomenon of laboring very plainly when overloaded, double cylinder motors exhibit it somewhat less markedly, but even in a four cylinder engine it can at times be plainly noticed.

When overloaded the engine runs slower and slower, and more and more jerkily, until it becomes a question in the mind of the operator whether or not it will make another revolution; it usually makes a characteristic clanking noise, and if the overload is continued finally fails to complete a compression stroke and stops, usually giving a spasmodic reverse motion as the piston under compression springs back under its influence.

During the operation of a car a portion of the energy delivered by the exploding charge to the piston may be expended in each of the following ways: Overcoming legitimate car resistance; that is, air resistance and tractive resistance; overcoming non-useful car and engine resistance, such as engine friction and the friction of change gear, transmission, wheel bearings, and so forth; performing the work of compression upon the charge, which is to a certain extent stored work, but not entirely so, and, finally, accelerating the flywheel and other rotating parts and the mass of the car and its useful load.

So long as the energy delivered to the pistons by the explosions is more than sufficient to overcome the legitimate car resistance, the frictional losses, and to do the work of compression, this excess goes into increasing the speed of the engine and the car and there is a certain amount of energy stored in the kinetic form, which amount is measured by the acceleration which has been imparted to rotating parts and to the car as a whole. This store of energy may be very considerable and may be usefully drawn upon under other conditions of operation. When acceleration has progressed to a certain point equilibrium is again attained, the increased speed having given rise to increased vehicle resistance and increased friction of an amount sufficient to just wipe out the excess of energy alluded to above. So long as an engine and car run at constant speeds under constant road conditions, the net power of the motor is all absorbed in overcoming car resistance and doing the frictional work of the mechanism.

CAUSES OF LABORING.

Whenever the rate of absorption of energy by car resistance and frictional losses becomes greater than the rate at which useful energy is developed by the engine there is at once a demand made upon the store of energy possessed by the rotating flywheel and by the moving vehicle itself. Any drain upon this accumulation of energy means a reduction in speed of the flywheel and other rotating parts and of the car itself. There is thus always a negative acceleration or slowing down under these conditions. The reduction in speed is, of course, not so rapid in instances where large balance wheel capacity is carried as when but a small wheel is employed, and it is common experience that the energy store of a vehicle can be drawn upon pretty freely for a short time, when climbing steep pitches or negotiating short sand stretches, without causing the motor to slow down to what may be called the laboring point.

Almost everyone, too, has had the experience of driving up a long, moderate, uniform grade or through heavy sand with his engine power almost but not quite balanced against the resistances. Under these conditions the engine and car slow down very gradually, and it may be that a hundred rods of road can be covered with the engine constantly but slowly losing speed before it is necessary to resort to a lower gear to prevent its laboring. This is an instance in which the overload of the engine is very slight, and in which energy is very gradually drawn from the store possessed by the balance wheel and the car itself.

When the overload conditions causing slowing down of engine and car are not excessive the decreased car and frictional resistances at the reduced speed may allow stable conditions to be again attained, so that a uniform lower speed may be kept up. Of course, the lower the engine and car speed, the smaller is the amount of energy stored in flywheel and car, and any demand upon it results in a much more serious slowing down than if a higher speed were being made.

If the overload is continually increased, slowing down of the engine and car increases rapidly, and while, with slight slowings down, there is still enough energy in the flywheel and moving car to yet permit of smoothness of action, excessive overloading finally reduces the speed so much that there is not enough accumulation of energy in the moving parts to furnish that necessary to up keep up speed during idle and compression strokes, or even to "smooth out" the differences existing in a single stroke. Jerkiness of motion is at once the result. Every explosion can be plainly felt as a jarring accelerative impulse, and there is a succession of metallic sounds like blows corresponding with the explosions. The car body may rock more or less in unison with the labored power impulses. Under these conditions there is another cause which may accentuate the effects above noted. If the spark is not duly retarded the engine may be working against another resistance not mentioned above, for the pressure of explosion may be at least partly realized before the piston reaches the centre, in which case the engine is actually trying to run in the opposite direction, if one may say so, during the last part of each compression stroke. In case the motor is excessively hot, self ingnition may produce the same effect as unduly advanced spark and in an uncorrectable manner.

THE EFFECTS OF LABORING.

Now as to the effect of this labored action upon the car and the engine. It is easy to see that this is very destructive in its action, even looking at the matter from a non-technical standpoint. Take, for instance, the effect upon the chain. During the normal, steady action of the engine, with the car bowling along at a good pace, the chain

has practically a steady pull upon it and runs without serious flapping or jerking. When, however, the engine is so slowed down that it seems about to stop between each explosion, and makes a convulsive start upon each power stroke, the chain has to sustain a series of jerks, and flaps and snaps very badly. Anyone who has noticed a horse start a load knows that the time that the tow rope is likely to break is when the slack is suddenly taken up. It almost never breaks when the load is in uniform motion. The automobile chain has to snap from an unloaded to an overloaded condition every time the engine gives a labored stroke. The greater the difference between the speed of the engine during different parts of its cycle, the more nearly the conditions approximate to a heavy tension being put on to a load at rest; that is, the more nearly the load or stress upon the chain becomes what is known to engineers as a "suddenly applied stress." Such a stress produces in a tension or compression member a strain double in amount to that which results from the same load being put on gradually. The chances of a breakage of a part by such an individual sudden stress is greatly augmented. Sudden application of a "fierce" clutch produces a stress of this same order upon all parts of the mechanism, and the effect of the labored explosions of a greatly slowed down engine under a bad overload is, in kind though not in degree, like suddenly and repeatedly throwing in and out of the clutch.

The effect upon the chain which has been spoken of is duplicated upon all moving parts, such as gears and shafts, and is more severe as the part under consideration is closer to the explosion. Tires, also, share in the general distress, as every sudden jerk results in a stress upon the fabric and rubber that tends toward deterioration and wear.

It is only lately that there has been any serious consideration of the effects of so called repeated stresses upon the mechanism of motor cars. For a great many years it has been known that any part of a mechanism or construction which is subjected to a succession of alternate stresses and rests, to a succession of alternate increasing and diminishing stresses, or to a series of alternate stresses in opposite directions, fails much sooner than a part which is under a constant load. The life of a part subjected to repeated stresses is short in proportion as the range of variation of the stress to which it is exposed is larger and in proportion as the number of repetitions is increased.

So long as a car is running swiftly and smoothly the stresses acting upon gears, shafts, chains and differential are very nearly constant, and energy is being furnished by the motor at a practically uniform rate, sufficient to overcome car and frictional resistances, the balance wheel serving almost perfectly to wipe out all fluctuations. When, however, the engine is laboring extremely, and approaching the stalling point, the stresses acting upon all parts of the car mechanism are "jerky" in an extreme degree, and the loads thrown upon the parts vary widely, from severe driving stresses during the height of the explosion stroke to slight driving efforts, or, perhaps, zero or negative loads at the ends of compression strokes. These constantly repeated conditions are extreme examples of the sort of usage which produces "fatigue" and early failure in car parts. Of course, under the best conditions of running many parts of the engine and car are constantly under the influence of repeated stresses, but the range of stress on all parts is enormously increased as the action of the engine becomes jerky and the rate at which the metal fatigues is greatly accelerated.

The clanking sounds which one hears when an engine is laboring are easily explained. So long as the motor is running at good speed the energy imparted to the pistons by the explosion is utilized in causing its motion. When the stalling point is nearly reached, and the moving parts are, comparatively speaking, nearly stationary, when the explosions occur the explosion pressure acts against so large a reaction as to produce almost a hammer effect upon the piston and its connected parts. The energy imparted to these is, to a considerable extent, distinctively wasted in producing molecular disturbances in the metal of the parts, resulting in slight distortions of form, weakening of the fibre and movements in the particles of bearing metal which finally amounts to looseness. It is this sort of hammer effect produced upon a piston at rest which the objectors to "starting on the spark" lay most stress upon. The parts of a badly laboring engine while not at rest are approaching that condition.

Some idea of this hammer effect above spoken of may be obtained by a simple experiment. Place a piece of metal in such a position as to be free to move and strike it a hard blow with a hammer. The piece of metal flies away freely under the blow, as there is no resistance against its motion, and most of the energy of the stroke is used in accelerating the piece, little being used in deforming it and heating it. This experiment represents, roughly, the effect of the explosion of an engine running at good speed with a large storage of kinetic energy and the resistance against which it is acting relatively small. Now clamp the piece of metal rigidly in a vise and strike it a blow of the same force. The piece moves as a whole but slightly, and thus practically no part of the energy of the stroke is used in accelerating it; but the piece, if of soft metal, is deformed or "upset," and it is heated by the molecular disturbance produced. This experiment is a greatly exaggerated but helpful illustration of what happens when the full explosion acts upon the piston of a nearly stalled engine. The balance wheel and vehicle are both running very slowly, and their inertia amounts to a very extreme resistance, though, of course, by no means an absolute one, as in the experimental illustration. However, there is a deforming or upsetting effect of the same kind, but less degree, produced upon all parts concerned. The connecting rod and crank shaft are stressed unduly, and the bearings are in time "pounded out." It is something like causing the engine to fire a charge with the car at rest and the clutch in.

When an engine is laboring it is running very inefficiently and at very low output. The slow speed of rotation allows all leaks around rings or past valves to waste a considerable portion of the charge, and, upon explosion, there is an abnormal loss of heat to the water jacket on account of the fact that the charge remains so long in the cylinder in contact with the walls. All bearings are under unusual stresses, and frictional and impact-like losses are large. Since the output of an explosion engine at full throttle is roughly in proportion to its rate of rotation, the useful effect of a motor, so greatly slowed down, is very small. So small is a motor's output under these conditions, and so wasteful is it of fuel, so rapidly does it wear and so excessively does it overstrain all its parts, that the careful motorist should be willing promptly to change gears and prevent the occurrence of laboring from every consideration of speed, comfort and economy.

Number of Autos in Germany—Accidents.

Mention has been made in these columns repeatedly of the intention of the German Government to keep records of the number of automobiles in use in that country, the character of the use of these vehicles and of the accidents caused by them. On January 1, 1907, there were in that country

Passenger automobiles	10,115
Motor trucks, etc	1,211
Motor cycles	15,700
Total	27,026

Of these there were used

For business purposes	10,699
For pleasure only	16,287

The cars in use in the city of Berlin numbered 2,408.

The accidents recorded occurred during the half year ending September 30 last. The records are as follows:

Total number of accidents	2,290
Number resulting in personal injuries	673
Number of persons injured	1,579
Number killed	51

Of those killed were

Drivers	9
Passengers of the automobiles	9
Other persons	33

The causes of the accidents were determined in 1,024 cases and were as follows:

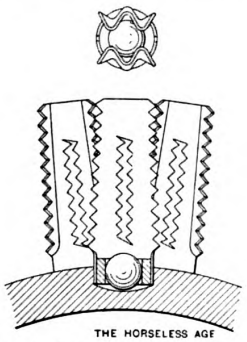
Too high speed or failure to sound alarm	478
Unskilled steering	220
Disregard of stop signals	26
Failure of brakes	53
Lack of proper precaution of other road users	174
Slippery pavements	48
Breakage of parts of machine	20
Explosions	5

During this period 695 lawsuits in connection with automobiles were brought in the courts, 625 of them against drivers.

NEW VEHICLES AND PARTS

The Payne-Modern Car.

A new car with many unusual features has been placed upon the market recently by the Modern Tool Company, of Erie, Pa., under the name of the Payne-Modern. This vehicle is to be turned out in three styles, viz., four and six cylinder touring cars and six cylinder runabouts. Both the four and six cylinder machines are designed along the same lines and differ from each other only by the fact that some of the parts of the six cylinder, such as axles, frame, crank shaft, etc., are heavier than the corresponding parts of the four cylinder.

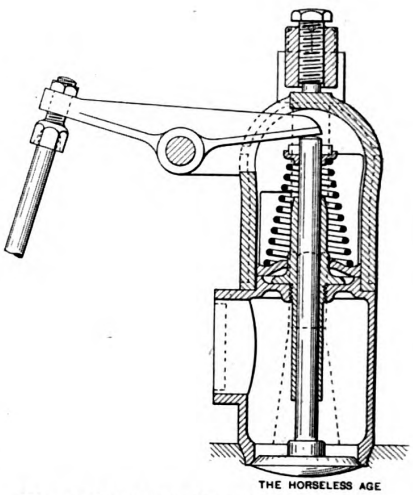


METHOD OF ATTACHING COOLING TUBES.

The cylinders are air cooled by means of a novel arrangement, and are placed at an angle of 60 degrees with each other, or 30 degrees from the vertical plane. In this manner the engine is considerably shortened, and the cooling is rendered more effective. As regards the effect of this arrangement on the length of the engine, it may be stated that the overall length of the crank case of the six cylinder motor, which has cylinders of 4 inch bore by 4½ inch stroke, is only 36 inches. The cylinders are cast of a special grade of iron, which, instead of being melted in a cupola by means of a coke fire, is melted by a new process without entering the cupola at all. The iron is claimed to be of such a high tensile strength that the cylinders will withstand a hydraulic pressure of 2,000 pounds to the square inch. As the explosion pressure, even under the most unusual conditions, probably never exceeds 400 pounds to the square inch, this gives a factor of safety of at least 5.

