

DOCTORS' AUTOMOBILES.

Experiences of Physicians in Various Parts of the Country Who Are Using Automobiles in Their Practice.

No service to which a light automobile can be put is a severer test of its practicability than a physician's daily rounds. Stopping, starting, standing and hurrying are the ceaseless routine he must follow. Long mileage and poor roads are his portion as a rule, and his automobile must be staunch and ready enough to take him wherever he wishes to go, to take him quickly, and be ready to take him further when his visit is ended. To the physician we must all of us look for much valuable information in this early stage of the automobile industry. He has the hard knocks that bring experience, often gained in out of the way places, at great expense and with great annoyance. We have accordingly requested some of our subscribers in different parts of the country to candidly relate their automobile experiences for the benefit of our readers. We believe that no more entertaining and instructive literature has been offered the inquirer, whether maker or user, than that which follows.

THE AUTOMOBILE IN MY BUSINESS.

BY DR. H. L. S.

The little girl, upon their return from church, asked her mother what the minister meant by the subject of his discourse, and the reply was: "The very thing he failed to speak about." Hence, dear reader, note the application.

I do not claim to know all there is to be known about automobiles, for, as one fellow who was once trying to help me out of a difficulty said, "There is a dum sight lot to know," but there are some things I have learned, and it has cost me a good many dollars to know them. The experience has been dear to be sure, yet what I have learned I shall not have to learn all over. Some of us don't have to learn a thing but once, you know, and some of us cannot profit by experiences of others, but must be our own teacher.

I yet own a machine, and have owned and operated two before, and am still paying for the experience. If in this article written at the solicitation of the editor of this scientific and helpful journal, I should more frequently use the first person singular instead of the usual editorial we, you may infer that it was I, instead of we, that got all rubs, stood the cussings and paid all the bills, and at this late day I am very reluctant to share these honors with even an editorial companion.

EARLY ATTEMPTS TO PURCHASE.

'Way back as early as the pioneer days of road auto-locomotion I became exposed, passed through the period of incubation, caught the fever, and had the various stages of the disease; was buried, but after all I resurrected, for they buried me face up, and I scratched out. To be more explicit, as long ago as when Duryea first put his machine on the market I visited Springfield, Mass., with the view of arranging for a purchase. Nothing accomplished, however, further than mileage and writing paper wasted! Not alone Duryea, but later nearly every concern that was manufacturing horseless vehicles from wheel barrows up, either in reality or "in their mind," had a very businesslike proposal from me after considerable letter parleying, but it was not

until the spring of 1899 that a business transaction was finally entered into with a Boston concern for a hydro-carbon automobile, a firm which was then turning them out in large numbers, "in their factory out of the city"—"in their minds" it should have been said. An advance payment was made as a guarantee of good faith on my part. The carriage never materialized, and the nearest that ever came to it was my making a trip to Boston—the third in interest of same—to get it, and finding it under a keeper's hands. I never saw it, and I doubt if anyone else ever did. The alleged attachment was made for breach of contract or infringement, I confess I have forgotten which. I was so completely unbalanced, as much so as the motor was said to be, and in the vibration which followed, next found myself within a few minutes ordering a steam carriage of a firm which was coming into public prominence about that time, and whose machine was said to be giving good satisfaction. Imagine my chagrin, however, when I was flatfootedly informed by them that no carriage could be delivered to me short of sixty days. It did not tend to make me any less impatient, knowing that I held contracts for exhibition runs at several fairs soon to be held.

Through the kindness of a Harvard friend, the happy owner of a machine manufactured by this same firm, I was able to keep one engagement, and the way we puffed around the track would put a pair of oxen to shame. It surprised the natives and our most sanguine selves.

A pleasure trip, with emphasis on the pleasure, please, was afterward made through the world renowned Austin Corbin game preserve, and either by reason of the timidity of the animals or the prejudice of the stockholders, an edict straightway came forth prohibiting automobiles the privilege of the park roads thereafter, and if, my reader, you should ever visit me and I should wish to take you through the land of buffalo and wild boar, we would have to drive my spanking pair. I always did like the horse, but somehow I felt that the long rides over these country roads were becoming irksome to me, and somehow I had acquired quite a reputation for having runaways. In fact, runaway and I were synonymous, so proverbial had they become.

VISIONS OF LARGE INCOME.

Then, too, I saw visions of a \$20,000 practice annually in consequence of purchasing an automobile. I could visit my patrons with more speed, and oftener; I would be the first physician on the spot in all cases of injury or poisoning. I should be the envy of all horse owners and the pet of all the charming young women of the country around. This was my theme by day and dream by night. It took upon itself such a serious aspect that my friends thought I had better have it out. As soon as it was learned with absolute certainty that I was really-going to have one of "them automobiles," then there wasn't anything more for me to say. The amount and character of speculation rife would have discouraged almost any person but a lunatic and a country doctor. There was one course of reasoning that all seemed agreed upon. The consensus of opinion was that they hoped "the d—n thing would bust up," and strange to say, I was not surprised to find it was my erstwhile friends, the horsemen, who wished the harmless thing such a dire calamity. A few less interested knew that it would not run up or down hills and that it would take fully five minutes to start or stop the thing, and in turning corners, if perchance, I should meet a team, an accident would be inevitable. Straightway several sold their horses, and from that time to

this have lived the life of a recluse—never seen on the streets with a team since. I would venture to assert that up to this time not a dozen people in town had ever seen an automobile of any description, and much less knew anything concerning one. In due season, but out of season for using it, for it was winter, I was awarded the prize I sought; also the privilege of settling a good sized freight bill. For the animal had arrived. Right on top of paying for the machine itself, it was enough to give me the kidney complaint, and I did not get off the bed for weeks. My intentions were to

BUILD A HOUSE FOR IT

before it made its appearance, and procrastination seemed to be the only good reason why I didn't. Up to this time my credit was good. A friendly competitor consented, however, by way of slight compensation, to find room for it until my house was completed, but owing to the room being needed or because his services were required too frequently in exhibiting it to the curious, it was thought best to remove it, and again it was pushed through the streets, this time to a livery stable, a very inappropriate place just at this time. According to my own plans (and I lay no claims to being an architect) a beautiful house was built, and painted red with white trimmings, and lettered artistically on the veranda roof. A large insurance tank, filled with 76 test gasoline, and electric light fixtures added to its completeness. Once more the machine was pushed through the streets, this time to its new home. Until spring all spare time was devoted to studying the directions for operating, and when the final day arrived which had been set apart as a day best fitted for making

THE TRIAL TRIP,

my father, from another town, a mechanic by trade—for years an engineer of a stationary and also steam fire engine—came over to assist me. You would think a circus had struck town when it became noised about that the carriage was coming out. It was amusing to watch the crowd. Only a very few of the braver ventured nearer than the corner of the road, fully 50 rods from the house, and once, when the main gasoline valve was turned on a little before the vaporizer had heated the flues sufficiently, and considerable black smoke was emitted from the rear and top of the carriage, these even sought standing room more remote. The steam was up. She was ready to move. In order to forestall any hitch in the program the rear wheels were jacked up and we let it run idle for awhile. No person felt any greater degree of importance than I when we began to sail majestically up through the principal streets with a pack of boys and dogs after us. The only accident which befell us that day was one runaway horse and a broken arm of the feed pump. The pump we soon found not large enough to feed our boiler, and a larger one was later sent me from the factory. This never quite filled the bill on these hilly and sandy roads. Yes, we do have hills up here, but most of my readers who live in less hilly States would call them mountains.

A GOOD HILL CLIMBER.

The steam carriage, however, always made these hills and could do it either forward or backward, occasionally waiting a moment for steam on the longer hills. One hill with a grade of 35 per cent. and fully three-fourths of a mile in length was made with two occupants in just two minutes. About all my business professionally, especially in town itself, was made with this machine and frequently calls to ad-

joining towns six or eight miles distant. Less time was required than with the horse when all worked well. The few criticisms I shall make and the difficulties encountered I shall reserve until later, when a comparison with two other machines I have since owned will be attempted. I was called to a town 25 miles distant, and this trip is one which is made in two hours and a half by train, necessitating twice changing cars and very poor accommodations in going and returning the same day. A friend accompanied me. We made the trip in two hours, making two stops, once to take on water and once for water and gasoline. Ordinarily, it is not necessary to refill even the smaller gasoline tank on a 25-mile trip, yet on bad roads it requires more fire to keep up the steam, consequently more gasoline is used. This was an enjoyable trip, and it is exceedingly exhilarating to annihilate distance when all works well, and feel that you are not inflicting cruelty upon a horse. We passed everything on the road and had a little brush with the electric cars. After completing our business and exhibiting the machine in a very satisfactory manner by climbing all hills and showing a speed of some 25 to 30 miles to the hour, we returned home, making the return in a little longer time, yet only gone from home a few hours.

EARNS AN EMERGENCY FEE.

Not long after I was ordered by the United States Government to make a special examination of an old soldier in a town some 15½ miles away, over one of the worst country roads I ever traveled. It was very hilly and the roads were badly out of repair. As it was early in the spring of the year the ground was full of frost and often the wheels sunk down into the mud three inches or more, and before we were fully aware many times we would run unexpectedly into a hole washed out by the water. We passed through four towns en route. The examination was made, but before I got through I was telephoned that I was wanted back immediately, as one of those hurry up cases that a doctor always keeps on hand was materializing. We hastily ate dinner, refilled our gasoline and water tanks and arrived home in less than one hour. It should be stated that in returning it was more down grade. I arrived on time to receive my full fee. Right here I would credit the automobile with all its faults, for making it possible for me to earn this fee. A horse never could have traveled back with such speed, after having so short a time before gone over the same road. We had considerable amusement on this trip with people along the road, as we were wont on all journeys. One incident is recalled which still causes me to smile. We noticed a farmer working at his trade—sawing wood—and it occurred to us that we better inquire of him the correct road, and in order to surprise him a little the throttle valve was thrown wide open with 140 pounds of steam on and the way we shot up into that dooryard surprised even us a little. Our presence had not been suspected until we were in his immediate presence. Instead of surprising the old fellow we frightened him and he dropped his saw, uttered just one exclamation, "For G—d's sake," and ran behind the barn before we could propound any questions. We saw him later, but not until on our way out of the yard, when he ventured a look from one corner of the barn. No persuasive motions from us could entice him from his place of refuge. I never quite knew whether the fright was feigned or real, yet the exclamation, together with his actions, still strikes me as intensely humorous.

My next trip of any length was to attend a complimentary

banquet given by the Metropolitan Life Insurance Company, of New York, to its agents and examiners of the state. This was held on Saturday evening, and as no trains run on our road Sundays there was no way for me to get home to attend to my business before Monday noon, unless I used the automobile. This was a trip of 67 miles, and we made it in just four hours and ten minutes. We did not hurry and at no time did we have to stop to wait for steam. Through all the towns of any size we stopped just a moment to let them look us over and answer questions, and if my profession hadn't fitted me pretty efficiently I could never have answered some of those questions. We sailed through the smaller hamlets at a breakneck speed, of course at the expense of our steam. Usually we had a crowd awaiting our coming, as the telephone message preceded us. I wore a white yachting cap and in passing through one town so small that I couldn't find it on the map afterward, one old man evidently mistook me for another person, for he ran into the house and informed those inside that "Dewey was going by in one of them torpedo boats." If Dewey had a cleaner cap after the battle of Manila than mine it was because he didn't mix up with so much oil and dust as I did on that trip. The resemblance, however, must have been in that respect, for otherwise the likeness was to me not quite so striking.

WAYSIDE REPAIRS.

Our journey back was not so uneventful as might have been. The rod to the band brake became broken, and as it was rather a dangerous undertaking to coast all the hills, we decided to stop at the next town and get it repaired. It was not an easy task to get a blacksmith out on Sunday to make the repair, I assure you. By the way, did you ever notice how wealthy you were from the standpoint of those making these repairs, and how miserly poor you really were after you had settled? It's only a difference of opinion, that's all. If a man was rich enough to own an automobile, why he must be pretty well fixed financially. At least I have always had to settle to that tune. The delay occasioned by the broken brake and its repair found us 14 miles from home at dark, and while we had two nice acetylene side lights on the carriage, I had neglected to take any carbide with us, and the roads being new to us both, we chose rather to put up at a hotel, and take an early start in the morning. This we did, arriving home in time for breakfast. About a week after, one of my confrères and I attended a medical meeting 43 miles away. The roads were sandy and very hilly, yet the distance was covered in three hours. We were delayed by mistaking the road, so that we went out of our way fully three miles at two different times. We arrived on time for the meeting, which was held at 10 o'clock a. m. On our return we met one man with a lumber wagon, horse to match, and it was with the utmost difficulty that we could get away from him. He vowed that he "had heard tell of them automobiles," with emphasis on the last syllable, but he "would as soon think of seeing' a steamboat up here in these air regions as one of them ar." As we were leaving the vanishing point we saw that he was still "rubbering," mouth wide open, and for aught I know may be there yet. On our return, when within a few miles of home, a very hard thunder shower came up, and as my carriage was new, and I felt some pride in its being kept so, in appearance at least, I put it on to the train and we came home by cars.

BUYS A GASOLINE MACHINE.

On one of my trips I found a man who had caught the fever like myself, and with the stipulation that he might be taught how to operate the automobile, I was to receive \$900. He ran it, accompanied by myself, to his home, a distance of 25 miles, in two hours and a half, on 3 gallons of gasoline, and was so well pleased with it that he wrote me the check at once. I immediately went to New York and purchased a hydro-carbon machine, and the very next day after arriving home with it made a 24 mile trip in about two hours and thirty minutes. I then entered a race with a steam machine and won one of the two heats, the third not contested. This was a mile only, very unfair for a hydro-carbon machine against a steam carriage. For this race I received \$35 and expenses. The machine being entirely new to me I failed to find all the oil cups—a very important factor to know in all automobiles, more especially of this system. I had made the run to the town, about town and in the race before I was aware that my clutches were hot. It was necessary for me to remain over night, or at least I thought so at the time, to wait for them to cool off, and for readjustment. The trip home was made without incident or accident, excepting while turning out for a team once we got stuck in the mud, requiring the services of a pair of oxen to extricate us. This machine also was used a great deal about town in making professional calls, and it was easier to start up of course than a steam carriage, requiring only a few minutes to oil up, turn on the gasoline and switch, and with a few turns of the crank shaft all was ready. Usually all could be done in two minutes.

FIRST TROUBLES.

In June it was necessary for me to take a patient to the hospital for operation. This journey would, owing to poor railroad connections, have required two days to go and return, and no horse could have made the trip easily in one day. The appended clipping, taken from the local paper, better explains the utility of the automobile than any words of mine:

A "horseless carriage" attracted considerable attention on the streets yesterday. It was owned by Dr. —, of —, and arrived about noon, having made the 30-mile trip in an hour and a half. Dr. — came with a patient for the hospital. The utility of the automobile in this case is shown by the distance and time saved over a trip by rail.

The return trip would have been made in better time than going, if in climbing a steep grade the high speed clutch had not been used, and in not being able to make the grade the brake was suddenly thrown on to prevent going backward. Such a sudden movement produced a shock to the whole machinery and broke the air cock of the compression valve. Afterward in starting, for it was frequently necessary to stop to refill the water tank and in meeting teams, it was necessary to get down under the carriage and open and close the broken part left in with a pair of pincers, while my man did the "crank act," both, particularly the former, very awkward things to do, besides using up considerable valuable time. You ask why we did not get it repaired. Not a very easy thing to do 'way up in the mountains 12 miles from any machine or blacksmith shop.

A BALKY MOTOR.

My next trip was 25 miles in 1 hour and 45 minutes over hills of all grades. She ran beautifully to the time we stopped in front of the house at our destination. It occurred to me that I had better run it into a barn out of sight of church-

goers and timid horses, and imagine my mortification when it would not start. I worked over an hour, and there was, as usual, a large crowd around, both churchgoers and those who never go, to offer assistance and advice, prayers and do the swearing. Finally it started all of a sudden, and never went better. The most plausible reason given was that the batteries had become tired, and so was I. The carriage ran back all right. Just a week from this time my wife and one child accompanied me on the same trip. It was made in just about the same time as on the previous week, but on our return we stopped for the purpose of giving her more oil, and I sweated for over an hour in the hot, blazing sun to get it started again. Becoming exhausted, I laid down in the shade to rest and cool off. Fortunately, some bicyclists came along and offered their services. One or two turns of the crank shaft and she went finely for a mile, and then began to go slower and slower, and finally stopped. It may, ere this, have been suggested to your minds that the batteries were weak; I hardly think so, as the explosions were regular, and later they were tested by the voltmeter. This time I also worked to the point of exhaustion, assisted by several farmers, who, by the way, gave me to understand from their conversation ever and anon that they had rather have a "hoss," and I indorsed their sentiments just then, anyway, even if I didn't say it. I managed to get it along another two miles, when it stopped, and then I "threw up the sponge," hired a team, and with my wife and child reached home after dark, and I was thankful that it was dark, too, for I was not proud of the exchange.

A SLOW START FOR THE RACES.

The next day my father and my man got it home for me. The story they told was that "it started up beautifully and ran like the devil and then began to slow down, and after it stopped it required an hour or so to start," and never to this day have we been able to solve this question. Any suggestions, my readers, which you may give to throw light on the difficulty I experienced will be most gratefully received. I had an expert from Boston up here who tried to solve it without effect. The following week I had a contract to race at a fair in Windsor, Vt., and as I was away on my vacation I gave my man instructions to fix it up somehow and make the trip, as there was \$50 in it for us whether we won or lost the race, so long as we made the exhibition. I was assured by my man by telephone the evening before that the carriage never worked better and that he was going to make an early start and was going up there and win the race easily. I rested well that night, but before 7 o'clock the next morning, the day of the fair, I was hastily summoned to the 'phone. I surmised that something was wrong with the machine and I was not disappointed in that respect, for in starting and going up a little incline and in throwing off the high and throwing on the low gear clutch too suddenly he ripped off seven teeth on the low gear. This ended all possibilities of reaching Windsor with that machine. I immediately telephoned to the party who purchased my steam carriage and got his consent to the use of his automobile, but in order to get it my man was obliged to take a team and drive 20 miles and meet him, and when he got there the water glass had broken, which necessitated putting in a new one, and it was three hours before the check valve to the glass gauge could be persuaded to open and let in any water, and it was not until the carriage was run up on to a bank that it came in. Fifteen miles from Windsor and

3 o'clock and the race was to have come off at 1 o'clock. How exasperating it must have been to them! But after they got started it required only one hour to make the trip, although one man had to keep the hand pump going all the time, as a leak was discovered in the air tank. My anxiety for the success of the enterprise got the better of me, and I left my family and reached Windsor by rail before the arrival of the carriage, and spent a small fortune in telephoning without avail to ascertain the reason of the delay. Not until we had given up all hopes of their arriving and were going home were we surprised to meet them. Although nearly dark, many lingered in hopes of seeing a race, and they were not disappointed. I won the first heat in a lead of 10 yards against a machine the exact counterpart of mine. It was my suggestion that we race the second heat backwards. We were making excellent time, when lo! and behold! the chain slipped off the rear sprocket and my machine balked. It was the best part of the show, they said. It came very near turning a complete somersault backwards. It stood up on hind legs and it was a question for a fraction of a minute whether it would or not. It finally decided in the negative and I was glad that it did, although I had the presence of mind to shut off the throttle valve. My man repaired the chain and returned it to its owner, and I came back home by train to swear at my own machine for the trick it had served us. As I had another \$50 fair engagement in a few days, I telegraphed to the factory for another gear, also for a clutch, in which we found a flaw. The cost of the two, with having the machine taken to pieces to put them in, was only about \$50.

ANOTHER START.

It now appeared in working order, and it was not until the night before the engagement that it was learned the batteries were weak and not sufficiently powerful to give a regular spark for more than five minutes at a time. We worked and fretted about all night, and as the batteries could not be refilled short of the factory (a wise financial precaution on the part of the manufacturers), we finally hitched on about a dozen salamoniac batteries. We contrived to get over there, a distance of 26 miles to the track, by having a pair of horses draw us up a long and steep hill onto the grounds. Then we put on about twenty dry cell batteries, which allowed us to win the race because the other machine, my competitors, broke down. A laughable feature of the race was, that when his machine was ready to go mine wasn't, and vice versa. After the race both machines were drawn off the grounds by horses. I found soon after by chance a gentleman in New York who wanted to exchange a steam carriage of the latest model with many improvements, for a hydro-carbon machine for the purposes of experiment. I concluded that mine was just the machine to experiment with. After refitting it with new batteries I bade my machine good-by, and in due season received his.

This carriage was run a month or so until cold weather put a stop to it.

PROHIBITIVE CONDITIONS.