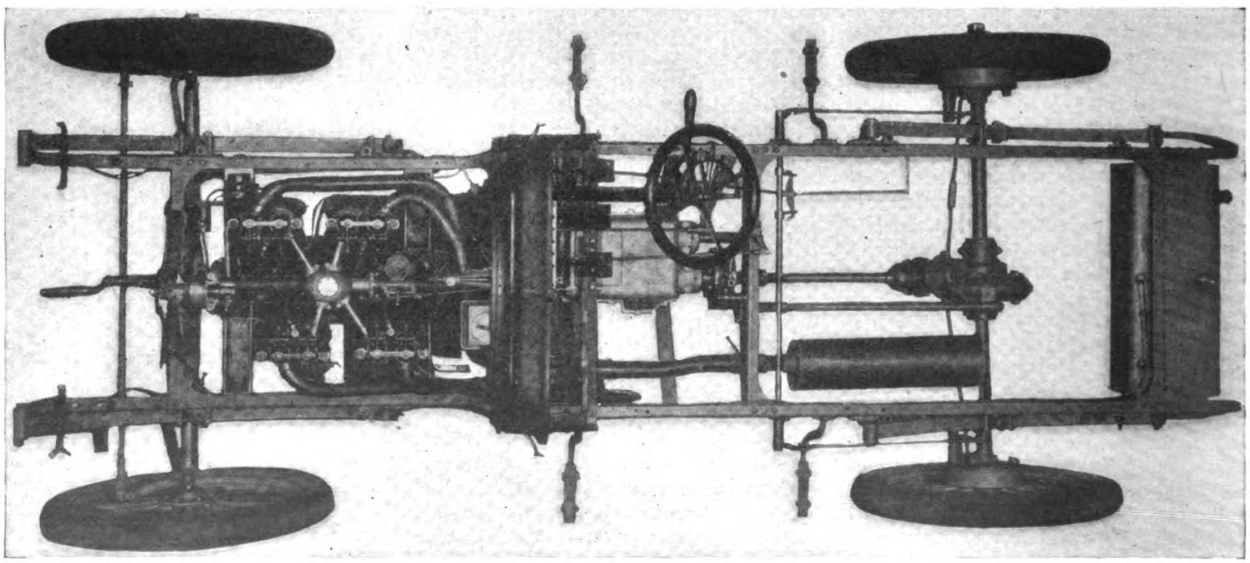
The cylinders are cooled by means of copper fins, with zigzag edges, which are swaged into the cylinder wall by means of a split collar and a steel ball, as clearly illustrated in the sketch, Fig. 1. The additional cooling effect, due to the greater conductivity of copper as compared with cast iron, is said to be very marked, and the use of these copper radiating members, together with the peculiar valve construction employed, is claimed to make it possible to carry a compression of 80 pounds without danger of overheating, this compression being well above that usually maintained in air cooled motors.

The valve construction is illustrated in Fig. 3. It will be observed that the valve housing is almost entirely on top of the cylinder, the valve head being located in the plane of the cylinder head. The inlet valves, as well as the exhaust valves, are operated by overhead walking beams, and the valve cage and walking beam bracket are held in place by means of an overhead bridge through which two pressure screws pass, one each for the exhaust and inlet valve respectively. The two sets of valves are interchangeable with each other. The inlet and exhaust pipes are connected to the valve cages by means of breech locknuts, and any valve and its attachments can be quickly removed as a unit by giving the pipe locknuts one-eighth inch of a turn, loosening the pressure screws in the bridge and swinging the bridge out of the way. The valves are held to their seat by means of conical springs, which take purchase against a spider specially designed to keep the spring away from the heat of the exhaust as much as possible.



VALVE CAGE AND OPERATING DEVICE.

The valves are abnormally large, being of about 20 per cent. the area of the piston head, or nearly one-half its diameter. The valve stems are made of high speed drill rod and the heads of 30 per cent. nickel steel. These steels were found necessary in order to avoid the scaling effect of the heat, and although high speed drill rods costs $1.25 per pound, it was decided that no expense should be spared to secure the required results. It is claimed that the special arrangement of the valve is a feature which adds greatly to the cooling efficiency of the motor, for the reason that when the valve is lifted to discharge the hot



PAYNE-MODERN FOUR CYLINDER CHASSIS.

gases the latter do not have to pass through passages along the cylinder head or wall, as in the majority of engines, but immediately they pass the valve they are away from the cylinder wall.

Air for cooling is circulated around the cylinders by means of two fans, one of them on the outside of the flywheel and the other, the speed of which is controlled by a governor, located in front. This latter fan is mainly depended upon to provide the increased cooling effect required when the car is traveling at low speeds, as in climbing steep hills with the throttle wide open. In such a case, the fan being governor-controlled, is able to work to its maximum capacity, and thus to take care of the extra heating effect.

It will be seen from Fig. 4 that the cam shaft is placed in a separate housing above the crank case, and may be readily removed as a unit for inspection when desired. The commutator is carried on the cam housing on the right hand side, and on the left hand side provision is made for fitting a magneto, if the owner should so desire. A McCord mechanical lubricator attached to the dashboard and driven by a V belt from one of the cam shafts serves for the lubrication.

The fuel supply is carried in a tank located at the rear of the chassis, from which it is transferred by air pressure to an auxiliary tank on the dashboard, which has a capacity sufficient for 5 miles running. The air pressure is obtained from a small air pump driven from the engine by an eccentric. From the auxiliary tank the gasoline flows to the carburetor by gravity. On the dashboard is placed a combined adjustable relief valve and air gauge. The latter may be adjusted to carry the air at any predetermined pressure, the usual running pressure being 1 pound. The ignition system is the ordinary high tension multiple spark coil system, and is supplied with current from a storage battery.

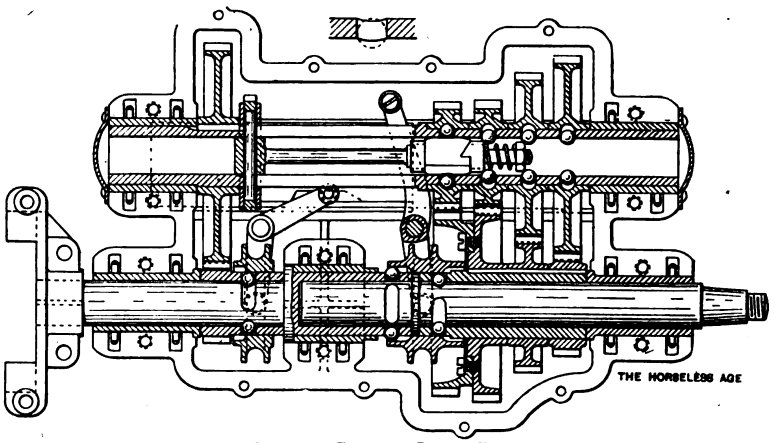


FIG. 5.—CHANGE SPEED GEAR.

The four cylinder motor has a four point support and the six cylinder motor a three point support.

The clutch is of the internal expansion type, as may be seen from the sectional view shown in Fig. 4. It is self-adjusting, and is claimed to possess the advantage that the gripping force automatically increases with the torque transmitted, so that there can be no trouble from slipping. The clutch is lined with a special fibre, which will not burn.

The change speed gear, which is illustrated in Fig. 5, differs materially from the usual design. Its main advantage is that all its gears remain constantly in mesh, and that there is consequently no clashing of gears being engaged. It provides four forward speeds and one reverse, of which the high speed forward is a direct drive. When the latter is engaged every gear and the lay shaft stand absolutely still. The gears and shaft are made of chrome-nickel steel, case hardened. The actuating parts are made of chrome-tungsten steel, a new steel claimed to be much stronger and tougher even than chrome-nickel steel. The shafts of the change speed gear are mounted in plain bearings, with phosphor bronze liners and ring oilers. The operation of the gear is as follows:

The lay shaft is hollow, or more than the usual diameter, and inside of it is placed what is referred to as a timing knuckle. The individual gears on the lay shaft are ordinarily free thereon, but can be made fast thereto by means of steel balls lodged in drill holes in the wall of the hollow shaft, and which can be forced out into sockets in the hubs of the gears by means of the timing knuckle above referred to. The holes in the wall of the lay shaft in which the steel balls are located are slightly contracted at their inner end, so as to prevent the balls from dropping into the shaft. In the illustration the reverse gear is shown in mesh. The timing knuckle is shifted by means of a cam ring at the front end of the main shaft. This same cam ring disengages the clutch pinion from its shaft when it is desired to engage the direct drive, and simultaneously the cone of gears at the rear end of the main shaft is disengaged from the shaft, so that when the direct drive is in action all the gears in the gear box, as well as the lay shaft, remain stationary. It must be understood that the disengaging of the various gears and the engaging of the direct drive coupling are effected simultaneously by the same manipulation. The gear is controlled by a single operating lever mounted directly beneath the steering hand wheel, as may be seen in the illustration of the steering gear. The lever moves over a quadrant containing notches for the different gears.

The spark and throttle levers are mounted on a rack above the steering wheel, and steering is effected by means of a screw and nut device of hardened steel. With the trunnions of the nut engages a hardened crab-jaw to which the steering arm is connected. The special arrangement of the

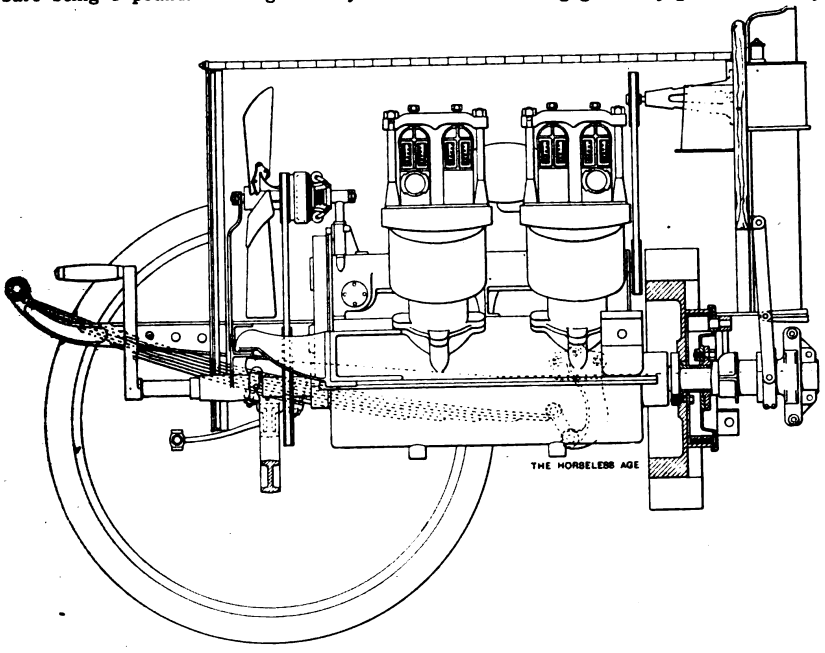
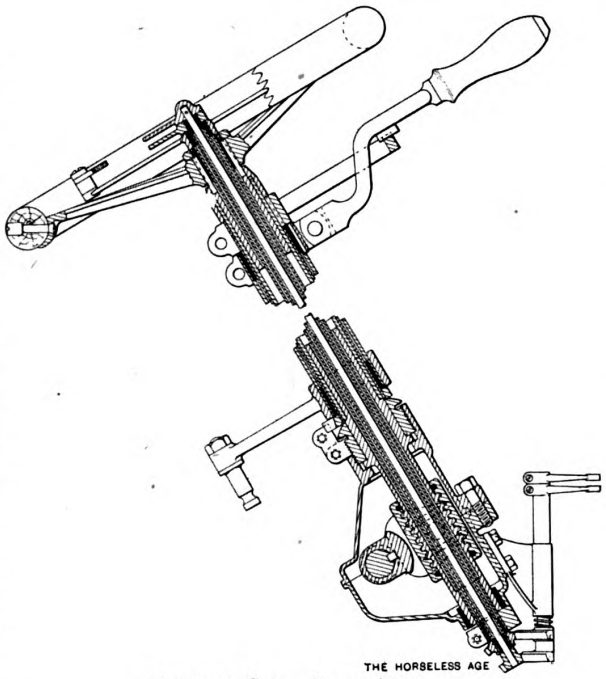


FIG. 4.—FOUR CYLINDER MOTOR, CLUTCH AND INCLINED SPRING.

controlling devices eliminates all levers from the outside of the seat, and this renders it possible to put up the top with its side curtain to completely close the car.

There are three foot levers on the toeboard, the right hand one actuating the running brake, the middle one the clutch and the left hand one the ratchet or emergency brake. The emergency brake is interlocked with the clutch in such a manner that the clutch will open directly the brake is applied. The running brake is also interlocked with the clutch, but in such a manner that it is possible to slightly apply the brake without affecting the clutch, but complete application of the brake also results in withdrawing the clutch. This latter arrangement is claimed to be particularly advantageous for driving in city traffic.



STEERING GEAR—PAYNE-MODERN.

The spring suspension is novel, the semi-elliptic springs, both front and rear, being inclined to the horizontal plane, so as to receive road shocks squarely. This arrangement of the springs is claimed to make the use of shock absorbers superfluous.

The Dow Magneto.

This latest product of the Dow Portable Electric Company is of the true high tension type, both primary and secondary windings being incorporated into the armature. The permanent field magnets are claimed to be of exceptional strength, and made from the best magnet steel obtainable. In the sectional cut herewith the parts of the magneto are clearly shown.

PRIMARY WINDINGS.

One end of the primary winding is connected with the armature core, while the other is connected with a brass plate, which ends in a brass stud. In this way the primary is brought to the contact place, holding the platinum screw. The brass plate is insulated from the body of the magneto by a hard rubber disc and a hard rubber bushing. Against the contact screw rests the interrupter spring, with platinum point; therefore, the primary current is short circuited from the armature body through the brass plate, the brass stud, the contact piece, the platinum points, and then through the interrupter spring to the body. Thus the primary winding is short circuited as long as the armature spring pushes against the contact screw.