The steam carriage is not practical for winter use in this climate, at least, neither is there an automobile of any system made which is practical for cold and deep snows. I am fully convinced, hence the assertion, and my experience and that of others will bear me out. It happened that the night our town celebrated the election of McKinley and Roosevelt was one of the coldest and most windy nights we experi-

enced last fall. It occurred to me that as I was a good Republican I ought to celebrate in some befitting way. Accordingly my residence was decorated and illuminated. An arched canopy was also forged, draped and wound with ribbon and bunting, and hung with Chinese lanterns, and fastened to my new steam automobile. The rest of the carriage was also correspondingly decorated at considerable expense. My wife was to impersonate the Goddess of Liberty, and ride with your humble servant, no less a personage than Uncle Sam himself. Our costumes being imported for the occasion, nothing was lacking but to put them on, steam up and join the throng already gathering. To prevent trouble, which I had guessed might happen, we had the fire under slow heat for an hour, and while making the last finishing touches I was not well pleased to find that it was the expected which happened in this case. The water glass and steam gauge had both frozen up. I could not run the carriage into any building in town on account of the canopy. Hot water was poured onto the frozen tubes for the next hour. The fire was continued for fear of other pipes freezing, and before the gauges were thawed out the water had become low in the boiler. The next thing which happened was a large amount of water thrown into my fire box from the boiler. The boiler had become scorched. This put a veto on further plans, and Uncle Sam and the Goddess were conspicuous that evening only by their absence. The next day a boiler maker readily expanded the tubes, and since then it has been used only for testing. Now, as regards a few

COMPARATIVE COMMENTS AND CRITICISMS.

both general and practical which have suggested themselves to my mind. One fault I found with the first machine was that the wheels did not track; in other words, they were of a narrow tread. While this would make no special difference in cities and on well traveled roads, it did make considerable difference here in the country, not only in ease of riding and steering, but more particularly in keeping up steam. It requires more power, hence extra cost in traveling. The air tank was not large enough, and of such construction that it was liable to leak easily. I should favor no tank at all if by some other device the gasoline could be sprayed into the fire box. The gasoline tank was much too small, as was also the water tank, necessitating too frequent replenishing. Neither was the boiler large enough; it would not make steam fast enough for sandy or hilly roads at all times. The escape of steam from rear of carriage was also an objectionable feature, as was the blowing off of the safety valve. The steam frightened many horses, and I am of the opinion that this was the chief cause of their fright. Horses will become easily accustomed to the steam automobile if this can be obviated in some practical way by causing the steam to exhaust and blow off in a coil pipe in the water tank, which will act as a condenser.

There are a great many things for the chaffeur to watch; namely, the fire, the steam gauge, the water in boiler and tank, the air pressure gauge, besides the road before him—all this requires much close attention. There is, as I have intimated by illustration, a liability to pipes freezing in cold weather even while in use, and it is absolutely necessary, when not in use, to draw off all water unless you have a warm carriage house. One great objection I have to the steam carriage in my business is the length of time required to get started when cold. Of course, this I can readily see would not be an objection to some people in other business.

Many of these criticisms have been remedied by the manufacturers in the later machines. The great points in favor of the steam carriage are its reliability, ease of repair and superior speed attainable over that of other systems for a short distance, and lastly, yet of no small importance, the ease with which hills of all grades can be made. Those objectionable features seemed to me at one time to outweigh and outnumber those in point of advantage, and I was persuaded to sell and buy a hydro-carbon machine. Perhaps I am not fair in my criticisms, yet after the experience I had with the latter I was only too glad to return to my first love. The steam carriage has its faults, yet withal is in my opinion the carriage without a peer for country use at this stage of experiment. In the first place, it is necessary for a machine of the hydro-carbon type to be built heavy in order to obviate vibration, and the first criticism I would make is that mine was cumbersome. It took up nearly the entire road, making it hard to turn out for teams on some of the narrow highways. Another disturbing element, it was very noisy, and so noisy that it received the names of "stone crusher," "ice cart," "threshing machine," etc. As you know, the noise and machinery does not cease when the automobile stops, and this is a source of annoyance in letting teams by or stopping to speak to anyone on the road for just a moment.

One of the worst objections I found, and the others seem of small account in comparison, was the unreliability and the difficulty in knowing just what the trouble was when it "balked" for any reason. Very few people in the country know very much concerning a gasoline engine. I shall venture the assertion that I do not think the mechanical construction of the cylinder was right, theoretically or practically. It seems to me to be contrary to all laws of mechanics for the cylinder to be the "whole push," and to receive, explode and exhaust the gasoline all in the same end. When anything gets out of repair, who can say for a certainty, without taking the machine apart, whether it is poor gasoline; whether there is a right mixture of gasoline and air; whether the inlet valve seats properly, or whether the exhaust valve seats firmly? Who can say but that it may be some fault with the batteries unless you have a voltmeter with you or take time to remove the spark plug? And when the trouble is found, who but an expert can fix it?

MERITS OF THE GASOLINE SYSTEM.

The features which commended the hydrocarbon carriage to me were the ease of starting over that of the steam when cold, and the reputation it had for running in all kinds of weather; the extra space for parcels, passengers, etc., afforded, and the absence of steam, water and air gauges to watch. The "no fire" and "lessened liability to explode" were also commendable, and the minimum cost of fuel, as compared with steam, was an item in its favor.

GENERAL SUMMARY.

I have tried to give impartial criticisms, unprejudiced comments, on both systems of machines used by me in common from what experience I have had. When all has been said, you will agree with me that the really practical automobile for country use in all kinds of weather has not yet been put on the market. I still like the automobile, still own one, and probably always shall, notwithstanding. I shall admit that I did not know as much about machinery and its principles as I ought. Much of the trouble I experienced might never have happened to you or anyone more familiar with its laws. It may never have been any fault with the automobile, the

system or the intention of the manufacturers. If I had been a natural born or trained mechanic and owned a machine shop, it would not have been so expensive for me; or if I had been a Vanderbilt, with a professional mechanic and chauffeur to operate and make repairs for me when necessary, it would have been less trying, and I should not have been worried in mind and strapped in pocketbook about all the time. Or even if I had lived in a city where I could step into a repair shop and find the parts or get assistance ungrudgingly, it would certainly have been more practical, to say the least. On the contrary, not always able to summon such assistance as I would have liked, I was obliged many times to be my own machinist and make my own repairs.

A LITTLE WORD PICTURE.

Apropos, I will paint you a little word picture which is familiar in my vicinity. A doctor (respectably clad in clean shirt, collar and cuffs) starts out with his automobile to call on a lady patient. He desires to make a good impression, as much depends in building up a reputation, ordinarily you know, on his personal appearance as the action of his drugs. All of a sudden the machine stops: something has broken—nothing to do but to repair it on the spot. After much labor expended he proceeds on his way, but how does he appear—more like a blacksmith than a doctor. His reputation is at stake if he presents himself with a wilted collar, dirty and greasy shirt, cuffs and hands. Which shall it be? Make the call with apologies or return for clean linen, taking his chances that the next time he will be more fortunate? Which? This picture has not been overdrawn. This is a painting from life; if you doubt it, ask my friends. Now, in closing, I want to mentally exhibit

AN IDEAL AUTOMOBILE.

its duplicate not yet manufactured. I predict, however, the fulfillment of all our hopes in this respect ere long—this is no idle dream. What the public demands is what they will get. This automobile must first of all be a "press the button and go ahead" machine. What the motive power is I am not prepared to state, yet I venture to say that when someone can solve the problem to hold electricity in some receptacle, or battery, if you choose, that will not leak when not in use and can store up enough energy for 100 miles or more, a battery which can be charged easily in a few minutes in most country places, or kept on hand at small expense—when this is made possible by some chemist or electrician, then this will go a long way toward solving the enigma.

The ideal must be noiseless, odorless and without vibration. There should be no danger from explosion or from freezing in any kind of weather. It should be of wide tread, have space for grips and parcels; must climb any hill open to travel, and go through snow banks, mud or sand easily. Above all, it should be reliable. The style, as regards body, top, etc., would be only a matter of choice. The style that would appeal to me might not suit the next purchaser, and really does not enter into the factor of practicability.

As regards weight, not more or less than 1,000 pounds for all kinds of roads. Speed regulation, to follow behind the slowest truck team, yet capable of winning in a brush with the fastest road horse or electric car, as suits the chauffeur. Am I expecting too much? I think these demands are not unreasonable. The only way we can expect to get the ideal is to justly criticise the automobiles in use, and there is nothing left for the manufacturers to do but comply.

Sufficient to say, as a closing word, that the day of practical auto-locomotion is not yet, although the dawn is not far off.

FROM PHYSICIANS EAST AND WEST.

SOME AUTOMOBILE EXPERIENCE BY A COUNTRY PHYSICIAN.

A country practitioner in New Jersey speaks of the bad roads a physician must necessarily traverse. He says:

When first I contemplated the purchase of an automobile for daily use in the practice of my profession, it was with the expectation that no other mode of conveyance would be necessary. Many a time was I informed by dealers and others that the particular make of carriage in which he was interested would do anything that a horse could do. This was not only true of dealers, but of all my friends who used carriages, and even such persons in public business who used the new method of locomotion. They all gave me the same impression. I have since learned how sadly I was mistaken. Either makers and automobilists in their enthusiasm overestimate the qualities of their carriages, or else they know nothing whatever about the roads of New Jersey. I was perfectly aware that my section of the country would furnish severe tests for automobile work, and in summer and snow in winter, off the main roads, which are of stone or gravel construction. The former are good the year round, but the gravel roads are very sticky after wet spells, and simply horrible in the spring after frost is out. Of course I can't confine my work to stone roads, so I encounter all the above conditions. I had been keeping three horses. On a venture I disposed of one of them after ordering my carriage, but everybody said I might sell all three with safety, but I kept the remaining two to satisfy any misgivings on my part, and have them yet. In selecting the carriage my first thought was to be able to start quickly. Some steam makers assured me their carriages could be started in 10 minutes, a few said 15, more said 5, one or two 3, and one declared he could start from cold water in less than 1 minute. I timed a few of these, and they all required 8 minutes or more. This I decided would not do. So I looked into the other system—gasoline—for lack of a charging station prevented any consideration of electricity. The noise and vibration seemed so obnoxious at first that I refused to consider gasoline carriages, but later, after having seen one perform with considerable credit, I concluded this system would answer the purpose, and decided to overlook the above mentioned objectionable features and look further. I knew I must have plenty of power, and although all the makers assured me "their carriage" would go through anything, I decided to err on the safe side, and purchased a carriage supplied with a 9 horse power single cylinder motor, and have never been sorry for having plenty of power, for even with this I frequently get into sand which takes it all, and once I have had to back out and go another road. I soon learned that my carriage is very economical, and my best record is 20 miles traveled in 1 hour and 25 minutes on three quarts of gasoline at 10 cents per gallon, or 7½ cents. This was under splendid road conditions, but in sand or on any kind of bad road the cost is so much more that I find it pays to use my horses for that purpose, and of course they have to be exercised some, anyway.

TIRE EXPERIENCE.

The fact that steam carriages climb hills was no inducement to me when buying, as I have no hills to encounter to speak of. On our common roads I find my 3 inch tires run in the ruts very well, but the rear wheels, which are sup-

plied with 4 inch tires, bind and make the ruts broader, which, of course, uses up considerable power. This I consider a great mistake on the part of the makers. While it may be true that on asphalt pavement even the 4 inch tires slip considerably, as I have experienced on one or two occasions in the city, yet it never happens to me in the country, even in clay and gravel mixtures, of which a good many of our roads are constructed. When the roads are frozen, anyone can easily imagine how much power is consumed, and, what is worse, how soon such chafing would render a pair of tires worthless. My readers will say, Why use the ruts at all? Because the bottom of a rut is always harder than the loose earth around it. Of course, I have no trouble from this cause over roads where there is heavy traffic with broad wagon tires, and my conclusion is that tires 3 inches in diameter are plenty large enough for use in these parts.

A word regarding noise: This at times is very annoying, and on one or two occasions has been quite detrimental in its influence on patients with nervous disorders. Again, it seems to be the means of frightening horses. Of course a carriage moving along the road, be its motion ever so quiet, without a horse attached, will frighten a certain percentage of horses, but add to this the noise of the motor and you greatly increase this percentage. I have never been the cause of a runaway, but it has been prevented only by exercising the utmost care. Anyone who stops to consider can readily see that it would not do for a physician to be scaring people's horses promiscuously, as he would soon ruin his business, but the average automobilist ought to strive to be as careful as anyone in order to further rather than check the progress of this great invention.

Regarding weight: I think many gasoline carriages are too heavy, my own included, which weighs over 1,600 pounds with fuel and water. This is purely from a business standpoint. Physicians do not often need to cover more than 40 miles, and I think the fuel capacity of the steam carriage would be quite sufficient. I only carry around more weight than is necessary, although I can cover 80 or 100 miles without replenishing fuel or water.

STABLING OF STEAM AND GASOLINE RIGS.

Regarding stabling: I do not have near the trouble with my gasoline carriage that my friends, who are users of the steam system, encounter.

The water will freeze as easily in one system as in another, but I can let it out by opening one globe valve, while it is very difficult to let out every drop from a steam cylinder. All users of steam know that in cold weather the steam gauge first freezes fast, then the automatic and lastly the water glass; with the gasoline system there is nothing to freeze but the cooling water, and this is always hot while the carriage is in use. No ordinary hostler such as a physician usually employs can look after any kind of an automobile entirely. I mention this because I have been asked the question so often. No matter how good a horseman one may have, it requires a man with a mechanical mind to attend to an automobile, and unless he have such a person the owner must do considerable himself.

In conclusion, I might say that while many hours and much trouble may be saved daily by the use of an automobile, yet in the country one cannot do without the use of horses. It may appear that I have represented the roads in my section as being in a very bad condition, but I have endeavored to speak honestly, and do not believe they are

any worse than country roads anywhere, with the exception of the presence of sand.

8,000 MILES WITH BOTH STEAM AND GASOLINE.

A well-known physician in suburban New York gives us the results of 8,000 miles of road work. His figures are most valuable, as they are derived from hard service, and he is himself a mechanic of no mean attainments. He writes as follows:

Early in the spring of 1899 I determined to replace my stable outfit, consisting of three good horses and appropriate carriages, harness and other fittings, with automobiles of some form. For four months I corresponded with makers and advertisers without being able to examine or try a single wagon in the vicinity of New York city, except those driven by electricity. These were entirely impractical for my work. Finally, about the middle of the summer, I saw the first steam wagon brought to New York, and a few days later had a ride in a wagon of the same make. I placed an order at once, and in November my wagon was delivered. I expected to have my troubles, and was prepared to discount liberally the rose-colored promises of the promoters, but at first it seemed as if my wagon was almost perfect. I mastered its management in so far as driving, filling, firing and its general care were concerned in a few days. Then my troubles began. The fire first blew out and then burned out my burner. I had not been warned of the dangers of a back draught. My pump was a little slow. Balls began to break in my engine bearings and spokes in my wheels. In short, I ran almost the whole gauntlet of accidents peculiar to this form of vehicle, but still I was enthusiastic and made from 10 to 50 miles a day, with the occasional help of one horse which I kept during the winter.

COLD WEATHER AGAIN.

When really cold weather set in my worst trouble developed. Steam gauge, supply hose, pump and even safety valve froze up. The company from whom I purchased the wagon sent down men who packed the pipes, put alcohol in the gauge and did everything in their power to make the wagon frost proof, but when the thermometer registered from 15° to 20° above zero the wagon could only be used if kept going at full speed all the time, freezing in less than two minutes if left standing. The gentleman who sold me the wagon had assured me that I could leave it standing for an hour or more in zero weather, provided steam was kept up. Moderate snow gave me no trouble, but heavy drifts were impassable. I realized more and more every day that my wagon was too light for practical and continuous road work. It seldom ran over 100 miles without requiring some repair, often slight, but always annoying.

When spring came I was still an enthusiastic automobilist, but had decided that for night work and stormy weather my steam wagon was not an ideal vehicle.

BUYS A GASOLINE WAGON.

I then bought a gasoline wagon. This wagon weighed about 1,700 pounds, had what I suppose is reckoned as a 7 horse power motor, and at first seemed very cumbersome to handle, very noisy and even slow. A few weeks after buying this second wagon I sold my only remaining horse. I then had the gasoline wagon put in thorough repair, and during the summer used first one wagon and then the other, very seldom having both laid up at the same time.

At first I very much preferred the steam wagon, except at night and in bad weather, but as I became more accustomed to the gasoline motor the fact became more and

more evident that with the gasoline wagon I used less fuel, made better time, had fewer delays on the road and fewer repairs at the stable. My man found the gasoline wagon much easier to keep in order. I could get off in thirty seconds from a cold start, while the steam wagon required from five to ten minutes, and I could, if necessary, leave it without an attendant. In short, I traded my steam wagon for a second gasoline machine of the same make as the one I already had, and now use sometimes one and sometimes the other, often having both in excellent running order at the same time. I should be very loathe to return to horses, although I am very fond of them, and have owned some really fine and fast animals. My motor wagons save me about two hours a day over a route ranging from 10 to 50 miles. I have driven about 8,000 miles, and only on a few occasions have I been towed home.

INACCESSIBILITY.

My strongest criticism of the American made motor wagons is that the parts are inaccessible and difficult to repair. My wagons do their full 18 miles an hour and have never refused a hill or moderate mud or snow. Our roads are the best of macadam, and I should not advise the use of automobiles on country roads in winter. Neither should I advise any one totally ignorant of machinery to attempt to manage the present product. I have mastered most of the details of my wagons, but it has been slow and expensive work, although for twenty years I have spent a large part of my leisure time in my workshop and consider myself superior to most amateur mechanics.

My man has learned to take care of the machines and under my direction, do a large part of the repair work.

INCOMPETENCE OF REPAIRMEN.

The most discouraging part of automobile keeping is the absolute impossibility of getting competent mechanics familiar with the work at reasonable prices.

One reason why I gave up my steam wagon was because the men, or rather boys, sent me by the company were so absolutely ignorant of mechanics, even as applied to this one steam vehicle, that with one or two exceptions they always left the wagon worse than they found it. My experience at their repair rooms was even worse. Twice I sent my wagon to them, and each time it came back so thoroughly demoralized that it required several days' hard work to make it fit to use. I have been able to secure much more satisfactory work on my gasoline machines, but the prices have been almost prohibitive. I have paid \$5 per day, hotel bills and all traveling expenses and incidentals, for men who were getting \$3 or less per day in the shop, and who reached me at 11 in the morning and left at 5 at night. We are less than an hour from South Ferry, New York, and the automobile repair shops are about forty minutes from the ferry.

COMPARATIVE TABLE.

So far I have not found the automobile as cheap as the horse. I have kept very careful track of all my expenditures and find that during my first year I spent for gasoline \$81.57; for oil, cotton waste and other supplies, \$46.54, and for repairs \$420.03. In addition to this I spent about \$100 on extras and alterations. It cost about \$200 to provide means of heating my stable and to make changes necessary to accommodate the new vehicles.

Figuring my present stock at full market value I find that the first year's cost of operating, maintenance, repairs

and deterioration in value amounted to about \$1,100. The maintenance of a stable with three horses to do the same work as calculated from careful accounts kept during several successive years cost about \$800 per year. Both of these estimates are exclusive of the wages of a man, which will be about the same in either case.

This year I hope to bring my expenses down to about what horses would cost, but with the present prices and imperfections I see no chance of making them less. Tires I find a great source of expense, having worn out two full sets the first year, besides having heavy repair bills for punctures. I am at present trying a much heavier tire, over an inch thick, and I hope nearly puncture proof. I am an enthusiastic user and admirer of the automobile, and believe that when the roads are good it is an ideal vehicle for a physician's use, but I fear that much of our talk and writing is tempered by our enthusiasm, and I find among my friends who have become chauffeurs a lamentable tendency to conceal their accidents, and say nothing of vexatious repair bills, but rather to dwell on the pleasures of a long and successful trip or an unusually fast run.

Our automobiles are not ideal machines, but I sincerely believe that they are better than horses, and mine are not for sale unless I can replace them with something better.

WEDDED TO STEAM.

Here is the sum and substance of a Boston physician's struggle with the automobile question:

I have been making a study of the automobile for over a year and a half, and have run several. Of all the three different powers—steam, gas and electricity—I am still wedded to my first love—steam, for the possibilities of steam, it seems to me, are greater to-day than any known power as applied to autos. The valves and joints may be leaking at every point, but if you can get gasoline and water you are pretty certain to wiggle home some way, and if stalled upon a high grade you have the assurance that in a few minutes your power will be sufficient to carry you over. But alas! with gas and electricity, if there is a slight break of some connection you are helpless until some expert comes to your assistance.

One of the greatest improvements to be made in the steam carriage is that which will bring the owner positive assurance of safety. I have had my mind upon a steam gauge that would assist in accomplishing this result. It can be set at any desired pressure, and will itself so regulate the flow of gas that the desired pressure will not be exceeded.

ZERO WEATHER, HILLS AND ABOMINABLE ROADS.

Here is a tale from the great Northwest, where conditions are anything but ideal for the automobile, yet our subscriber seems to have met with good success, considering the difficulties he has encountered:

I have read with great interest the letters in *THE HORSELESS AGE* from users of motor vehicles, and hope my experience may be of use to someone else. I am a country doctor in a very hilly country with abominable roads, 30° below zero in winter and snow drifts galore. I suppose if a rig will do my work it will do anyone's. I find a steam carriage will do, but had trouble getting water into the boiler on long hills. In extreme cold weather the steam gauge and sometimes the check valves on the water supply pipes would freeze. It was also a good deal of bother to keep the carriage from freezing

up on cold nights. I had a house built with double walls, and kept a lighted lantern under the boiler. At times I had to walk up very steep places. It required constant attention to keep the water in the boiler at the proper height, as on level or down grade I did not use nearly as much water as on up grade. It was more work to pump up the air tank, fill the water tank and get up steam than to hitch up a team.

PREFERS GASOLINE FOR HIS WORK.

I next got a gasoline automobile and think it much better adapted to my business. It starts instantly, doesn't require so much watching, will stop any time; cold, hot or windy weather seems to make very little difference, and if a man will be careful of his electric wires there is very little trouble. I use eight cells of dry battery (cost, \$1.60 to start with), and a small sparking dynamo afterward. I have tried a three-cell storage battery for starting and a dynamo to keep it charged, and liked them very well.

I see many inquiries and answers in your journal as to horse power. It seems to be a rather hard question to determine. Men who use 12 horse power thresher engines claim they can do more work than twelve horses, and can pull a load for twelve horses out of any hole or up a steep place. I have never found a chuck hole or hill so steep but my 8 horse power would take me out. In fact, I never got into trouble but once, when a wire broke in the dynamo, with no soldering iron in the neighborhood, and with dense darkness enveloping me and a heavy rain falling. I ran it until the dry batteries gave out, and then abandoned it. It is safe to say that with a well constructed gasoline engine 95 per cent. of the trouble is in the spark.