The primary circuit is interrupted as soon as the points are separated by means of the two elevations in the interrupting disc. The condenser is connected in parallel with this interruption.

SECONDARY WINDING.

One end of the secondary winding is connected with the armature body; the other end is brought out to the slide ring, on which rests a carbon brush held by a spring. The carbon is insulated from the body by a hard rubber carbon holder. From here the current is brought over to a brass piece inserted in a hard rubber cup. Inserted in the brass piece is a carbon, held by a spring against the conductor of the distributer.

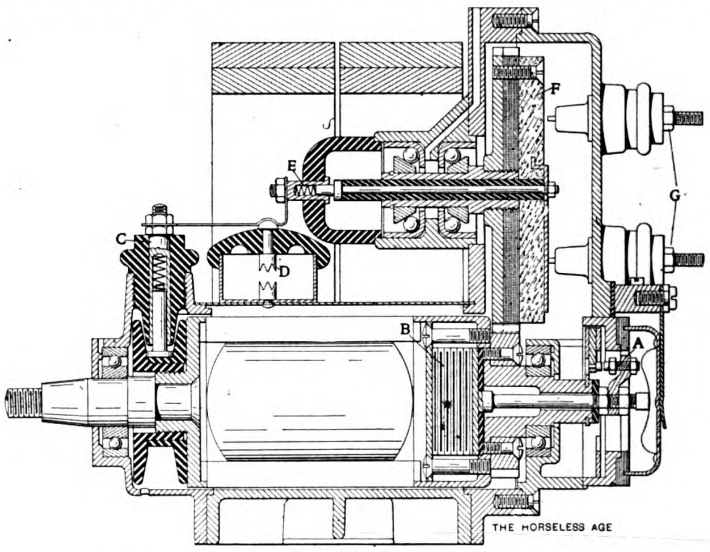
The conductor is insulated from the body by a hard rubber tube. The conductor is connected with a brass piece inserted in the distributing disc 20. The distributer disc is fastened by means of screws to the gear 21, which is in mesh with the gear 22 on the armature. By revolving the distributing disc a segment on this is brought in contact in succession with the various high tension terminals 23; then from these terminals the current is carried to the spark plugs in the cylinders and then runs back to the body of the magneto through the body of the motor.

SAFETY SPARK GAP.

The magneto is fitted with the safety spark gap 27. If a break in one of the high tension leads should occur the spark jumps this gap, thus preventing the breaking down of the magneto insulation in any part.

The Brown Compressometer.

This instrument, shown in the accompanying cut, is being placed on the market by the Auto Supply Company, New York city. As shown, the device is a pressure gauge designed to be screwed into the cylinder in the place of the spark plug for the purpose of indicating the degree of compression pressure. One of the indicating hands shows the momentary compression pressure, and the other stays at the point of maximum pressure. Being made in standard pipe and also metric sizes, it is applicable to any motor.

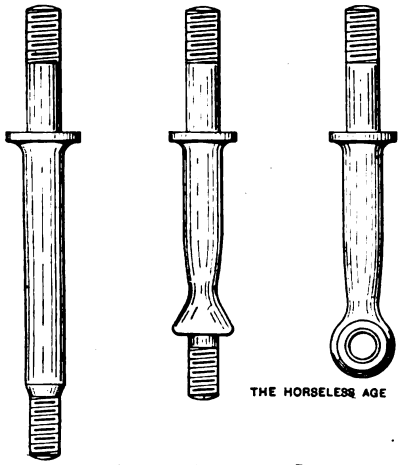


DOW MAGNETO.

A, primary circuit breaker; B, condenser; C, secondary collector ring and brush; D, safety spark gap; E, conductor to the distributer; F, distributer disc; G, high tension terminals.

"Cortland" Irons for Cape Tops.

The Cortland Forging Company, of Cortland, N. Y., which has for some time supplied Cape top irons in parts, as shown in the figure, is now prepared to supply them in any length, which makes them easily adaptable to any car, requiring only to be



"CORTLAND" SOCKET IRONS FOR SUPPORTING CAPE TOPS.

bent to suit by the top builder. They are furnished with tapers of two sizes, which will fit nearly all the seat irons in use. The company will furnish these irons in any style on orders of 100 or more.

"Heron" Motor Pump.

Our attention has been called by S. F. Edge, through the British Motor Trades Alliance, to a tire pump which it is proposed to introduce into this country. The pumping device consists of a single cylinder air compressor of small size, in which the crank and connecting rod are fully enclosed. The drive for the pump is from a leather faced pulley which may be attached to the frame of the car in such a way that pressure on a pedal or lever will apply it to the flywheel of the motor. From the pulley the drive is carried through a universally jointed shaft to worm gearing enclosed in a chamber beside the crank chamber of the pump. From the pump cylinder the compressed air is led to a small tank provided with pressure gauge and pressure reducing valve. The tank may be installed in any part of the car, and the pump itself is designed for installation beneath the floor boards.

"Standard" Jack.

A new single acting jack with a capacity of 2,500 pounds is being placed on the market by the Auto Accessories Company, of New York city. This jack has been designed for use in cramped quarters where a double acting feature would be undesirable because of difficulty in the manipulation of the handle where the car weight must be taken care of in both directions. This jack, styled "Standard," is light and compact and guaranteed by the makers.

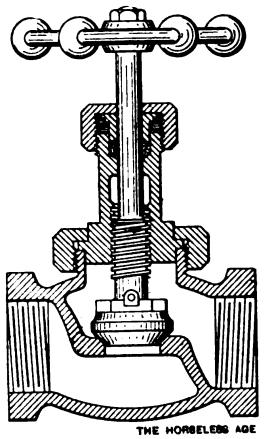
Lunkenheimer Improved Regrinding Globe Valves.

Some few improvements have been made in the globe valves of the regrinding type manufactured by the Lunkenheimer Co.

The weight of the valve body has been increased to insure it against deformation from rough handling while being attached; in addition to this the length of the threads for its attachment to the piping has been increased, thus making a secure joint at the threads more certain. The hand wheels are all secured to the valve stems by lock nuts in these newer valves.

In the cut herewith may be seen the construction of the stem packing gland. This gland is designed along the most approved lines, and the whole valve is so constructed that the valve stem packing may be renewed, even though steam at high pressure be passing the valve. The entire valve and stem fittings are retained in position in the body of the valve by a large union nut, as shown; the unscrewing of this nut permits removal of the operating parts as a unit.

The chief feature of this valve is that it may be readily reground. The valve disc, with conical seat, is retained, to a certain extent freely, upon a boss on the end of the stem by a union nut; this allows of a slight motion of the disc with reference to the



THE LUNKENHEIMER IMPROVED REGRINDING VALVE.

stem necessary for the valve to properly find its seat. Making this attachment in the form of a union facilitates the renewal of the valve discs, and at the same time prevents the corrosion of the threads whereby the attachment is made. To regrind the valve the nut retaining the fittings is unscrewed, the fittings removed and a piece of wire inserted in the small hole shown in the stem and passing through the notches in the nut, retaining the disc on the stem end. The fittings are then replaced, with some fine abrasive on the valve face, without their retaining nut, and the stem rotated until the valve is again tight, after which the small wire is removed and the fittings reassembled. These valves are made in two grades, one for pressures up to 200 lbs., the other up to 350 lbs.

Commercial Applications.

The Dingman's Ferry and Bushkill Line.

By XENOPHON P. HUDDY.

EARLY PLANS FOR AUTOMOBILE TRANSPORTATION.

As far back as the spring of 1899 F. C. Dickey, vice president of the Lawrence Gas Fixture Company, of Philadelphia; R. Bormann Palmer, representing certain Philadelphia brokers, and Philip F. Fulmer, Jr., then a practicing attorney in Philadelphia, now proprietor of the High Falls Hotel at Dingman's Ferry, Pike County, Pa., formulated a scheme for running automobiles between the Delaware Water Gap, Pa., and Port Jervis, N. Y. The plan was to have two or three cars, the largest then built, holding six or eight people, and start one from each end of the route daily. It was intended to advertise extensively, and to arrange with people like Cook and Raymond & Whitcomb to sell round trip tickets over the Erie Railroad, the auto line and the D., L. & W. Railroad, as it was thought that automobiling being then a novelty many would take the trip for the ride over the picturesque road between the two points.

WHY THE PLANS FAILED.

The project fell through because of lack of co-operation on the part of the manufacturers of the automobiles. They declined to take part payment in stock, as had been hoped, and insisted on cash on delivery, declining to guarantee that their cars would climb Shawnee Hill, which is now negotiated by automobiles with no trouble whatever. The manufacturers also refused to guarantee that the automobiles would stand up for even one season. As they had so little confidence in their own ability to furnish satisfactory machines it was impossible to induce anyone to risk money in the enterprise.

HOW THE PRESENT LINE WAS STARTED.

From 1899 on nothing was done until last year. Meanwhile the Delaware Valley Railroad was built between Stroudsburg and Bushkill, making the latter the most convenient point for reaching Dingman's Ferry, one of the most beautiful and popular resorts in the very centre of the valley of the upper Delaware.

Here is located the High Falls Hotel, probably the oldest building in good state of preservation in Pike County, and one of the pioneer resorts. It was opened as a resort by the late Dr. Philip Fine Fulmer in 1869. Philip F. Fulmer, Jr., who succeeded to the management in the spring of 1902, was one of the first in Pike County to own an automobile, and the first to build a garage for the accommodation of others.

The formation of the line between Milford, Pa., and Port Jervis, N. Y., run by the Delaware Valley Transportation Com-

pany, revived interest in automobile transportation between Dingman's Ferry and Bushkill, and the co-operation of Milton Yetter, president of the Delaware Valley Railroad, and local hotel proprietors was secured. About July 5, 1906, a limited partnership association was formed under the laws of Pennsylvania, with a capital of $3,100, and known as the Dingman's-Bushkill Transportation Company, Ltd. On July 9 the company had a car running. It was a side seated vehicle holding twelve passengers and with no accommodation for baggage, and was rented from a local automobile dealer in Stroudsburg at a cost which frequently exceeded the day's receipts. The company was obliged to hire baggage wagons and frequently extra teams to bring the excess of passengers, so it was sure to be out of pocket at the end of the day.

FIRST CAR PURCHASED AND ITS DRIVER.

On August 4, 1906, a twenty passenger car, of a well known make, was delivered at Dingman's Ferry, costing $3,150. To make sure that there would be a person competent to run it the company spent $60, besides wages, in sending a man to the manufacturer's plant a few weeks in advance to learn all about the car. He turned out to be, without exception, the most incompetent man that could be put in charge of an automobile, and the only reason he did not bankrupt the company is because he was not continued long enough in the company's employment. Combined with this misfortune was the fact that the car had evidently been hurried in construction and was not delivered in good shape, being left by the manufacturer's representative without proper testing. The driver referred to made it worse. In justice to the manufacturer it should be said that, while at first the company declined to admit the poor condition of the car as delivered, it has since done so and has made every effort to give full reparation.

OTHER DRIVERS EMPLOYED.

After discharging man No. 1 they employed another, recommended by a gentleman formerly connected with the manufacturer's plant. The first thing this man did was to run the car into a wagon, taking off a wheel of the latter. Fortunately this wagon belonged to a stockholder of the company and he made no trouble. Then one of the stockholders in the company, who had been the conductor, took the wheel, and also another man who had been in the employ of the company at odd times tried his hand at driving. Under their hands troubles were considerably lessened. The second man was retained for about three weeks, because it was thought that though he could not run a car his experience in the factory might enable him to keep the car in order. However, he did little more than draw his pay; but meanwhile the other two were learning the machinery, so that at the last of the season things went easier. In addition to the aforesaid troubles with chauffeurs and machinists the company was frequently obliged to hire the little machine rented earlier in the season to do the extra work or when the big car was laid up, and also to call on the machinists at Stroudsburg for assistance. These Stroudsburg people certainly had acquired the art of charging better than that of repairing.

SUCCESS IN SPITE OF TROUBLES.

In spite of various misfortunes, resulting from lack of experience, lack of equipment, incompetent chauffeurs and mechanics, all of which added materially to expenses and caused unnecessary delays, often resulting in missing trains or laying off the service altogether, and all of which tended to bring the line into disfavor, the net results far exceeded the company's expectations and showed a balance of between $200 and $300 at the end of the season. This balance, together with additional capital, has been applied to the purchase of a single cylinder Knox car, additional parts, tools, gasoline and oil tanks and appliances. A garage, or rather shed, has been erected at Bushkill.

FORMATION OF CORPORATION.

So far did the business and travel exceed even the hopes of its promoters that a new company has been incorporated under the laws of Pennsylvania, with a capital of $15,000, divided into 600 shares at a par value of $25 each, known as the Dingman's-Bushkill Auto Company. In addition to acquiring the assets of the old transportation company the new company purchased a new 1907 Rapid fourteen passenger car.

FINE GARAGE IN PROCESS OF CONSTRUCTION.

Mr. Fulmer has given the company the use of ground adjoining the High Falls Hotel, on which is being erected a large garage 24x60 feet, of galvanized iron, the only wood being used in the sliding doors, corner posts and the crossbeams supporting the roof. It will front on the road and will have six sliding doors 8 feet wide. There will be no posts in the interior, so there should be little trouble for cars to get in or out. At the front will be the office of the company, and at the back a thoroughly up to date repair shop, which will be in charge of a trained mechanic. It is intended to keep a full line of automobile supplies. The garage will be a public one, and will supply the ordinary needs of the touring autoist as well as those of the company. The cost of the building will not exceed $200, but as the town is not supplied with water it is necessary to connect with the hotel supply and erect a separate tank, which will add about $150 more expense. Just exactly what equipment will be necessary, and the cost thereof, are not definitely settled as yet, but the garage is nearing completion and will be in running order at an early date.

CARS OVERHAULED.

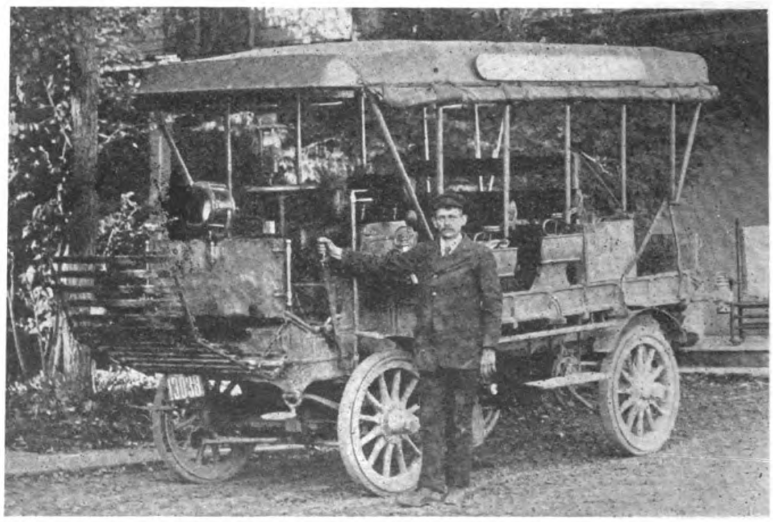
The two cars purchased last autumn have been painted and thoroughly overhauled by W. E. Martin, of Bethlehem, Pa., and the larger car, which was delivered on August 4 last year, is in better shape than the day it left the factory.

DRIVERS AND FUTURE EQUIPMENT.

The large car purchased last summer and the new car will be in charge of the company's last season's employees, and the small car will be in charge of a new man. The company will purchase several small cars, it being intended to run a general automobile livery business as well as the regular transportation line.

BAGGAGE, FREIGHT AND RATES.

The large cars are so arranged that the back seats can be removed for the transportation of baggage and freight, and whenever they are not overloaded with people a fair freight business is done. By working in harmony with the Delaware Valley Railroad the company has made a through freight and express rate from Stroudsburg, and at this time of the year the cars are carrying shingles and barrel heads from a neighboring mill on the down trip to Bushkill. An excursion ticket for $1.50 is sold, and a charge of 50 cents each for trunks is made. Last year only 25 cents a trunk was charged, but it was found that this rate



ONE OF THE CARS USED ON THE DINGMAN'S FERRY LINE.

was too cheap. In August the traffic will probably be so heavy that it will be necessary to hire a separate baggage wagon or buy a new car, using one of the old machines for the baggage, freight and express business. An effort was made to arrange with the D., L. & W. Railroad and the Pennsylvania Railroad to sell through tickets from New York and Philadelphia over the auto line, but the railroads declined to do so on account of their inability to charge for baggage. An arrangement, however, for checking baggage at the Dingman's Ferry end of the line to various railroad points has been made, thus avoiding any possible detention of passengers on account of delay in handling the baggage.

LESSONS FROM LAST SEASON'S EXPERIENCE.

The experience of the company—or rather lack of experience—last summer convinced the parties interested that there were a few maxims or rules to be followed. They are as follows:

First.—Facilitate the means of travel and increase travel.

Second.—Competent chauffeurs are equally as important to the success of a transportation line as good cars. In fact, as much or more depends on the former than on the latter. Employ good drivers.

Third.—Cars must not be overloaded or overworked.

Fourth.—Cars should be gone over by a competent man after each trip. It is the realization of this that caused the company to establish a repair shop at Dingman's Ferry. The members of the company find that the chauffeur should know something about the mechanism of his car, but he should scarcely if ever have to touch it. When the cars are brought in the mechanic should go all over them, and the cars should not go out until they are carefully examined. The necessity of keeping a skilled mechanic is what has led the company to open a general repair shop.

Fifth.—Keep on hand an ample supply of essential parts of the cars and those most likely to break. Delay in repairing in the busy season may be more costly than an entire new set.

SECRET OF THE COMPANY'S SUCCESS.

To attempt to run, as did the company last year, lacking experience, with incompetent men in charge; lacking sufficient cars to do the work, and consequently overworking those it had, and lacking appliances and equipment, is like attempting to run a trolley car without a wire. The wonder is that the results were not complete disaster. The reason why failure did not come was due to the work of the members of the company, and especially the treasurer, for his executive and business ability; the only other reason is that there was a very busy but short season. In other words, the company did not have time to ruin itself.

FUTURE OUTLOOK.

The members of the company are thoroughly convinced and unanimously of the opinion that with the experience gained last year, and with proper facilities and equipment, combined with the extensive advertising given both by the D. L. & W. Railroad and the booklets of the High Falls Hotel, it will more than double last season's business, and at less than half the proportional expense. The company confidently expects to pay a fair dividend on its capital stock as well as provide a proper sinking fund to cover depreciation, which must ever be an essential feature of a permanent automobile line.

BOARD OF DIRECTORS, OFFICERS AND STOCKHOLDERS.

The board of directors of the present company consists of Philip F. Fulmer, Jr., Dingman's Ferry, president; E. M. Peters, Bushkill, secretary; Milton Yetter, East Stroudsburg, treasurer; A. M. Adams, Dingman's Ferry, and M. B. Briscoe, Delaware P. O. Harry L. Briscoe is general manager, and Joseph Shull, of Stroudsburg, is the company's attorney. Among the nonresident stockholders are New York and Philadelphia capitalists.

COUNTRY THROUGH WHICH LINE RUNS.

The country through which the line runs is noted for its scenery. The section is in a centre of good roads, good fishing and magnificent waterfalls. Here one can stay for weeks and make trips to different points every day. The river road, which won fame in the days of the cyclist, is comparatively level and composed of mountain shale, which hardens almost like asphalt and dries immediately after a rain. The road winds between the river and mountains, forming a picturesque run of about 40 miles. The automobile company's schedule includes two round trips daily from High Falls Hotel to Bushkill Station and three trips of Friday and Saturday. The run is 12½ miles over one of the best sections of the entire valley. The time table is as follows: Leave Dingman's Ferry at 9:45 a. m. and 2:45 p. m., arriving at Bushkill at 10:50 a. m. and 3:50 p. m. Leave Bushkill at 1:15 p. m. and 5:40 p. m., arriving at Dingman's Ferry at 2:20 and 6:45 p. m. The actual running time is about fifty minutes, but it has been found best to allow a few minutes for people getting on and off along the line or other possible delays.

Increase in the Use of Commercial Trucks in Richmond, Va.

We are informed that the increase in the number of commercial vehicles in operation in the city of Richmond, Va., during the past year has been rapid, and seems to indicate a growing demand in the South for vehicles of this class. The statement has been made that within the past year the number of commercial automobiles in the city has doubled. It will be remembered that within a short time the police department has purchased an automobile wagon, and one of the large hospitals an automobile ambulance. At the present time it is stated that a great many merchants are purchasing motor delivery wagons.

Origin of Sealed Bonnet Contest.

Editor HORSELESS AGE:

I would like to know who originated the Sealed Bonnet idea, and how long ago a contest was held under the above named conditions. A. H. CHAMBERLAIN.

[The Sealed Bonnet Contest of the A. C. A. is not the idea of any one man, but is the outgrowth of a general feeling among the members that a contest should be held in which repairs of any nature should be cause for disqualification. To the best of our knowledge no contest has ever been held under like conditions.—ED.]

Fared Badly in a North Carolina Town.

Editor HORSELESS AGE:

In warning to motorists let me advise them, through your columns, to avoid the town of Hickory, N. C. The writer, while driving at a speed not in excess of 8 miles per hour, was "pulled" by the chief of police, and, upon remonstrance and resistance, knocked down by a blow in the breast, resulting in two hemorrhages from right lung. The speed limit in the town is 3 miles per hour, and motorists are admonished to drive further and fare better. Walking is preferable in the limits of that village. J. L. C.

Making a Diagnosis.

Editor HORSELESS AGE:

About two weeks ago my four cylinder, air cooled car began to act strangely. As this is its second year of continuous hard service, and nothing had ever happened to cause the least anxiety, I was surprised to find that while running along smoothly it would suddenly slow down as if choked, then as quickly bound forward as if to make up for lost time. These "spells" gradually became more frequent, especially on rough streets or in crossing car tracks.

Investigating in the order of frequency of troubles of this character, as they usually occur, the ignition system was gone over carefully and found in order, the battery was tested and showed 6.5 volts. It had only recently been charged, and always ran from 1,000 to 1,500 miles on one charge. Next the carburetor was removed and thoroughly cleaned and the supply pipe blown out. There was no improvement. New spark plugs were inserted without the least effect. The timer was removed and all connections remade. The engine now ran perfectly while the car was standing, and fairly well on asphalt.

At this point I began to consult the experts. One after another drove the car, after getting a history of the case; then they would take down the carburetor and go over the ignition, even to testing the battery. One of them proposed a new car-

buretor, another a new float, and so on. We compromised on a new ball valve for the float, having in mind the possible and common occurrence of flooding the carburetor. The result was negative. By this time I had learned to drive with the throttle partly closed, so as to shorten the rabbit-like jumps and lessen injury to transmission.

After this condition of affairs had lasted nearly two weeks, I made another call at the garage of the agent for the purpose of installing a new carburetor, and while waiting my turn for a mechanic my fat friend, the agent's demonstrator, drove in, and to him I unbosomed. This man does not say much, but after driving my car around the square he said he might be mistaken, but he thought a new battery would cure the trouble. It did, the reason being that the one in use had a broken plate, the ends of which remained in apposition while the car was standing or running on asphalt, but separated when on rough streets, thus momentarily breaking the connection and causing the trouble. H. A. R.

Starting on the Spark and Operating on Hills.

Editor HORSELESS AGE:

I have a motor which starts very readily on the spark; of course, I always have the spark fully retarded before I put in the plug. Someone was telling me that it strained the engine, but more particularly the crank shaft, to start the engine on the spark; is that true? My throttle is so arranged that I can, by pushing it back all the way, cut off all the gas. When I go down a long hill (if steep) I do that, leaving the clutch in (high gear being used), with spark fully retarded; then when the grade is such that the car would soon stop on account of the resistance of the compression, I open the throttle just enough to start the engine, after which I gradually advance the spark to the proper time for ordinary running. Will that procedure do the engine or transmission any harm if carefully executed? J. R. WILSON.

[It is untrue that an engine is injured by starting on the spark. The reasons are many and cannot all be given here, but in the Engineering Number of THE HORSELESS AGE, November 7, 1906, you will find an article treating this subject fully. The chief reason for its not injuring the motor is that the piston is, at the time of the first ignition, more than half way on its downward or power stroke, and the crank is in the position of least resistance to the power impulse; at the same time the degree of compression is only about one-quarter of the full compression pressure, and this, of course, reduces the explosion pressure in about the same ratio.

The mode of operation outlined by you is not only permissible but the best practice. The engine is allowed to cool somewhat, and at the same time the brakes are relieved of unnecessary work. On slight grades the turning over of the engine by the car, so to speak, is sufficient to keep the speed within bounds, and on steeper grades the use of one of the lower speeds is very good practice. A slight touch of the brake will, under these conditions, have as much effect as a full application if the engine were unclutched.—ED.]

Exclusion of Automobiles from Certain Streets.

Editor HORSELESS AGE:

Our city council has just passed an ordinance prohibiting automobiles on a certain street. Can an ordinance of this kind be enforced? We have thought of making a test case of this. If you can give us any information on this point through the columns of your paper I shall appreciate it.

O. A. HESLA.

[A municipality as a general rule has the power to regulate traffic over its streets, provided the regulations are reasonable and are either expressly or by implication authorized by the powers conferred upon the municipal corporation from its charter or general laws. If it is a reasonable precaution with a view to the protection or safety of the public to exclude automobiles from a certain street, then there can be but little question that the municipality possesses the power to do so; but it must be remembered that the automobile has as much right to run on the public highways as any other vehicle. This has been decided in several cases. In Pennsylvania it has been held that a turnpike company possesses the power to exclude automobiles from its road because they tend to frighten horses. In answer to the above communication it should be said that the charter of the city and the general laws should be examined in regard to the city's power over its streets. Ordinarily a city would possess authority to exclude automobiles from a certain street if there is sufficient reason for prohibiting motor vehicles on that particular highway. If there is no reasonable ground for the exclusion then the ordinance is invalid.—ED.]

Effect of Size of Spark on Horse Power.

Editor HORSELESS AGE:

I read with much interest Mr. Clough's interesting article on some tests he made to find whether the size of the spark affects the power of the engine. I must say, however, that from my own experience I cannot agree with him.

In the early days of the automobile I thought that a spark large enough to ignite was a spark, regardless of size. That once the mixture was ignited it must immediately inflame throughout the rest from the small flame around the spark. And I must confess that I cannot see any reason why this is not the case, but results speak for themselves.

In the Buffalo Endurance Run I was a passenger on the Holyoke, driven by Mr. Greuter. This machine was equipped with wipe spark system supplied by an Apple dynamo, and a dry battery for starting purposes.