To recapitulate: My experience has been that for hard work in the country, and in all kinds of weather, a heavy carriage with very powerful gasoline engines is a success, but it costs nearly as much as a good team, is more bother to guide and does not ride as easy over rough roads as a buggy.

SOME HELPFUL CRITICISMS FROM THE NEW HAMPSHIRE HILLS.

The subscriber who favors us with the following practical criticisms on the steam carriage for physician's use, is of mechanical bent, like many of his profession, and has devoted much time to the study of the mechanism of his carriage. His experience should be doubly helpful, both to maker and user.

I have been the possessor of a steam carriage since last October. Has it been a success with me? I will try to answer on two different points. 1. Has it been a success as a pleasure carriage? Without hesitation, yes. 2. Has it been a success as a business vehicle? I also answer without hesitation, no.

As a pleasure carriage it is excellent. It is speedy, runs smoothly without the least noise, except that soft purring of the exhaust, which under ordinary circumstances is not at all objectionable. The machinery seems to be perfect with the exception of a few items of secondary importance. As an example of the fine condition of the engine, I will say that when the boiler is empty I close all the valves, reverse the engine, open the throttle, then I run the carriage a few lengths forward so as to raise the pressure in the boiler to 20 pounds. I can hold the carriage a few seconds, and when I release it, it will start back and retrace part of the way. The management of it is also very simple, and anybody can learn to master all the details in a short time.

My wife can now heat the torch, raise the steam, run the carriage, and take care of the water feed without any attendance. In fact she has often started the carriage all alone, and given rides to lady friends of hers without my knowing of it. I must also add that I have not found anything in the way of road obstructions that could prevent the carriage from going through.

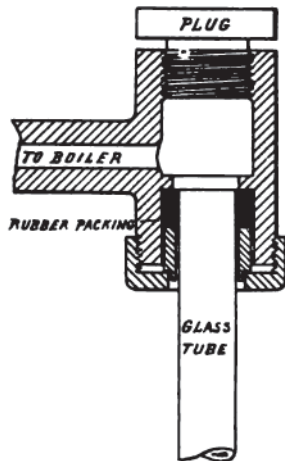
LITTLE TROUBLES.

I don't mean to say that I did not have my little share of troubles the first times I used the machine. The first time I lighted it I found that the fuel regulator did not work. When I took it apart I found the rod heavily dented as by the application of a pipe wrench. I had it polished, and it has worked well ever since. My air pump gave way one day and came apart. Now I have a larger one that works better and doesn't give any trouble. My water gauge gave me trouble in more than one way. First the fittings were not in line, and I broke quite a number of tubes. One day when my wife had been riding alone, she came to me saying that the feed pump was not working right. There was about 1 inch of water in the tube. I raised the rear wheels and started to pump. After a little while, and without any gain of water in the tube, the engine began to slow and the water to come through the exhaust; the boiler was full. On removing the glass tube I found that it was a little short, and that the rubber packing had slipped over the end of it and was acting as a valve. So I had fittings made according to the accompanying sketch, with removable plugs on the top. This permits of inserting a tube without twisting the fittings, placing the tube at the proper height, packing satisfactorily, and cleaning the tube without removing it.

The small hand wheels on the valve stems have also worked loose, so that when I was trying to open a valve I was only unscrewing the hand wheels. A few pins in the right place have settled that difficulty, and now I have a fine pleasure carriage; but I have not a physician's business vehicle, and it is not the addition of a top that will make it better adapted for that purpose. And why?

One of the greatest faults of the steam carriage is that it takes too much time to prepare it for a run, and the detachable torch is in great part responsible for it. If a permanent vaporizing coil, with a small burner to keep it hot all the time, were adapted to the machine it would probably shorten the time necessary to raise steam within proper limits, and would also do away with the necessity of a side road fire, which is always objectionable and sometimes impossible when the wind is high. Some manufacturers claim that their pilot lights will keep up the steam pressure without any variations any length of time. I do not think that in practice their claims could be justified, for the capacity of a burner to furnish a given quantity of steam depends on too many different conditions, such as the quantity of water in the boiler, the air pressure in the fuel tank, the quality of the gasoline, and even the force and the direction of the wind, etc. If the pilot light is sufficient to raise steam the pressure in the boiler will keep increasing, the safety valve will open, and after a time no water will remain in the boiler. If, on the other hand, the light is not sufficient to raise steam, the pressure will go down, and liquid gasoline is liable to flood the burner.

It seems paradoxical that a carriage that is one of the best adapted to the hard conditions of roads in winter should



FITTINGS WITH REMOVABLE PLUGS.

not have been built to stand cold weather, and this condition is one of the worst objections against the practical use of the steam carriage by physicians, for no amount of winding will prevent the pump from freezing during a stop even of small duration. All that has been said in connection with the steam carriage in cold weather is of no avail to the physician, at least with the kind of carriage I have.

COLD WEATHER DIFFICULTIES.

Here are a few suggestions in regard to that difficulty:

First—The carriage ought to be self-heating. It ought to be easier and less expensive to keep a carriage warm than to heat a building for that purpose, and besides the warm stable cannot follow the carriage. All the machinery, pipes, water tank, etc., ought to be well enclosed; this would be easy with carriages that have bevel gears and universal joints for transmission instead of the chain.

Second—A small burner could be fitted with upward draft inside the water tank and downward draft through the boiler, the reverse of what occurs when the main burner is lighted. The auxiliary burner could be made large enough to keep the carriage warm and not powerful enough to evaporate much water in the tank.

Third—A coil of tubing piped to the gasoline tank could be fitted over the auxiliary burner and lead to the main burner, and so form a vaporizer permanently attached to the carriage.

This would advantageously take the place of the detachable torch, as it could be heated in place and kept hot as long as desirable. This would be far superior to pouring a quantity of alcohol or gasoline in a cup inside of the main burner, for it is not always easy to tell whether the burner is cool enough to receive that amount of gasoline or alcohol without danger. It would also reduce the time necessary to get up steam within proper limits.

A carriage built like this and well inclosed could be left a whole night outdoors at this season of the year, provided the auxiliary burner would work well and there was enough water in the tank. With chain transmission the problem of inclosing the machinery would be more difficult. Perhaps we could make the steam pipes larger and wind them to prevent freezing when riding, and provide cut-off valves near the boiler and drip valves to empty them when the carriage was standing. As for the pump I don't see anything

else to do but to discard the ordinary pump in winter and use an independent steam pump with body and valves located inside the water tank, leaving only the plunger and packing rings outside.

I have written the above in a hurry and with all the enthusiasm of inexperience, and I have no doubt that mechanics and experts will find much fault with the crudeness of the above suggestions, but I hope that soon the fine running qualities of the steam vehicle will be utilized in the form of a practical steam carriage for physicians' use and also practical steam delivery wagons, for the requirements of both vehicles have many points of similitude.

A REMODELED STEAM CARRIAGE.

An Ohio physician tells of some changes he made in his steam carriage the better to adopt it to his wants. He enters a plea for modesty in the advertising and selling of automobiles and urges the claims of the user from a practical standpoint.

A large amount of the literature afforded by the automobile trade papers, he says, emanates from manufacturers of various types of automobiles, manufacturers of parts of automobiles, and those who contemplate patenting special parts or building new styles of automobiles which will outrun, outpull, outwork any automobile heretofore produced. Upon watching for these mechanical wonders we are surprised at their slowness of development. Frequently they never appear, and if so, they are generally of no practical value.

It is high time for the users of automobiles to assert their knowledge through the automobile journals relative to the practical side of the automobile industry.

DECEPTIVE ADVERTISEMENTS.

Machines are advertised, manufactured and placed upon the market as practical which prove a great annoyance and a detriment to purchasers. Enough has not been said by the users of these machines tending to refute the enormous, unreasonable and unreliable claims made by the manufacturers.

Reading the advertisements sent out by these firms, no one would hesitate to purchase an automobile with a thorough belief in its practicability. In addition to the glowing literature we see the most artistic catalogues with specially arranged photographs of vehicles upon high mountains, in the lowest valleys, in the deepest mud, plowing through snow and weathering the greatest hurricanes, indicating that these machines are the only methods of travel practical from every standpoint, even superior to the comforts of the Pullman palace car of to-day.

I do not believe that manufacturers of automobiles generally intend to impose upon their customers. What they usually advertise is thought to be correct on their part, for the reason that they are not practical users of automobiles. It is true they ride them on the ordinary pleasure jaunt or in the automobile race, but usually under the most favorable circumstances, such as weather, prime condition of machine, etc. If manufacturers of automobiles would use their machines as they should be tested I am certain that their statements to prospective customers and their public advertisements would be much modified. When I speak of a thoroughly practical motor vehicle I must admit from the outset, from the user's standpoint, no such machine is turned out at the present time. But that these machines can be made practical and perform the duties of the horse, except upon the farm, there can be no doubt. When automobile builders put

themselves in the place of the constant user they will then (and not until then) determine the shortcomings of their carriages. Unfortunately, they are as a rule unwilling to listen to suggestions, believing that they have a perfect product.

Every one to his fancy as to the motor power he desires, but upon investigation I decided that steam was the power that would be most practical, and a year ago I began using a steam carriage. In making this purchase I was unfamiliar with automobiles in general. I relied wholly upon the statements of the salesman, who was willing to guarantee the best workmanship, least consumption of fuel, amounting in no instance to more than seven cents per day. He also claimed that one filling of the tanks would last for a run of 75 miles, and that the machine was capable of climbing any hill where there was a road, would go through freshly ploughed fields, snowdrifts, and other exaggerated conditions too numerous to mention.

Repairs, while very infrequent and inexpensive, in case they were needed, could readily be attended to at any machine shop, etc.

My machine was ordered "knocked down, crated," and I found upon assembling it that it had never been tested at all. The first experience was that the throttle valve leaked steam to such an extent that the machine could not be stopped upon the road without running it against a post, curbing or something immovable. The pump lever broke off the first trip out, owing to the plunger being too tightly packed. The boiler went dry (with the gauge full of water), the boiler flues loosened, etc. I took the machine entirely to pieces, which, considering the method of construction at that time, consumed a day's work. I took the boiler to all the numerous boiler makers of my city and was unable to find one who would attempt to tighten the flues. I succeeded, however, after a few days' time, in finding an ingenious friend of mine who was willing to undertake the matter, and who succeeded in effecting a perfect job.

I found that the small pipes leading to the water gauge became stopped up on the first trip, and while the gauge showed sufficient water in the boiler, the boiler was dry. I was about four weeks, taking all things into consideration, in getting ready for my next trip. I subsequently found that my water gauge pipes would stop up and that I was in constant danger of scorching the boiler. There was no adequate way to blow it out and keep it clean, hence a great deal of trouble ensued. At this time I had no auxiliary hand pump, and when my water was below the safety point I could not get home by standing still, and I was afraid I would not get home if I advanced, consequently I would generally go ahead, trusting to the Lord that nothing would happen.

I found that the plunger pump accompanying this machine was too small to supply the boiler, even though kept in operation all the time; consequently, if out long, my boiler was bound to run dry sooner or later.