One day as we were driving along we got to arguing over the effect of the spark on the power. I ridiculed the idea that it could affect it in the least. "Well, I will prove it to you," said Mr. Greuter, and with that he threw the switch from the dynamo to the battery. The power and speed at once diminished to a very pronounced extent, and as soon as he threw back to the dynamo the power and speed was restored. I was convinced.

Mr. Clough's argument that the quicker action of the coil vibrator and the earlier production of the spark caused the difference will not apply in this case of the wipe spark.

All my later experiences have borne out the above facts, and I think what has misled Mr. Clough has been the fact that his single coil was of ample power to give maximum results. Above a certain amount I do not believe there is any gain in increasing the volume of the spark. "Enough is as good as a feast," but there must be enough. HARRY E. DEY.

The Proposed Motor Parkway.

Editor HORSELESS AGE:

The writer took occasion to go over the course of the Long Island Motor Parkway in order to reconcile the many conflicting stories as to the progress of the work.

As a speedway the course is in many respects ideal, the route extending through level and comparatively uninteresting stretches, where the only fascination would be to hold the wheel over a high powered car. However, the entire course is by no means uninteresting, and parts of it are really beautiful.

While the parkway was originally intended as a speed proposition, it is probable that its greatest usefulness will be as an outlet for a crowded city, where the motorist can leave the dirt and noise behind and can open the throttle without keeping one eye open for lurking policemen.

The automobile more than anything else has been the cause of good inns springing up throughout the country. It was only a few years ago that good inns in the vicinity of New York were the exception. Since the automobile has become such a factor in suburban life the inns have increased so that now the motorist is assured of excellent accommodations at almost every point.

The new parkway is the beginning of a general good roads movement, and the entire island will be covered by a network of roads that will be a paradise for automobilists. The surveyors had already been at work on the course, as was evidenced by the stakes, and while it will be impossible to hold a race there the coming season, 1908 should see the Long Island Motor Parkway completed and one of the greatest courses in the world. H. A. GRANT.

LEGISLATIVE and LEGAL

Our Automobile Laws.

By Xenophon P. Huddy, LL. B.

The following letter suggests food for thought in regard to the legality of our automobile laws:

"Dear Sir—I am not an owner of an automobile, nor am I a chauffeur within the meaning of the New York motor vehicle law, which defines a chauffeur as a 'person operating a motor vehicle as mechanic, employee or for hire.' I understand the operation of an automobile, and consider myself a competent driver. What I desire to know is, whether it is possible for me lawfully to drive a motor vehicle on the public highways of the State of New York, considering the fact that the State law mentions only owners of automobiles and chauffeurs?

"Very truly yours,

"Signed —— ——."

COMMUNICATION RAISES SERIOUS QUESTION.

The above communication presents a question concerning the motor vehicle law of the State of New York which deserves the serious consideration of all automobilists in this country, inasmuch as many of the other State laws are similar to that of the State of New York. Moreover, the problem set forth in this letter is one of peculiar interest to lawyers, and undoubtedly would be solved by the courts, if properly brought to their attention, declaring unconstitutional the motor vehicle law of New York. Wherein the invalidity of the law lies will now be considered.

REGISTRATION OF MACHINES.

The New York State law provides for the registration of all automobiles when they are acquired by individuals or corporations. The wording of the statute is "every person" must file in the office of the Secretary of State, etc. It will be seen that the law requires all automobiles to be registered.

REGISTRATION OF CHAUFFEURS.

The only other registration requirements of the New York law are concerning the chauffeur. Any person desiring to operate a motor vehicle as an employee or for hire is compelled to register with the Secretary of State and wear a badge upon his clothing in a conspicuous place at all times while operating the car.

WHO MAY DRIVE WITHOUT REGISTERING AND PAYING FEE.

From a close study of the provisions of the motor law it will be seen that according to the letter of the law and its express requirements any person who does not come within the definition of a chauffeur, even though he does not own an automobile, may lawfully drive a motor vehicle without having previously fulfilled requirements of any kind; in other words, the non-owner who is not a mechanic or employee for hire is at liberty to jump into an automobile which has been registered by someone else and drive it wherever he will. He is not compelled to wear a badge, and is the most unrestricted of all persons in regard to operating a motor vehicle. It may reasonably be asked if this law is fair. Is it just to allow the layman to operate an automobile without complying with any legal requirements, and at the same time prohibit the experienced mechanic who drives for a living from operating an automobile unless he has paid a fee? Most certainly this law is unconstitutional, in that it arbitrarily imposes restrictions upon a class of competents and exempts the other class, which may be totally incompetent.

DEAF, DUMB AND BLIND PERSONS MAY DRIVE.

It may be of considerable interest and surprise to many automobilists to know that in New York and many other States a blind person may procure a license to drive an automobile. There is nothing in the laws which prohibits such a person from operating a motor vehicle unless it is dangerous driving. Moreover, there is nothing prohibiting a deaf, dumb and blind person from driving an automobile. It may well be asked whether our automobile laws are framed upon the right theory. It certainly seems that they are not. If the proposition set forth above in regard to the constitutionality of the motor vehicle law of the State of New York and the automobile laws of other States is doubted, all that is necessary in proof is that a chauffeur drive a machine without badge or license and allow himself to be arrested. Upon being brought into court he may file a demurrer to the charge against him and question the constitutionality of the law in the respect which has been mentioned above, claiming that he is discriminated against. If the question is presented to an intelligent court or judge, the statute must be declared unconstitutional, and that will mean the breaking down of the system of requiring the registration of chauffeurs.

LAWS MUST ACT EQUALLY UPON ALL.

It is just that we should have automobile regulations. Motoring should be restricted with a view to protecting the public, but the methods of regulating automobiling adopted by the Legislature must be fair in dealing with every person who drives a car, especially the individual who drives for a living and the support of his family.

There is nothing in the fact that a man drives an automobile as a mechanic or for hire which authorizes the Legislature to especially restrict him and not regulate the individual who drives for pleasure or some other purpose. The New York and other State automobile laws say that no motor vehicle shall be driven on the highways unless the same is registered with the Secretary of State. Inasmuch as the law permits only owners to register their machines, it may be asked what a non-owner is to do if he wishes to drive a car hired by him from the owner who lives in another State? The hirer is not permitted to register the machine, since the privilege is conferred only upon owners. It certainly seems that one who hires an automobile for two or three years, for example, is deprived of his property and denied the equal protection of the laws if he is not permitted to enjoy the use of his property. A lease of a chattel constitutes property. In such a case the non-resident owner is not required to register in the State where the hirer desires to drive, the lessee cannot register in such State, and he is not permitted to employ a chauffeur to drive his car, because an unregistered machine cannot be used.

A decision has been handed down by Judge Graham, of the Supreme Court of San Francisco, in the case of Clark vs. the Pioneer Automobile Company, of San Francisco. As was noted in our issue of June 5, the plaintiff, Milton T. Clark, was a student at the University of California who, while a minor, bought an automobile from the Pioneer Automobile Company, of San Francisco, paying $500 down and promising to pay the balance within three months. After using the car for more than three months Clark returned it to the company and demanded the return of the $500 on the ground that he was a minor. The company made a counter claim for damages and rent amounting to $1,000. Judge Graham gave the following decision: "In view of the condition of the machine at the time it was returned by the plaintiff, and the fact of his having had the use of it during the time intervening between the purchase of the machine and its return (nearly four months), the court is of the opinion that plaintiff is liable to defendant for the reasonable use of the machine and for the amount of its deterioration, which, in my judgment, would be the amount paid by the plaintiff on the purchase price."

A highly original way of evading the speed laws seems to have been developed in the State of Ohio, and was brought out very clearly in an unpleasant encounter between R. H. Magoon and H. S. Pickands, mayor of Euclid, Ohio, a village just outside of Cleveland. Mayor Pickands halted Magoon, who was traveling through Euclid at a high rate, but was told that the speeder was a deputy sheriff and could not be arrested. The mayor disregarded this fact, but was forcibly thrown from Magoon's car when he attempted to place him under arrest, and seriously injured. It is claimed that this case is not exceptional, since there are a great many deputies who take advantage of their positions to break the speed laws. A warrant has been issued for the arrest of Mr. Magoon.

We understand that a new ordinance providing for the operation of the automobile buses of the Auto Transit Company, of Philadelphia, is being drafted for presenta-

tion to the council. Mayor Reyburn stated that he vetoed the previous ordinance because of the indefiniteness of the measure. The new bill is much more definite in its statements regarding the privileges of the transit company, and it is expected that for this reason it will be more favorably received by the aldermen and the mayor.

It is reported that the Wisconsin Legislature has under consideration a bill providing prison penalties for motorists who fail to stop when signalled to do so by horsemen on country roads.

M. R. Osburn, manager of the Rock County Sugar Company, of Janesville, Wis., who entered suit recently for recovery of damages to his runabout, which was destroyed by fire in a repair shop in Chicago, has been awarded a judgment for $680.

It is reported that City Judge Garvin, of Hartford, Conn., was fined $25 a few days since by City Judge Beall, of Yonkers, N. Y., for exceeding the speed limit in the later city. Judge Garvin remarked, as he was leaving the court room, that he had himself fined many a man for speeding, and that now he knew what it was like. It was not until after he made this remark that his identity was discovered.

A complaint has been received by the secretary of the Automobile Club of America from a New York city motorist, who states that while traveling from Wappinger's Falls to Poughkeepsie, N. Y., at a speed which was moderate considering the fact that the country was entirely open and the road in very good condition, he was arrested by a constable displaying a revolver and brought before a magistrate, who told him that because of damage done the roads in the recent endurance run money was needed for their repair, and that the intention was to obtain this money from automobolists themselves.

A recommendation has been made by the house of delegates of St. Louis that the police interfere with the operation of the garage of the Union Electric Light and Power Company on the grounds that the building permit was granted with the understanding that the garage would be erected for storing and private use, and not for the purpose of storing and repairing automobiles for hire. It is claimed by the officers of the company that the company does not rent machines to the public, but does repair automobiles and charge batteries, and that it was made plain that this would be done before the permit was issued.

Two gasoline ordinances are before the council of the city of St. Louis, Mo. The first of these relates to garages and prohibits the occupation as a garage of a building more than two stories in height, and provides that all gasoline tanks, pumps and receptacles or other appliances containing or having connection with gasoline be confined in fireproof tanks; all open lamps are prohibited. The second ordinance is intended to regulate the handling of gasoline in mercantile establishments other than garages. All tanks must be at least 2½ feet under ground.

Two more automobile bills introduced by legislators from the rural districts are now under consideration by the Legislature of the State of Wisconsin. The bills are designed to control the speed of motorists in the Waukesha Lake region, and to provide for the appointment of deputies by the judges of the municipal courts of Waukesha County with authority to issue warrants for the arrest of any person suspected of having violated any law. Hitherto it has been impossible to arrest lawbreaking motorists on account of the necessity for the constables driving from 5 to 7 miles to obtain warrants, during which time the motorists would get out of the county.

Changes in the Route of the Glidden Tour.

Two rather important changes in the Glidden Tour route as at first published have been made, which avoid some very rough traveling and bad hills. The course from Canton, Ohio, to Pittsburg has been resurveyed, and a route of slightly less than 100 miles via Beaver Falls has been chosen. Again, between Baltimore and Philadelphia the railroad ferry across the Susquehanna River at Havre de Grace has been avoided. The route now takes the tourists over the toll roads by way of York and Lancaster and is longer than that previously selected, but the roads are excellent and, inasmuch as the ferry, which would have caused delay, is avoided, there can be no cause for complaint. The Susquehanna River is crossed via the bridge of the Pennsylvania Railroad at Columbia.

We are informed that the Touring Board of the A. A. A. has decided, after carefully going over the Glidden Tour route, that it will not be advisable for the association to undertake to carry the baggage for the contestants, so that this year there will be no official trucks, although the Reliance Motor Car Company had been appointed to furnish these. Each contestant will carry his own baggage.

"Stucky" Hill Climbing Contest at Cleveland, Ohio.

The third annual hill climbing contest of the Cleveland A. C. was held on Saturday, June 15. There were eighteen events, and the list of these, with the winners in each, is given below:

County Amateur Championship.—1. Stearns, W. F. Hart, 1:20.

Stock Runabouts Under $850.—1. Reo, McGinnis, 1:36 1-5.

Protested. Decided in favor of Ford, A. B. Manley, 1:49 2-5.

Stock Runabouts Under $1,500.—1. Jackson, Robert Burman, 1:38 3-5.

Stock Touring Cars Under $1,500.—1. Reo, C. R. Thomas, 1:46 1-5.

Stock Runabouts Under $2,000.—1. Jackson, R. Burman, 1:32 4-5.

Protested.

Stock Touring Cars Under $2,000.—1. Jackson, Robert Burman, 1:34 1-5.

Stock Runabouts Under $3,000.—1. Ford, M. J. Roseboro, 1:13 1-5.

Stock Touring Cars Under $3,000.—1. Ford, Kubeck, 1:21 7-10.

Stock Runabouts Under $5,000.—1. Stearns, F. Leland, 1:03 3-10.

Stock Touring Cars Under $5,000.—1. Stearns, C. Schelpp, 57 1-10.

Stock Cars Over $5,000.—1. Stearns, F. Leland, 1:11 1-10.

Piston Displacement, Two Cylinder.—Jackson, R. Burman, 2:33.

Piston Displacement, Four Cylinder.—Darracq, A. L. Campbell, 54 4-5.

Piston Displacement, Six Cylinder.—Stearns, F. Leland, 1:14.

Cars from 851 to 1,432 Pounds.—1. Stoddard-Dayton, A. Brooks, 1:28 7-10.

Cars from 1,432 to 2,264 Pounds.—1. White, Walter White, 47 2-5.

Free for All.—1. White, Walter White, 48 7-10.

Special for Electrics.—1. Baker, Gruenfeld, 1:41½.

Automobile Thieves in San Francisco.

Considerable annoyance and alarm, to say nothing of actual loss and destruction of property, has been caused by a band of automobile thieves during the past few weeks in San Francisco. The party was made up of chauffeurs discharged by various auto livery companies for bad conduct. Their usual procedure was to meet in the early evening, walk around looking for cars, and having found one drive it to the Barbary Coast and earn a few dollars by carrying passengers; then to go for a ride themselves and abandon the machine, which by that time was usually damaged to quite an extent. The nuisance finally became so great that the A. C. of California, the Automobile Dealers' Association and the Fireman's Fund Insurance Company joined together and offered a reward for the conviction of the guilty parties. Four men were finally arrested and charged with having been the cause of all the trouble. They were convicted, but were released after paying absurdly small fines.

Cornerstone Laid at the Maxwell-Briscoe Newcastle Factory.

Vice President C. W. Fairbanks laid the cornerstone of the new Maxwell-Briscoe factory building at Newcastle, Ind., on Saturday last. The town of Newcastle made the event the occasion for a general holiday, and in addition to the townspeople, who turned out en masse, there were many visitors from the large cities and representatives from most of the organizations connected with the automobile industry. It is expected that the new plant will be in operation by December of the present year.

Police Traps Near Philadelphia.

The idea of placing speed traps for the unsuspecting motorists is not peculiar to any particular section of the country, as is shown by a list of such traps in the vicinity of Philadelphia, recently published by the Philadelphia *Press*. No less than nine speed traps in the suburbs of the city are noted. It is said that the officers hide or are dressed in plain clothes, so that the motorist is usually taken entirely unawares.

Book Review.

Der Automobilzug (The Automobile Train). A study of the general principles underlying motor road train systems, illustrated on the Renard road train system. By W. A. Th. Mueller. Published by M. Krayn, Berlin.

This book contains a very comprehensive study of the subject of driving individually a number of road vehicles which are mechanically coupled together to form a road train. The author starts out with a report of a demonstration of the Renard system made before the German military authorities in Berlin on November 17 and 18, 1904, then gives a list of references to the literature on the subject, with comment on the views expressed by the different writers, and in the following chapter begins his own theoretical investigation regarding the steering action and the losses in transmission in the Renard train. The treatment is both analytical and graphical, and complete illustrations of the tractor and load carrying vehicles and their parts accompany it. The author states that the following are the general conditions which must be satisfied by the transmission arrangement between the motor and driving wheels of a mechanically propelled road train:

1. Each driving wheel must be capable of moving independently of the mean velocity of the frame, at an angular speed which (a) corresponds to the distance to be covered in unit time on the road surface by that particular wheel, and which (b) takes account of the unavoidable difference in the wheel diameters.

2. The driving mechanism must be of such design as to guarantee that each driving wheel is always actually driving.

3. The mean speed of revolution of all the wheels (which corresponds to the speed of progression of the frame) must be under perfect control from a single point.

4. Disturbances in the operation of the transmission to one wheel must have no detrimental influence on the other wheels.

The author reaches the conclusion that these four conditions can be perfectly satisfied only by means of electric motors, and the problem of motor road trains of which each vehicle is a propelling vehicle can be solved in a theoretically unobjectionable manner only by means of electric transmission from the motor to the driving wheels.

OUR FOREIGN EXCHANGES.

The Herkomer Contest.

The third annual competition for the Herkomer Trophy was held in Germany, June 4 to 11, inclusive. The contest is held for a trophy offered by the renowned Bavarian-English portrait artist Hubert von Herkomer, and has also attached to it a large number of minor prizes, some of them offered by the organizers of the contest, others by leading cities passed en route, and still others by important firms in the automobile and allied industries. The route of the contest this year was as follows (by daily stages):

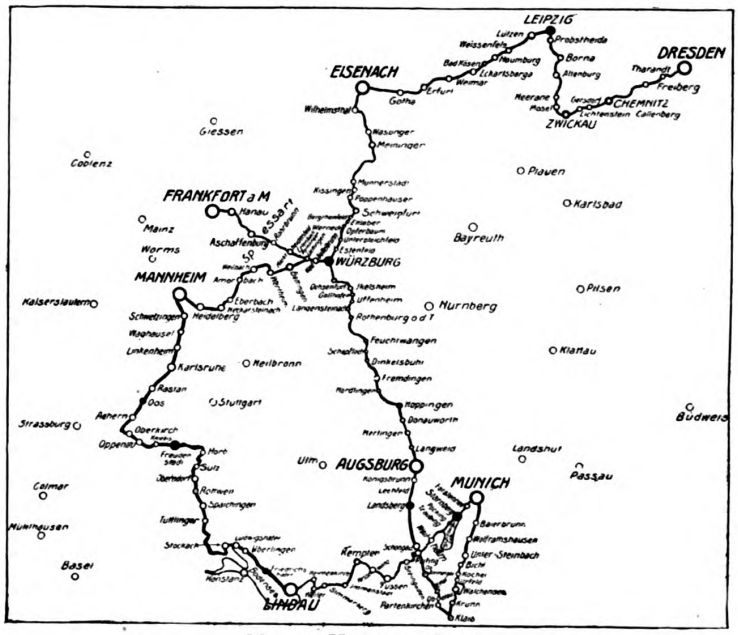
	Miles.
Dresden-Eisenach	224
Eisenach-Mannheim	210
Mannheim-Lindau	232
Lindau-Munich	144
Munich-Augsburg	129
Augsburg-Frankfort	203
Total	1,142

There were certain restrictions on the class of vehicles accepted for entry, the object being to limit the competition to touring vehicles and to bar racers. It will be remembered that last year a number of intending competitors were disqualified because it was held that the bodies of their vehicles were racing bodies, some of these bodies having canvas tonneau doors and bonnets. The contest was based on the following conditions: Each vehicle was accompanied by an official observer whose duty it was to report all involuntary stops and their duration. For each involuntary stop due to the machinery a car was penalized one point per minute. For renewal or repair of tires, even if the work was done during the time allowed for cleaning up and getting ready before the start in the morning, a penalty of five points was provided. Stops for replenishing the cooling water after the cars were once under way were penalized three points each. In case a car arrived late at the start, through no fault of the vehicle, it was penalized one point. There was no penalty for replenishing gasoline and oil at the control stations.

In addition to the tour over the above described route, the competition comprised a hill climb on the Kesselberg and a level race in the Forstenrieder Park near Munich. In these speed contests the cars were required to develop a speed dependent upon their cylinder volume, the variation of the speed with cylinder volume for the two events being shown in the curves herewith. If they exceeded the required speed they were allowed a certain amount of "good" points, proportional to the excess, and if they failed to attain this speed they received a proportionate number of "bad" points. The Herkomer Trophy went to the competitor who had the least aggregate number of penalty points for the tour, the hill climb and the level race.

The event drew the unprecedented number of 191 entries, of which 168 were received before the preliminary entry limit date, April 15. Of the 191 cars entered, 126 were German, 25 Italian, 14 French, 14 Belgian, 6 English and 6 Swiss, so that the event was an international one in the full sense of the word. The leading German makers, such as Mercedes, Benz and Adler, had each about a score of vehicles in the list, many of which were, of course, entered by private owners.

On Tuesday, June 4, the competing vehicles were received and inspected by the contest committee at the Municipal



MAP OF HERKOMER RACE.

Exhibition Palace in Dresden, and 159 cars reported up to 7 o'clock p. m. The committee was very strict in respect to compliance of the cars with the rules and regulations, and many of them were ordered to return to the city for such minor defects as lack of body finish, lack of rear lights, etc.

Some of the cars which were objected to were able to make the required changes or additions in time, but in some the defects were of such a nature that the vehicles had to be barred from official participation. This applied to a total of 26 cars, including 9 Opels, 14 Adlers, 1 Itala, 1 Achenbach and 1 Minerva. The Opels and Adlers were rejected on account of too light bodies, the Opels having a sheet steel body with nickel steel frame.

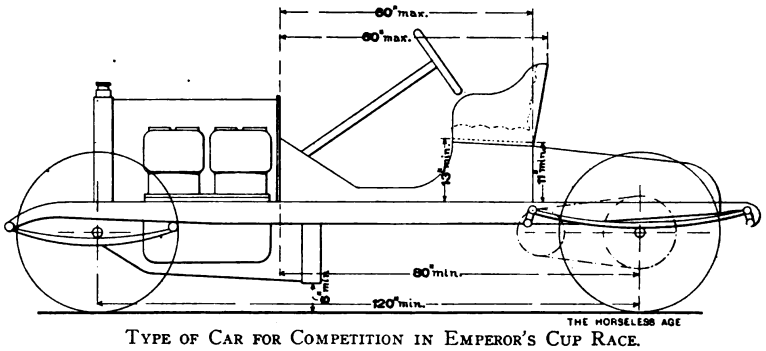
On Tuesday the cars were exhibited in the Municipal Exhibition Palace, where at 8 o'clock p. m. Count Arco, a member of the committee, gave the necessary instructions to the observers. This day was also marked by a number of official festivities.

The start took place from the Exhibition Building on Wednesday morning, June 5, the first car, a De Dietrich belonging to Baron Turkheim, leaving at 6 o'clock, and the others following at half minute intervals. After a certain number had been started, the King of Saxony arrived on the scene and was escorted to the royal box, from where he viewed the start of the remaining competitors. A total of 161 competitors started, and in addition two official cars and several hospital cars. One official car ran at the head of the procession, and the other and the hospital cars were distributed among the competing vehicles. On the vehicle last to start, No. 181, a lady acted as official observer.

As might be expected, there was much dissatisfaction among the entrants of the 26 vehicles which were rejected by the committee. A proposition was made to them that they would be allowed to start if they would carry 88 pounds of ballast in the form of sand sacks, and this condition was accepted and the vehicles started with the rest.

It was forbidden by the rules to pass the official pilot car, and this provision somewhat restricted speeding, though, of course, it had no effect on cars which were detained in some manner and then tried to make up time. The country passed through the first day was for the most part level. Stop for luncheon was made at Leipzig, where the first cars arrived shortly before 12 o'clock. The pilot car arrived at the end of the first stage, Eisenach, at 4:16 p. m. Several more or less serious accidents occurred during the first day's run. A Minerva car (102) broke a steering knuckle; a Dixie (42) knocked down a child at Altenburg; a Stoewer (75) ran into a Horch (139), with the result that the latter car ran down an embankment and tipped over, and one of its occupants broke a leg; Edges' Napier (14) retired on account of a magneto defect, and an Opel (66) broke a wheel. The winner of last year's contest, Rudolf Stoess, broke a steering gear and was forced to retire from the contest, though he continued unofficially after repairs had been made.

The manager of the run, Count Arco, of wireless telegraphy fame, had the misfortune of seriously injuring one of his fingers in cranking his car, which necessitated his going to a hospital in Weimar, where the first joint was removed. In Freiberg a man attempted to save a dog which ran in front of a car and was himself caught by the car and run over, his injuries being reported as serious.

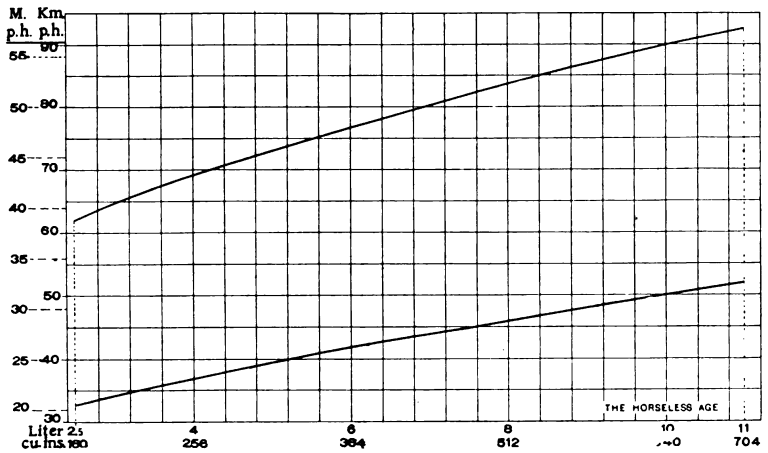


TYPE OF CAR FOR COMPETITION IN EMPEROR'S CUP RACE.

There was a reception of the contestants in the evening at Eisenach. The next morning the cars were started in a pouring rain, beginning at 7 o'clock. The number of cars which were officially started was 144, and several continued in the run unofficially. Four cars were disqualified for the reason that they had been involved in personal accidents the previous day. The route for the second day's run led through a mountainous district, but the rain had served to lay the dust and had not been sufficient to make the road slippery. There were several further accidents on this day. A Mercedes gasoline electric car (13) tipped over at Eisleben near Wurzburg, and two of its occupants were slightly injured. There is a steep descent and a sharp turn where the road enters the village, and it was at this point that the car overturned. While entering Mannheim, where the streets were closely lined with people, a man was run over by car No. 173 and had his leg broken.