It would be impossible for me to detail the numerous unfavorable experiences I had with this automobile until I decided that it was wrong in construction. I believe that during the first five months that I owned this machine I spent fully sixty days in repairing this or that, as it was impossible to make two or three successive trips without something going wrong, necessitating a repair of some kind. I finally decided to take the engine and boiler of this machine and build an automobile to my own notion.

This was somewhat facilitated by an accident which oc-

curred while my wife and myself were in rapid transit descending a hill during the early part of the summer. Striking a hole, the right hind wheel broke off and the hub ran into the ground, turning the machine over one and one-half times on its side, and demolishing it to such an extent that repair would have been somewhat expensive. No fault attaches to the machine, however, for this accident, as I was going entirely too fast, considering that the road was a strange one.

In reconstructing my automobile I determined to make it as practical as possible, and in order to do this I was obliged to overcome some difficulties—first, ease of riding on all kinds of roads. This was easily attained by lengthening the reaches between the front and back frames 16 inches, allowing the machine to roll gradually over the bumps and breakers. The original machine was so short that the front wheels would not clear a breaker before the rear wheels encountered it, causing the carriage to bounce. Also the shortness of the original carriage gave it a disproportionate appearance. I therefore abolished two objections in one change.

Second—To facilitate removal of the boiler, cleaning flues, firing and tending to overcome "burning back," I placed the boiler in the rear, over the differential gear, and raised the body four inches.

Previously, in order to get at my boiler, the seat had to be removed and a great amount of plumbing taken apart in case the boiler was to be removed. To avoid taking out an unusual number of pipes and connections, I placed five union joints in such location that in order to remove my boiler, all that had to be done was to raise the boot from over the back of the carriage, and unscrew the five unions. Ten minutes' time is ample for the removal of my boiler as now arranged.

Furthermore, firing up from the rear obviates coming in contact with muddy wheels, and, together with a properly constructed smokestack (to be mentioned later), absolutely prevents blowing back of the fire under all conditions.

BROKE TWENTY-SIX WATER GAUGES.

Third—During the first three months when I used my machine, I broke twenty-six water gauges, as no water column accompanied the machine, and none was made in connection with this machine at this time. The dangers of running without a water gauge are at once apparent. In constructing my new machine, I endeavored in connection with this to overcome the breaking of water gauges and the stopping up of the same. I found that the breaking of water gauges was due to the fact that the side of the body through which the openings were made was so fragile that certain inequalities of the road would bring a strain upon the glass, breaking it in almost every instance. To overcome this I used heavier panels and placed an upright strip on the inner side connected with the frame of the body, which is 1 inch thick, made of oak, screwed and glued to the body rigidly, so that no matter how unequal the road surface may be, no strain can be brought to bear upon the water glass. As a result of this improvement I have not broken a single glass in several months, and my experience enables me to say that there is absolutely no necessity for breakage of water glasses.

In this same connection I used, leading off from the boiler to the water column, quarter-inch pipes instead of one-eighth-inch, as heretofore, which allows free circulation. Also I made a large water column with a 1-inch opening from top to bottom, being much larger than the column now

supplied by the makers of this machine, placing at the bottom of this column a one-half inch blow-off cock, which effectually cleans the boiler, the water gauge and water column at one time. There is absolutely no possibility with this arrangement of any of these pipes becoming clogged.

Fourth—The by-pass and reverse levers were originally on the outside of the seat, making it very difficult to use them with the top raised. These have all been brought to the inside, convenient to the right hand.

Fifth—The steam gauge connection originally came off from the under side of the boiler, the pipe frequently becoming clogged, as a result of precipitated material. I was obliged to connect this pipe over from the top of the boiler to overcome this difficulty.

Sixth—I found with a temperature of 30° Fahr. that it was impossible to use the machine on account of freezing. To overcome this, I removed the asbestos from the muffler and placed the muffler inside of my main water tank, so that the exhaust steam is not only perfectly muffled, but in addition keeps the water hot, obviating in a great measure freezing, avoiding pumping cold water into the boiler as heretofore, and in addition slightly reducing the consumption of gasoline.

Seventh—I found my water tank entirely too small. I therefore enlarged the old tank and placed an additional tank in front of the dash, thereby improving the appearance of the front of the carriage and furnishing a water capacity of 52 gallons. The great convenience of this improvement is at once realized when one understands that to fill the water tank frequently requires time, besides the danger of running dry away from home.

Eighth—The cramped and crowded condition of the engine made it difficult to repair. In my new arrangement everything has been cleared away (so to speak), leaving the engine free and accessible from all directions, facilitating oiling, packing and general attention.

Ninth—The oil cup accompanying the machine had a capacity of 2 drams, and being of the ordinary needle valve variety, it either did not feed or would empty itself at once, according to circumstances. I therefore attached a large sight feed cup, by which my engine is properly and economically oiled.

Tenth—To prevent the fire blowing down, I applied an especially prepared smokestack. This consists of a square base, to which is attached a central upright stem four inches in diameter and two inches in height. Running transversely across the top of this stem is an attached pipe of the same diameter and nine inches in length. Placed vertically, and attached very much like an ordinary T, are two pipes, one on each end of the cross pipe before mentioned, three inches in diameter and six inches in length. These are open at each end, so that wind striking in any direction blows out at the opposite end, either above or below, according to the direction of the current, obviating absolutely all disturbances to the fire, no matter how strong the wind.

ADOPTS THE TUBULAR STEEL WHEEL.

Eleventh—Relative to wheels. This is a problem that on the part of automobilists should receive serious consideration. Several things should be taken into consideration in connection with wheels, viz., strength, trueness, lightness, durability and appearance. I found the spokes of the wire wheels frequently snapped off either at the hub or rim, and while it is not difficult to replace a spoke, it is, however, a matter

of some moment, as I believe it very difficult to readjust a wire spoke so that the tension conforms to that of the original spoke. I determined to test a tubular steel wheel manufactured in Columbus, Ohio. This wheel will, in my opinion, in time supersede both wood and wire not only for automobile purposes, but for the ordinary carriages as well. It is strong, resembles a wood wheel in appearance, though much handsomer, as it can be enameled and beautified according to the taste of the purchaser, a process of finish which facilitates cleaning (I do not believe a full set of wire wheels can be thoroughly cleaned under two hours' time, and owing to this are usually in an unrepresentable condition). They are true to the smallest fraction of an inch, and cannot vary by usage, as the spokes are brazed at both ends in such a way that it amounts to a solid piece of steel throughout. An especially devised rim adds wonderfully to its strength. I believe this wheel will revolutionize the industry.

I have described numerous improvements on my automobile which of necessity have been expensive, but soon after purchasing I disposed of my horses and determined to make it successful or to demonstrate that the machine was worthless for general utility. I have satisfied myself that if automobiles are constructed as they should be, and as my machine is now remodeled, there need be no trouble outside of ordinary wear. My machine, however, is not yet practical during very cold weather. I cannot use it when the temperature is below 20 degrees Fahr. This, however, I will overcome in a machine I am now building, which I can use during zero weather as well as during the summer.

I have of necessity omitted many minor improvements which are of great practical value, but I desire to state in closing that the man who uses an automobile in sunshine and in storm, during the freeze and during the thaw, on asphalt and in the mud, and under all conditions and circumstances, is the one who should understand it from a practical standpoint.

SIX THOUSAND MILES, SUMMER AND WINTER.

The Connecticut physician who favors us with the following notes seems to have had a very satisfactory experience with his gasoline carriage.

I purchased a gasoline carriage in October, 1899, and used it every day (with the exception of two or three days while waiting for a new tire) throughout the winter, in every sort of weather, and on all sorts of roads, ran it through rain, snow, frozen ruts, ice, deep mud and slush.

The carriage proved satisfactory in every kind of going except the deep spring mud, when the frost was coming out of the ground. Then I often wished for more power. I always went through, though, and never was stalled by deep mud, but it makes hard going, especially when climbing hills. Snow does not give much trouble if the ground is frozen underneath. Once or twice I wound the rear wheels with chains to climb hills in deep snow. I tried rope, but it cut all to pieces in a few miles.

TO PREVENT FREEZING IN COLD WEATHER.

During the cold weather I use a rubber cloth cover over the back of the carriage body to prevent the air from circulating around the water tank and to retain the heat when the carriage is standing.

When making a long stop on a cold day or night I also throw the robe over the back of the carriage body. My

carriage has stood for several hours on a zero night with the wind blowing, and the water was nowhere near freezing when I started for home. I use this rubber cover only when making short runs. When running ten miles or more without a stop I roll the cover back and let the air circulate.

In the barn in freezing weather I cover the back of the carriage body and place a lighted lamp beneath the water tank on the floor. Of course, I am careful to have my gasoline shut off tight.

I had two tin lamps made, each one foot square by three inches deep. I used to keep both lighted in very cold weather, but I find one will keep the water from freezing. One of these lamps will burn night and day for several days. I have never had any trouble with the water freezing.

COST OF OPERATION.

From October, 1899, to October, 1900, I ran my carriage about 6,000 miles. During that time my gasoline cost me \$33, my lubricating and cylinder oil \$21 and my electric spark \$48, which was excessive. This item should not have cost more than the gasoline, but I had trouble with my batteries. Tires cost me about \$60 for the year, due to using the carriage on rough, frozen roads in winter. The weight of the carriage on the sharp, frozen roads would sometimes tear the rubber right off the canvas, making a tear perhaps 6 inches long. A lighter carriage would be easier on the tires.

FINAL DEDUCTIONS.

During the warmer months of the year I consider the motor carriage for a physician's use very much better than horses. It is especially pleasant on a rainy day. You are all shut in and dry, there are no wet lines to handle and no horse to hitch with a wet tie line. On long trips especially the motor carriage is a great time saver. You can go five miles out into the country in eighteen or twenty minutes, and when you get home you are all ready, if necessary, to go just as far in the opposite direction in the same time; no tired horse to think of or pity.

The most unpleasant thing about running a motor carriage in the country is the danger of frightening horses. No matter how careful you are, or how much trouble you take to avoid accidents, some horses will be frightened, and people will blame you for it. It is not pleasant, and the pleasure of many a nice ride will be thoroughly spoiled by some fool of a horse taking fright and doing more or less damage, which you are powerless to prevent. When motor carriages become more numerous this objection will be largely done away with; but at present I find it the greatest objection to owning a motor carriage.

THE AUTOMOBILE FOR THE CITY PHYSICIAN.

Here is some very favorable testimony from a busy practitioner in a large city near the Atlantic seaboard. It is interesting to note the difference in cost of operation and maintenance between city and country, as shown by comparing his experience with that of those residing in the country.

Nearly ten years ago, he says, my attention was first attracted to the automobile. As a physician I eagerly watched its slow development, my interest in the new vehicle being stimulated by the limitations of the horse, which are too well known to need recital here, and are most apparent in city use. In my city one of the conditions for successful employment of the motor wagon is now widely found—well paved streets.