A total of 134 cars arrived at Mannheim up to the closing of the control at 9 o'clock, and of these 133 started the next morning for Lindau. The weather continued threatening but was not at all bad from the standpoint of the contestants, the temperature being about right, and there being little dust on the roads. This day the course led through the Black Forest, where there were many dangerous points in the road and some exceptionally steep hills to be mounted. There were three collisions between competing cars but none that had any serious results, except that one of the cars had its rear fuel tank pressed in. Before the closing of the control at Lindau 131 cars reported.

The start from Lindau took place the next morning, beginning at 6:45, and 136 cars were dispatched, although 10 of these were noncompetitors. The stage between Lindau and Munich comprised several dangerous stretches, and there was an increased number of accidents on this day. A Vinot-Deguingand (89) collided with a telegraph pole. An Opel (20) left the roadway and turned a somersault in an adjacent field, but none of the occupants was hurt. Another Opel (24) broke a wheel; an Erdmann (185) broke its transmission shaft and the official car (105) was run into by another car not taking part in the contest



Upper Curve Shows Speeds Required for Forstenrieder Park Race. Lower Curve Shows Speeds Required for Kesselberg Hill Climb.

and was upset by it, with the result that Captain Murmann, General Secretary of the Bavarian Automobile Club, one of the occupants, broke his arm.

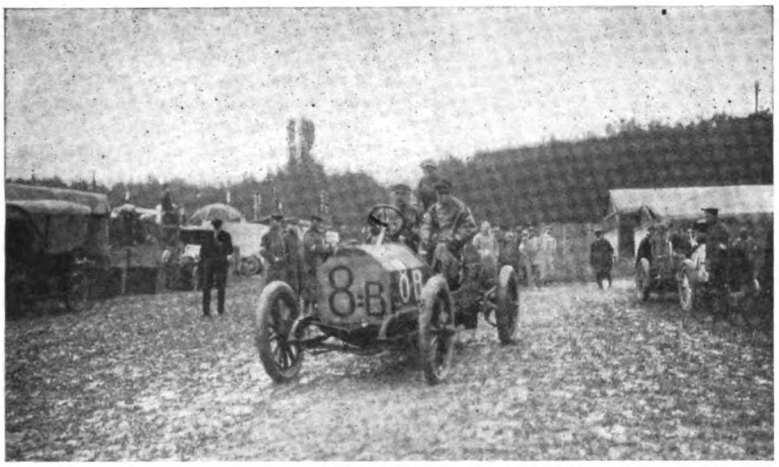
The run of this day comprised the speed trials in the Forstenrieder Park. The course was guarded by soldiers, and was kept perfectly clear of spectators as long as the trials lasted. The attendance was fair. The following are the best times made in the race; that is the times of the cars which gained most on the time in which they were required to cover the measured distance:

	Actual Time.	Gain on Schedule.
Poege (Mercedes)	2: 52.6	1: 04.6
Aschoff (Metallurgique)	3: 48	64.2
Heine (Adler)	3: 43.4	63.

The best showing in the speed trials was made by Rudolf Stoess (Horch), last year's winner of the contest, who gained 1:09.6 on the time in which he was required to cover the course, but as he had a steering defect the first day, he was out of the competition.

THE LINE-UP FOR THE START.

At Munich magnificent weather set in, and the start from there was attended by large crowds. A total of 132 cars were officially started, but fourteen of these were out of competition. The first to start was, as usual, Edgar Ladenburg. Hermann Weingand (Mercedes), who up to this time had one of the best scores to his credit, arrived late at the start and lost thirty points in consequence, which practically spoiled his chances.

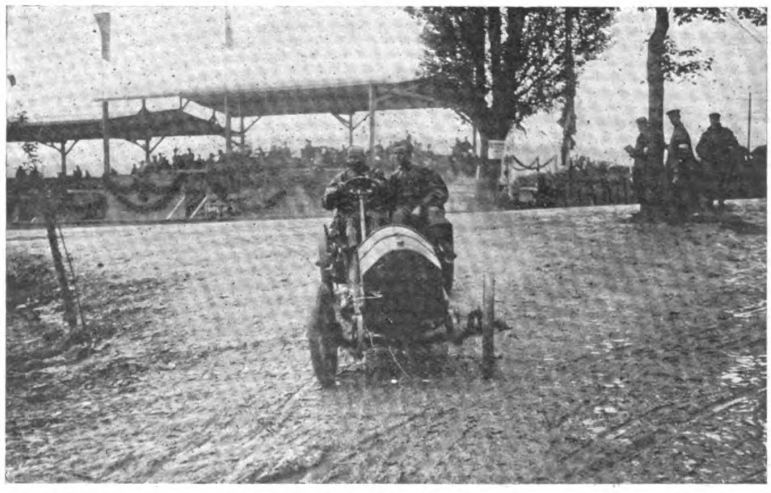


NAZZARRO, THE WINNER, DRIVING TO THE START.

From Munich the road led direct to Kochel, a short distance beyond which the hill climb on the Kesselberg took place. According to a special regulation it was forbidden to overtake preceding cars on the road from the start to the Kesselberg. On the way to the Kesselberg Willy Poege (Mercedes) broke his differential gear. He had also been in the front ranks up to this point, and the chances of the Mercedes team seemed to be materially declining.

The start for the hill climb took place at the Gray Bear Inn from a standstill, but the time was taken from a point a short distance further on where the cars passed at full speed. Among those who made the best times in the Kesselberg Hill Climb were a Horch car (No. 188), which gained 104.8 points, an Erdmann (No. 100), 82.8 points, and a Siddeley (No. 174), 81.6 points. The hill climb was a rather tiresome affair, and was several times interrupted by cars breaking down and blocking up the road. It began about 10 o'clock, and ended shortly after 2.

The last stage of the contest was from Augsburg to Frankfort on Tuesday, June 11. One hundred and twenty-eight cars were started, 115 of which were still competing for the Herkomer trophy. There arrived at Frankfort a total of 130 cars, of which 110 were still in the contest. Large crowds attended the finish, which had been set for 3 o'clock p. m. The first half of the last day's run was covered at good speed, and then the drivers began to loaf so as to fill in the time up to 3 o'clock. Among the notabilities at the finish were Prince Henry of Prussia and the Grand Duke of Hesse. Up to 5 o'clock ninety cars had arrived,



WAGNER ON FIAT.

and at the closing of the control at 8 o'clock 130 were in, as already stated. Among the cars which completed the entire tour were 11 Mercedes, 9 Benz, 9 Opel, 7 Adler, 5 Dixie, 5 Bianchi, 4 Metallurgique, 4 Horch, 4 Solidor, 4 Diatto A. Clement, etc.

The results of the Herkomer contest were announced at Frankfort-on-Main on June 12 as follows:

Prize.	Car.	No.	Entrant.	Driver.
1	Benz.	19	Edgar Ladenburg.	Erle.
2	Metallurgique.	169	Aschoff.	Entrant.
3	Opel.	61	Heinrich Opel.	Entrant.
4	Benz.	92	Carl Neumaier.	Entrant.
5	Benz.	109	Richard Benz.	Entrant.

GERMAN EMPEROR LEAVING GRAND STAND AFTER THE PRELIMINARY RACE.

On Wednesday, June 12, the entries for the Emperor's Cup race were received. The cars were weighed in and passed, after which most of them made another trial spin over the course. The eliminating races took place on Thursday, and the final heat on Friday. The results have already been published in these columns. We show herewith several photographic views from the race and a map of the route of the Herkomer contest, the latter from the *Allgemeine Automobil Zeitung.*

Improvements in Steering Gear Joints.

One of the most noticeable changes in design to be noted in recent cars is the adoption by makers of the universal joint with bolt pivots for the steering gear in place of the ball joint which held such undisputed sway, but which has evidently been found wanting. The ball type has no doubt many advantages, but it was found that when undue wear took place something generally came adrift—usually the longitudinal rod from the vertical steering lever to the off side wheel centre. It is within our own experience that the weight of the back end of this rod wears away the ball socket, with the ultimate result that the socket has fallen away, owing to it having worn sufficiently to allow the ball to pass through the slot in the rod. This type is shown in Fig. 1, from which can be seen the small wearing surface on the cup taking the weight of the rod. To guard against the rod falling out a pin may be let vertically into the ball and the socket opened to allow the pin to pass through. A substantial split pin through the vertical pin ensures that the steering shall not become uncontrollable should the ball socket wear sufficiently to pass the ball. This is a defect which is to be found in many cars in use today which were built up to last year, and in the light of our own experiences we strongly advise the protective measure here given to be followed. In cases where renewal of steering gear joints and rods is necessary, the designs here given may be adopted in the new parts with advantage, those shown in Figs. 2 and 5 being particularly recommended on account of their ease of construction; moreover, there is no infringement of design in either type.

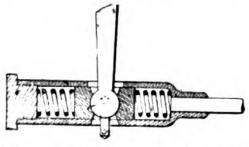


FIG. 1.—COMMON FORM OF BALL STEERING JOINT.

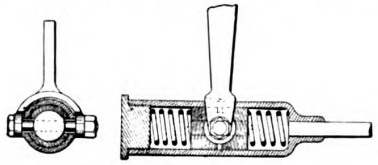


FIG. 2.—A MODIFIED BALL JOINT.

Fig. 2 shows a modified form of the ball joint. In this case practically the whole of the upper portion of the socket is kept intact to provide greater wearing surface; the cross pin also precludes all possibility of the rod falling except in cases of extreme neglect and carelessness.

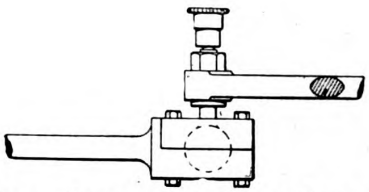


FIG. 3.—FORWARD END OF THE STEERING CONNECTION OF THE NACKE CAR.

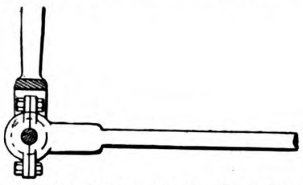


FIG. 4.—BALL JOINT ON THE STEERING ARM OF THE MERCEDES-MIXTE CGR.

Fig. 3 gives the front joint fitted to the Nacke cars, from which it may be seen that a large wearing surface is obtained, while at the same time wear is reduced to a minimum by the provision of a lubricator which forces grease into the joint.

Fig. 4 is a view of the forked steering lever end fitted to the Mercedes-Mixte, showing that spring buffers have been dispensed with. The cross pin universal joint which appears to be coming into vogue is shown in Fig. 5 as fitted to the new Riley car at the front end of the steering rod.—*The Autocar.*

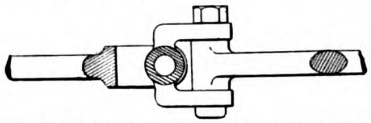
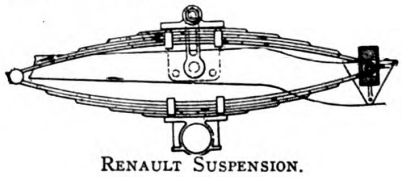


FIG. 5.—KNUCKLE JOINT OF THE NEW RILEY CAR.

New Renault Spring Suspension.

Louis Renault has recently patented in France a spring arrangement for axle driven cars which renders it unnecessary to employ a torsion rod and obviates the unsteadiness of the body often noticed in cars with full elliptic springs. As shown in the drawing herewith, a full elliptic spring is fastened to the axle housing in the usual way and to the frame by means of a depending crank. The forward end of the spring is located in a cylindrical box secured to the frame. The free play of the spring is not hampered in any way.



RENAULT SUSPENSION.

MINOR MENTION

The Packard Motor Car Company, of Detroit, is rushing the work on the additions to its factory.

A number of motorists of Atlanta, Ga., have organized the Atlanta Automobile and Good Roads Association.

The Durocar Manufacturing Company has moved into its new building on South Los Angeles street, Los Angeles, Cal.

It is reported that ground has been broken for the erection of the Hart-Kraft Motor Company's plant on Duke street, York, Pa.

An automobile club, the objects of which are road improvement and the furthering of mutual interests, has been formed by twelve motorists of Wadena, Minn.

The Milwaukee Automobile Club is planning to hold an automobile "Derby Day" at State Fair Park some time in July, when various contests and races will be held.

An order has been issued by Major H. C. Benson, acting superintendent of the Yosemite National Park, prohibiting automobiles from entering the Yosemite Valley.

The Mitchell Motor Car Company, of Racine, Wis., recently conducted, on the Pacific Coast, a hill climb and endurance contest exclusively for owners of Mitchell cars.

The testers in one of the well known automobile factories have found a new name for the motorcycle police. They call them "corn poppers," which is peculiarly descriptive.

It is said that a company with a capitalization of $10,000 has been organized in the town of Grape, Monroe County, Mich., for the manufacture of friction transmissions.

We understand that three verdicts against the New York Central Railroad in damage suits brought by automobile parties who had been struck by trains were $10,000, $35,000 and $101,789.

The Granite State Automobile Club, of Manchester, N. H., will hold its hill climbing contest on Saturday, June 29. There are nine classes, of which one is free for all, with no restrictions whatever.

The State of California has adopted the convict system of road building, and it is stated that particularly in the southern part of the State a great deal of work is being done in the way of road improvement.

The Long Island Automobile Club will be associated with the United States Motor Racing Association in conducting the twenty-four hour Automobile Endurance Derby, to be held at the Brighton Beach track on August 9-10.

We understand that the Priest Tire Company has been incorporated at Oconto, Wis., to manufacture an invention of A. T. Priest, of Milwaukee. The main office of the company will be at Oconto, and the factory at Akron, Ohio.

Henry Ford has recently been making a tour of the country, investigating the processes employed in the manufacture of automobiles and other machinery. The results of these observations will be used in selecting the equipment for a new factory.