It is my belief that there are at this time many physicians

who are looking forward to the adoption of the automobile in their daily practice. Many, who like myself, feel the need of some form of conveyance which shall lessen the drudgery of going from patient to patient, and perhaps convert this into a pleasant recreation possessing all the advantages of riding in a horse drawn wagon and none of its disadvantages.

To these brethren anything based on actual experience must prove, as it always does to me, very interesting reading. I may here add that I speak from actual experience when I say the bicycle is not appropriate for daily use all the year round. Even with weather conditions favorable it seems to me unwise to ride day after day 25 to 40 miles. At the end of a day's work thus filled with physical toil the average man is not in the best condition to meet emergencies liable to arise in the line of the doctor's duties, emergencies which demand that we be not handicapped, but have a clear intellect and an unwearied body.

About one year ago I sought the advice of a medical neighbor. He had sold out wagons and horses some months before that, and was well pleased with his venture, being now dependent solely on the automobile, and with much satisfaction and some saving in the item of expense. This physician began to use the motor carriage in July, 1899. He has now covered many thousand miles, and I am sure that nothing could ever induce him to give it up and return to the horse.

Four months after placing my order with the manufacturers my wagon was completed and shipped to me.

ADVANTAGES OF THE GASOLINE MOTOR.

It was of the latest and most improved design and of the hydro-carbon type. Although involving a larger original outlay than the steam competitors, these motors I think will better meet our requirements, and I believe will prove cheaper in the end. They are safe, economical in operation—a fraction of a cent a mile is no exaggeration—and exceedingly simple in details. My son, a boy of fourteen, is perfectly competent to start, operate and care for my machine. Always ready for use, it is started at an instant's notice, and can be operated in the coldest or in the hottest weather. With some attention to details and practice, the average man may soon become a successful operator. But here, as in every other art—and the running of an automobile is an art—practice alone can make perfect. Still I hope a frank narration of my own failures and successes may in small measure prove suggestive. Failures and disappointments incident thereto have come from two sources. The first and most important, and most vexatious, were due to faulty ignition; the second were dependent on the transmission.

The engine gave no trouble, barring some slight repairs to the exhaust, a new spring and resetting of the valve. The wagon itself promises to run indefinitely. Here practically the only expense to be considered is that of the tires, no small item in the case of pneumatics, which are so generally used on all American made motor vehicles.

IGNITION TROUBLES.

As to poor ignition. I was told the 8-cell wet battery with which my wagon was equipped would last me in daily use without a recharge for months. I was therefore not prepared to look for trouble from a failing battery. Yet it is very clearly remembered that the motor missed explosions in its original run from the freight station. But no serious trouble occurred during the first week or two, and daily runs of,

say, 20 miles, with numerous stops, were made. Then a run of 40 miles into the country was made. Our destination was reached, but the several hills taxed the power severely. The exhaust was smoky at times. On the following morning a run to the village, a mile distant, was attempted, but the wagon stuck in a stretch of sandy road, and though I put in the hardest day's work all the long, hot July day, I failed to move either motor or wagon. The spark points needed cleaning and dressing, and they got it, yet the spark was poor; the gasoline supply needed adjustment, but with the poor ignition the carburetor became flooded and starting was not possible. As evening came on a pair of horses towed the wagon back to the house, and here it remained for thirty-six hours, while I returned to the city to consult machinists and friends. One said: "Your carburetor is flooded; turn the crank about seventy-five times, with the supply shut off, or nearly so, and your motor will start." He was correct. I went back, followed the advice given, and made a successful return trip. For some days after this my experience was a long chapter of delays, disappointments and general demoralization. In the morning the motor would start fairly, I would get perhaps ten squares away from my home, then nothing would move it. Several days were spent in the street, while curious crowds gathered, looked on and commented; finally my boys and a half dozen stout companions would push the craft home. I now came to the conclusion that my battery was at fault, and replacing it by a series of five dry cells, though of small size, proved this correct—for I got excellent results. A day's hard work, however, finished these, and I halted on the outskirts of the city at nightfall. Repeated attempts failed to start the motor, and the usual crowd had collected; this time it was for once successfully dispersed by a loud explosion in the muffler. I abandoned my property at the roadside for the night, and sent another motor for it early next morning. This was unnecessary, since the little battery had recovered enough energy over night to allow successful but very loud operation. The wagon was now run out to the repair station and the damaged parts replaced. Several days were spent in hunting the loss of battery power, which was finally located in a contact of the spark-rod with the side of the jacketed cylinder; a little filing away of a projecting shoulder completely eliminated all the difficulties incident to poor firing.

Valuable as was the experience, it served to establish for me a reputation as the unsuccessful operator of an impractical wagon. I fear this still clings, while the ruined clothing has been replaced and my usual equanimity re-established.

A failing battery may allow operation on starting after a period of rest; as its remnant of strength is used up there will be missed explosions and soon a stalled wagon. I have since had a double set of five large dry cells connected with a switch, so that if one battery fails I have a second in reserve. But my sparking troubles were ended months ago—none have been encountered since the grounding of the original wet battery and the small dry one.

This bare recital conveys but a poor notion of what this piece of sloppy, slipshod work cost me. It is incomprehensible that manufacturers should be slow to learn that such things must be costly for them.

These troubles were purely accidental, and not necessary; the same is not true of those inherent to the transmission.

TRANSMISSION TROUBLES.

The first fault observed was in the chain. It would be necessary to adjust it after every trip, and yet it was always

loose and rattling. The company's representative was appealed to in vain. Finally, while going along on perfectly smooth asphalt, I came to a rather sudden standstill. The engine would run well without the wagon, but as soon as the clutch was put in it would stop. The chain had "climbed" the sprocket and become jammed there. But this was not all, for a number of teeth were missing in the differential. The damaged gear was replaced at some expense and the loss of considerable time. For several weeks longer I struggled with the constantly loosening chain, in fear and trembling lest the former accident be repeated. Finally, a clever machinist was found who remedied the defect.

I now felt my most serious troubles were at end, but a little more experience was in store for me. On a snowy, slushy Sunday, when all seemingly was running well, I broke the yoke which carries the differential gear. The accident occurred as I was attempting to start, at the time on a slight down grade! This laid me up almost two weeks. While waiting for the new part from the factory one of my friends came into the same shop. He had suffered a similar "fracture" on a companion wagon. No sooner were we out than a third mishap of the same nature occurred, this time on a wagon of the same make. While I have broken but one differential, observation shows this an accident of frequent occurrence. Steel in place of cast iron would, it appears to me, eliminate in a degree this annoying trouble. And every one who runs one of this make of wagons is pretty sure to have a break of this kind at some time.

Although there are two brakes, both become non-acting through a broken yoke. Should this accident occur on a decided down grade the consequences would be most disastrous. It would seem needless to add that the brake or brakes should act independently of gears, and when going either forward or backward.

The chain, if used at all, should be incased. I am looking forward to its complete elimination.

GROWING CONFIDENCE.

I have now used the motor carriage a little over seven months, in every kind of weather and over all sorts of roads. During this time it has been out of use about two months through breakdowns incident to lack of experience in operation, or to faulty construction, or to poor material. The consequent repairs have cost me about \$200. I have now a wagon better than when it came to me new. I have gained the experience which will in the future enable me to drive day after day with fewer interruptions. I have recollections of many difficulties overcome and of many days when the operation of my wagon was ideally perfect.

The conviction constantly grows that we have in the motor carriage the ideal carriage. Its operation will prove a source of unending delight to the man of a mechanical turn. One not thus inclined would do well not to touch an automobile at present. If he start out with a liking for such things he is pretty sure to make a success of it even though the machine be not perfect.

At this time, I am sure, a stage of development has been attained that renders it suitable for our everyday use. I believe it will soon become an indispensable necessity.

In conclusion, I would like to offer advice on a few points. The first, as to the wagon. Get a second-hand machine at the outset. In every large city you will find practical machinists with considerable experience in this line whose opinion as to the condition of a given wagon may be relied

on, if you do not care to select on your own judgment. It goes without saying that you will operate your own machine. A man is not indispensable on your rounds. There is no reason why one should not accompany you, but the fraction of a minute involved each time in starting would enable this assistant to save you very little time in the aggregate. He might be better employed on your premises at home. The cleaning, lubricating, attention to the filling of tanks, etc. is very proper work for him.

If possible, house your carriage on your own premises (in winter time the room should be heated). If there be a small back street you will usually find enough yard space in the built-up part of even a large city to allow this. On most corner properties the situation is more suitable still.

I had erected a corrugated iron barn 12 feet long by 11 feet wide, gravel roof sloping to one side, 2-inch plank floor, all on a substantial foundation. Double doors at each end allow the wagon to run into the yard for washing. If there be room enough, build larger—have a drain inside and wash there. My shed cost, complete, \$250—little more than the expense of a year's storage in a station. The advantages of having your conveyance at hand at all times are too manifest to need mention.

A final word as to cost. This is the element which will sooner or later determine the fate of every appliance. The expense for fuel and lubricating oil has been \$1.50 a week or less—say \$75 a year. My repairs have cost, as stated, \$200. I am sure in future they will be much less. I should estimate expenses on this account at \$100 per annum. This will hardly include tires, for which another hundred may be calculated. With the interest on original outlay we have an expense account aggregating less than \$400. To make the comparison fair it must be remembered that one motor carriage is capable of doing the work of at least three horses. Thus the economy of the automobile is even now demonstrated.

THIS VERDICT A STRONG AFFIRMATIVE.

No stronger testimonial could be asked than is contained in the appended letter from a Philadelphia physician of large practice, who has run one gasoline carriage 11,972 cyclometer miles:

After using an automobile exclusively eighteen months, I feel like saying to my fellow practitioners that for me it has been actually the ideal mode of locomotion for this work. I have at the present time two gasoline carriages, one of which I have run 11,972 cyclometer miles around the streets of Philadelphia, and the other, which is new, about 250 miles. Almost the first thought is, on looking into the motor carriage business, can this carriage be depended on at all times and under all circumstances? I can say positively that I can depend absolutely on coming back every time I go out, so much so, indeed, that the thought never enters my head about the carriage's ability to do what I ask of it. Of course this does not mean that trolley cars are to be knocked off the track, wagons pushed out of the way and pedestrians scared to death as I go.

Next is the kind of power. In my estimation the only successful, economical and certain power is gasoline. Every gas engine has its peculiar tricks. Any intelligent person will in a few months learn every trick his particular motor is capable of. I mean good gas motors; there are lots of badly designed engines on the market that break down. That is not

what I mean by "tricks." A gas engine of good design and even poor workmanship will go on and on long after one of bad design and good workmanship has ceased to run. I cannot see why the small amount of noise produced by the gasoline carriages put out by the older manufacturers now should be taken into account as against the extra number of parts and complications of a steam carriage. Electricity is not to be considered at all for our use. I admit electricity is ideal, but it is not practical at the present stage of development.

SOME WHO SHOULD NOT BUY AT PRESENT.