The Buckeye Foundry Company, of Rockdale, Ill., proposes shortly to take up the manufacture of automobiles. The cars to be built will be 12 horse power runabouts and delivery wagons, and will be known as the Utilis. It is purposed to turn out cars at the rate of four per day.

A fire in the automobile district of Boston last week threatened many of the garages, and caused a loss estimated at $100,000, about thirty-five automobiles being destroyed. The fire is believed to have been started by spontaneous combustion in the garage of the Back Bay Automobile Company.

The final report of the Wisconsin Trust Company, trustee of the bankrupt Four Wheel Drive Wagon Company, has been filed in the office of Referee Maxwell at Milwaukee. It shows that $37,070.42 has been collected and $4,106.75 expended by the trustee, leaving a balance of $32,963.67 for distribution.

The timers and distributers of the Monitor Speed Recorder Company, of 274 Pearl street, Cambridge, Mass., will be made by a new company, called the Monitor Manufacturing Company, at 115 Massachusetts avenue, Boston, Mass. The present company will continue the manufacture of marine speed recorders.

On July 29 will be held the Reliability Contest of the newly formed Milwaukee Automobile Dealers' Association. It will include rough road work from Milwaukee through Sheboygan, Fond du Lac, Watertown, and thence back to Milwaukee. It is proposed, also, to hold an Owners' Reliability Contest on the same day.

The Federal Rubber Company, of Milwaukee, Wis., some time ago purchased the assets of the bankrupt Milwaukee Rubber Works Company, whose business it is continuing. The erection of new buildings, with the necessary new machinery, is contemplated, and the company expects to place on the market a tire of its own.

C. G. Carpenter, park commissioner of Milwaukee, Wis., has purchased an automobile which he is now using in his work of inspection. It is said that the machine is such a time saver and convenience that a number of the other departments of the municipality of Milwaukee are preparing to follow Mr. Carpenter's example.

John E. Myers, of Shepherd, Mich., has constructed a vehicle with a capacity of 30 tons for the transportation of logs. The machine weighs 7 tons, has rear wheels 20 inches wide, 52 inches in diameter, front wheels 14 inches wide and 44 inches in diameter, and is equipped with a 40 horse power gasoline motor. The truck will be used in Alabama for the transportation of logs.

Messrs. Pirelli & Co., one of the largest manufacturers in the world of cable and rubber goods, with factories at Milan, Italy, have made arrangements for an American branch of their tire department, to be located at 296 Broadway, New York city. A full line of automobile and motorcycle tires will be carried in stock.

An ordinance has been introduced in the common council of St. Paul, Minn., providing for the inclusion of automobile garages in the same class as stables, thus making it necessary for a person wishing to erect a garage to obtain first the permission of the adjacent property owners, just as is done when desiring to build a stable.

We understand that William Walsh, of Cananea, Mexico, is planning to place in service a number of large gasoline freight trucks to transport building materials, fuel supplies, machinery and ore in that section of the country. There are numerous mining camps surrounding Cananea, and difficulty has been experienced for some time in handling the freight with animals. It is the belief of the promoter that there will be a reasonable demand for the service.

A great many people have become strongly impressed with the idea that all the information regarding any branch of engineering which one obtains at a college or university is purely theoretical, and not practical in any sense of the word. This statement is particularly true in its application to the public's opinion of the college trained automobile engineer. The faculty of Sibley College, Cornell University, have for the past few years offered courses relating to automobiles, and these courses have grown more complete each year. At the present time the lecture courses take up in detail the science of automobile construction, bringing out the differences between modern and obsolete methods and forms, both American and foreign. The matter of gas engine design, particularly as applied to the automobile, is given a great deal of attention, and a drafting room course in which the student is required to actually design an engine to fulfill certain specified requirements is also offered. Besides these courses, the students are required to test various kinds of gas and gasoline engines in the laboratory under varying conditions.

Garage Notes.

Merrill & Hansel, of Stockton, Cal., are now occupying a new garage on East Market street, near Sutter street, in that city.

The Dickinson Automobile and Repair Company recently opened a repair shop at Dickinson, N. Dak.

The A. J. Lucia Company has leased a building at 218 North Adams street, Green Bay, Wis., which will be used shortly as a garage.

Arthur Wilson is planning to erect a garage 62 x 22 feet and one story high, at Huron street

and Adams avenue, in Berlin, Wis.. A provision will be made for adding other stories to the building.

A garage and repair shop has been opened by the Billings Iron Works at Billings, Mont.

The Motor Transfer Company, Incorporated, of Richmond, Va., has announced its removal to a new garage at 605 West Broad street, in that city.

A permit has been granted Perini Brothers for the erection of a one story brick garage on Corona street, between Eighth and Ninth streets, Denver, Colo.

New Incorporations.

Duplex Motor Car Co., Chicago.—Capital, $30,000.

Teg Motor Co., Chicago.—To manufacture automobiles and parts. Incorporators, O. C. Smith, Fred H. French and Wm. J. Sneal.

Eureka Automobile Station, New York City.—Capital, $10,000. Incorporators, J. Edward Murphy, Walter B. Caughlin and J. Walter Robertson.

The Toledo Auto Parts Co., Toledo, Ohio.—Capital, $50,000. Incorporators, F. D. Cook, Wm. N. Taylor, G. Ohlinger, T. B. Earl and D. Whitaker.

Tincher Motor Car Co., Chicago.—Capital, $200,000; to manufacture automobiles and motors. Incorporators, F. J. Johnson, Samuel G. Goss and John L. Hickey.

The Kinsler-Bennett Co., Hartford, Conn.—Capital, $40,000; to manufacture automobiles and parts. Incorporators, Jos. A. Bennett, E. D. Seymour, G. B. Kinsler and C. S. Lyons.

New Agencies.

Fargo, N. Dak.—H. G. Barnes, Ford.

Decatur, Ill.—J. G. Starr & Son, Northern.

Ann Arbor, Mich.—H. W. McClure, Maxwell.

Cooperstown, N. Y.—Crist, Scott and Parshall, Cartercar.

Bakersfield, Cal.—B. B. Sharp, Chester avenue, Maxwell and Reo.

New York City.—Autocar Sales Company, Eightieth street and Broadway, Columbus electrics.

Trade Personals.

Clyde Holcker has been appointed office manager of the Detroit branch of the Goodyear Tire and Rubber Company.

Raymond Chidester, formerly with the Locomobile Company of Chicago, has joined the sales forces of the Welch Brothers Motor Car Company at Milwaukee.

M. J. McKinnon, formerly with Reed & Brown, of Toronto, Ont., has been appointed Detroit salesman for the Brush cars in connection with the Maxwell-Briscoe-McLeod Company.

E. R. Hollander has resigned from the vice presidency of the Hol-Tan Company, and after taking several weeks' vacation will engage in another line of business which he has not as yet announced.

Coming Events.

July 2—Grand Prix.

July 10—Glidden Tour starts from Cleveland, Ohio.

July 29—Circuit Des Ardennes.

August 1—Second annual hill climbing contests of Chicago Automobile Trade Association and Chicago Motor Club at Algonquin, Ill.

August 2 to 6—"The Cup of the Press" Race, France.

September 5—Second annual economy test of Chicago Automobile Trade Association and Chicago Motor Club. (Route not selected.)

September 9—Commercial Vehicle Trials of English Royal A. C.

MOTOR VEHICLE PATENTS.

Patents Issued June 18, 1907.

857,032. Clutch for Automobiles and Other Purposes.—Maurice H. Cormack, New York, N. Y., assignor to Standard Brake Company, New York, N. Y., a corporation of New York. Filed March 2, 1906.

857,033. Change Speed Gear for Motor Vehicles.—Gustave Cornilleau and Auguste Sainte-Beuve, Paris, France. Filed July 31, 1906.

857,041. Can or Receptacle for Storage Batteries.—Thomas A. Edison, Llewellyn Park, Orange, N. J., assignor to Edison Storage Battery Company, West Orange, N. J., a corporation of New Jersey. Filed October 5, 1903.

857,084. Motor Vehicle.—Lynn C. Lull, Kalamazoo, Mich. Filed October 24, 1904.

857,091. Wheel for Cycles, Motor Cars, Carriages and other vehicles.—John N. B. Moore, Ipswich, England. Filed December 21, 1905.

857,092. Pneumatic Hub for Vehicles.—George Middleton, London, England, assignor to the Middleton Pneumatic Hub Company (1906), Limited, London, England. Filed September 14, 1906.

857,102. Change Speed and Reversing Gear.—Jules R. Parant, Neuilly-sur-Seine, France. Filed January 17, 1907.

857,114. Gear for Automobiles, Etc.—Karl Schnaitmann, Untertürkheim, Germany, assignor to the firm of Daimler-Motoren-Gesellschaft, Untertürkheim, Germany. Filed December 3, 1906.

857,196. Circuit Breaker for Gas Engines.—Flemion B. Packwood, Lincoln, Neb. Filed January 2, 1906.

857,200. Felly for Vehicle Wheels.—William S. Plummer, St. Louis, Mo., assignor to American Wheel Company, St. Louis, Mo., a corporation of Missouri. Filed May 17, 1906.

857,204. Hub.—Jacob C. Redemer, Beaver, Okla. Filed June 23, 1906.

857,219. Vehicle Wheel.—John R. Welch, Alexandria, Ind. Filed January 20, 1906.

857,256. Vehicle Spring.—Francis E. Pratt, New Rochelle, N. Y. Filed March 21, 1906.

857,272. Brake for Motor Vehicles.—Giovanni Enrico, Turin, Italy, assignor to F. I. A. T., Fabbrica Italiana Automobili Torino, Turin, Italy. Filed August 16, 1906.

857,275. Carburetor.—Charles T Gaither, Youngstown, Ohio. Filed February 1, 1906.

857,281. Ball Bearing Tube for Tires.—Walter Hogben, Leominster, Mass. Filed October 17, 1905.

857,296. Vehicle Wheel and Axle.—James E. Murray, McKeesport, Pa. Filed October 17, 1906.

857,330. Vehicle Wheel.—Francis J. Conant, Los Angeles, Cal. Filed June 26, 1906.

857,335. Vehicle Wheel.—Ferdinand Ephraim, San Francisco, Cal. Filed November 21, 1905.

857,361. Gearing.—Francois Pilain, Lyon, France. Filed August 15, 1905.

857,365. Guard for Tires.—Charles R. Saunders and Anton B. Breitweg, Cleveland, Ohio. Filed December 1, 1906.

857,383. Vehicle Spring.—Charles Burgess, Jr., Wenona, Ill. Filed January 14, 1907.

857,476. Speed Changing Mechanism.—George D. Munsing, New York, N. Y. Filed April 4, 1907.

857,494. Motor Vehicle Steering Gear.—William E. Slater, San Francisco, Cal. Filed May 31, 1906.

857,495. Machine for Filling Fabric for Tires.—William R. Smith, Buffalo, N. Y., assignor of one-half to Herbert H. Hewitt, Buffalo, N. Y. Filed November 16, 1906.

857,546. Vehicle Wheel.—Dell Ward, Grand Rapids, Mich., assignor of one-fifth to John Kelsey and one-fifth to Henry J. Herbert, Detroit, Mich., one-fifth to Joseph R. Taylor, Grand Rapids, Mich., and one-fifth to Wallace W. Johnson, Chicago, Ill. Filed April 2, 1906.

Review of Specifications.

No. 848,885. Automobile Wheel.—David R. C. Devine, of Philadelphia, Pa., assignor to himself and John F. Phillips, of Philadelphia, Pa.

The new wheel here described comes within the general classification of "spring wheels," but is claimed by its inventor to be free from many of the defects common to spring wheels. Fig. 1 is a side view of the wheel complete, and shows quite clearly the general construction. There are two

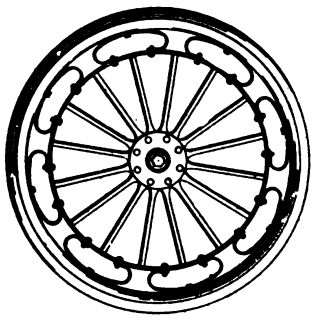


FIG. 1.

rims—the outer, which carries the tire, and the inner, to which the spokes are attached, with the springs between. The inventor makes the claim that most of the trouble which has heretofore been experienced with spring wheels has been due to the spring members breaking near their points of support. Fig. 2 is a detail of one of the springs with the portion of the rim to which it is attached. The spring itself is bent into el-

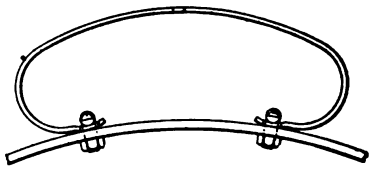


FIG. 2.

liptical form as shown, and the ends are given a slight extra bend, forming a "hump" on which the spring can rock. These ends are secured by a fulcrum-like headed bolt which passes through a lengthwise slot in the spring. It may thus be seen that the ends are free to slide and rock, which eases the strain induced. In case of a large deformation it is apparent that the main portion of the spring will strike the inner rim and help reduce the stress at the support.

Trade Literature Received.

William A. Mayes, Reading, Pa.—Booklet, "Economy in Lubrication," descriptive of oils and tests of oils for motor car lubrication.

Universal Repair Bench Company, Rochester, N. Y.—Illustrated catalogue describing the Universal repair bench, fittings and applications.

The Motor Car Supply Company, 1427 Michigan Avenue, Chicago, Ill.—Complete illustrated catalogue and price list of the line of parts, accessories, tools, etc., carried.