It is my opinion that a doctor who has no mechanical knowledge whatever, does not care to acquire a little and cannot afford a mechanic to care for and run his carriage for him, should not buy an automobile. It will always be out of order, and is never to be depended on. It is incomprehensible to me how anyone who is able to properly understand the mechanics of the human body cannot master all the mechanical details necessary to run an automobile successfully in a very short time. The work required of a carriage for a doctor is very different from that for most other users. There is usually necessity of hurry between patients and frequent stops, sometimes of long duration. There is the night call, the accident call, and these all need different sorts of attention; a good gasoline carriage is always ready with a turn of the crank, and uses nothing while waiting on you, either at the patient's door or in the stable. My carriage also has been through the roughest storms of both summer and winter, and has been able to negotiate all kinds of conditions of roads, both city and country, through mud and snow, the only thing that ever stopped it being an artificial drift, and that only after the carriage had climbed it high enough to raise the wheels off the ground. The drift was peaked, and lengthwise of the road. Consequently the automobile will take you under all conditions and circumstances.

WATCH THE LITTLE THINGS.

Watch the little things and the big breaks will never happen, and you can make all your repairs in the stable and not be harassed by an interested but rather sarcastic street mob. The question of tires has come to more than one. I have used my present tires seventeen months—the ones that came with the machine were very faulty, and the ones sent to replace them were very much worse. In eighteen months I have worn out four rear and two front tires—the ones now in use being fairly well worn. My mishaps have been a broken pump, due to lack of lubrication—my fault; the tearing out of some teeth from the differential during a sudden, enforced stop, and a hot connecting rod box, due to choked oil tube. My experience with graphite, thinned with good oil, so that it could be forced into all bearings, has been most satisfactory.

The strange thing to me about my experience with my second carriage is that the very same things are happening to it that happened to my old carriage when I got it, viz., ignition bad, on account of batteries and too much cylinder oil. But the tires are all right. My second carriage is very fine and capable, and will do the work, but has a shorter wheel base and is narrower, which makes high speeds, even moderate speeds, impossible over anything but the best of roads. This carriage will have a longer body and running gear later, and will then be an ideal gasoline rig, and, in my opinion, satisfy every requirement for every kind of work. I cannot speak too highly of the new carriage, except as to

the length of wheel base. Detachable tires are very preferable to single tubes.

BILL OF REPAIRS.

Repair bill to date, 18 months.....	\$133.77
Tire bill to date.....	71.46
<hr/>	
Total	\$205.23

My effort has been to give facts, and in a very limited time, because this is gripe season. I have jotted the above facts down with the hope they may be of use to some one.

FOUR YEARS' EXPERIENCE WITH ONE MACHINE.

Our readers are familiar with the writings of Dr. Henry Power, Upper Montclair, N. J., one of our valued contributors, who has had an unusual experience upon the road. His deductions will therefore be read with attention. The anti-freeze solution he gives may help many a user of gasoline carriages out of a quandary.

It is now a little less than four years since I gave my order to the manufacturer for my first and only motor carriage.

Four months later I went to a town in central Massachusetts and received the finished product. As I look back I am forced to smile as I think how like a child with a new toy I was. How perfectly happy, how immensely superior to mankind in general, how cock sure I could show the makers how such a carriage should be run. Oh, the verdant greenness of the entire picture! With a great show of wisdom I had decided that what small amount of practice I required I would obtain in the 200 miles, more or less, that lay between me and New York. With a passenger I started at about 4 p. m., and with the full intent of taking dinner, a little late perhaps, at Hartford, 28 miles off. That night at 11 found us on our way scant 7 miles, glad to run the d— thing into a shed and go to bed in a disreputable little village tavern, and without more dinner than some very old, cold meat and a lump of cheese. Well, this is not exactly what I started to write about, but let it go if only to establish a fellow feeling in the reader's mind, for have we not all "been there!" I presume your readers would, if I met them, ask much the same questions that are put to me each day by those I talk with at the clubs, or among my patients, or when "broken down" on the roadside. I am glad to say I can note a great improvement in the kind of questions I have to answer now in comparison with three years ago. At that time the most common question was, "Where is the parade at!" so impossible did it seem to the average mind that such a carriage could be anything but a show. Later on I could count on hearing, "Quite some machinery into it, ain't there?" This when I had stopped "to look at something."

Well, time goes on and the same machine still runs. Many new parts have taken the place of old ones, many old parts have been thrown aside and the work done by a markedly different method. Perhaps the most frequent question I am asked is, How much does it cost in comparison with a horse? First, to clear the ground, I must say that the average horse owner does not have any idea how much his yearly outlay amounts to.

For convenience of comparison I will set the items down in parallel columns. Thus we have on both sides the various items. It will be noticed that I do not in either case

count the first cost, but prefer to consider that under the head of annual interest and deterioration of the property.

TABLE OF COMPARATIVE COST.

MOTOR CARRIAGE AND RE- QUIREMENTS.		HORSE AND REQUIREMENTS.	
1st. Interest at 6 per cent. on first cost of carriage.....	\$90	1st. Interest on first cost of carriage	\$18
2d. Deterioration of same.....	150	2d. Deterioration of carriage..	30
3d. Interest on first cost of suitable building for same	6	3d. Interest on cost of horse..	12
4th. Deterioration of same.....	10	4th. Deterioration of same.....	40
5th. Repairs (tires, &c.).....	100	5th. Harness and its deterioration	6
6th. Oil, gasoline, &c.....	50	6th. Repairs to carriage and sickness bills of horse...	30
7th. Attention, washing, &c.....	25	7th. Shoes	30
		8th. Feed, attendance, &c., as provided by livery stable	240
			<hr/>
	\$431		\$406

I have here assumed that the owner of the motor will himself attend to the minor adjustments, repairs and introduction of supplies and oil. I have also supposed that the horse owner will do without a driver.

We see so far, then, that the cash outlay is slightly greater for the motor than for the horse, &c. There is, however, one more item which is difficult to compute, but which without doubt throws the balance far the other way.

I allude to the far greater amount of service rendered and adaptability of the motor carriage. Thus, when time presses, one can move with double the rapidity of the horse, and this without harm and without reducing its capacity for further immediate activity. For while it is true that a horse can go 50 miles in a day he must do it in his own time, at his own pace and must stop at the correct time to feed, &c. Beyond this he must rest the next day, or two even. The elasticity of the total daily output is also shown in the other extreme. Thus I go each year for a holiday, and during the time I am away I am at no expense for maintenance; there is no wages to pay, no horse to put out to grass and feed. During times of sickness the same is true. Only two nights ago my carriage stood out of doors all night and half the next day without being looked at even; yet when I wanted to go on to my next case I was started in only a few minutes. I here refer to the night of January 19, when the snow fell and the thermometer was below 10.

I am often asked what degree of skill is required to keep my carriage in order. I do not think the problem too difficult for the average man, but he must expect to learn by experience. It has been a common thing with me in the past to take half an hour to find out exactly what was the matter, and then five minutes only was necessary to put right the offending part. Perhaps one of the most difficult things to do correctly is the selection of a carriage. I can only say that you can best be guided by the most honest man you know if he has had real and ample experience. Above all do not trust your own judgment in the matter, as the problem appears in a most warped and unnatural form to the novice, and you, my dear friend, are not the exception. I am myself well satisfied that the gasoline explosive engine is the best for this purpose, the liability of water supply to freeze in the steam engine being alone enough to make it impossible for it to give me the service I require.

ANTI-FREEZE FORMULA.

My cooling water jacket has in it a solution of glycerine and water, about 27 per cent. glycerine and 80 per cent. water. This mixture will not freeze and does not require to be removed at any time. Simply keep the required amount in

the tank as evaporation takes place. The mixture now in my tank has not been removed once during the last two months and is still doing good work.

Avoid a machine that makes much noise. To determine this take it up a steep, long hill.

Remember that a light machine is stronger than a heavy one if each is equally well proportioned and constructed. Cannot a grasshopper stand more activity than an elephant?

Other things equal, that machine is better which is more simple, and there is nothing but loss to be had from the addition of parts. For first one must pay for them, then keep them in order and then replace them.

To return for a moment to the matter of cost. Upon the basis of an average of eight miles each day in the year I find my total cost per mile is about 6¾ cents. I may say that I think eight miles a day is well beyond the average for a pleasure carriage and not far from 75 per cent. of the average for business purposes.

LEARN YOUR MACHINE.

A prominent physician and surgeon residing in a city of central New York has the above advice to give the beginner who would have as satisfactory an experience as his has been.

As the automobile has now nearly completed its experimental career, the question of its real worth as a vehicle forcibly presents itself to an interested and inquiring public. During the past year a great number of automatic vehicles have been used both for business and pleasure. It cannot be denied that the element of pleasure has been fully demonstrated by hundreds of enthusiasts who have found solace and an agreeable pastime never before dreamed of.

My odometer tells me I rode 1,500 miles in my steam carriage last year. I therefore feel that my experience may possibly be of some benefit to those who have yet to learn the intricacies of automobilism. Last June I took my first ride under the guidance of an experienced chauffeur. After a few days I was allowed to handle the throttle and steering bar. When put in this responsible position I assure you I felt somewhat timid, and when I got the machine under good headway I turned in my toes and hugged the seat with a tenacity that would do credit to a greenhorn taking his first ride in the cab of a rapid locomotive. A short experience entirely cured this timidity, and replaced it with confidence that was a gratifying contrast to my former condition.

I find the steam carriage in many respects preferable to the horse; the expense of maintenance is very much less; it is not consuming anything when not at work; with good care it does not perceptibly age; when in use it is under perfect control, and can be used in any reasonable weather. We cannot say as much for the horse. He must be constantly fed whether he works or not. If he "feels his oats" he is not always under control, and may dump his driver into the ditch or somewhere else, or he may run away and maim or kill someone. In short he is a cause of constant care, anxiety and expense to his owner. The steam carriage, when not in use, ceases to draw on the pocketbook or cause the least apprehension as to its health. I do not go so far as to say that the horse is soon to be put out of business, for he has proved himself too useful an animal to be so ruthlessly cast aside and ungratefully forgotten. He will be used long after our day for work and duty that steam or electricity can never profitably accomplish. During my career of over

thirty years as a practitioner of medicine and surgery, I have constantly used horses, but from my comparatively short experience with the latest vehicular evolution I feel that I never again will return to the horse, excepting, possibly, for an occasional saddle ride.

When I leave my machine at the door of a patient's house I am sure to find it there on my return. Not always so with the horse; he may have skipped off as the result of a flying paper or the uncouth yell of a street gamin, and the expense of broken harness, wagon and probably worse has to be met. The throttle of the steam wagon can be securely locked and be made "fool proof," thereby preventing any possible interference by the over curious meddler.

OPPOSED TO RACING.

I am strongly opposed to racing and fast driving; 10 miles an hour on country roads is a safe and comfortable speed for any well disposed chauffeur. When we know the capacity of a machine, what is the use of trying to prove it to everybody that may come along? In crowded city streets a much less speed is highly desirable for all concerned.

To beginners I would say: before you attempt to ride in your automobile—with a driver or alone—learn the machinery perfectly, even to the minutest details; learn what this and that are for, and how to correct them if anything should go wrong. You will then have confidence in yourself after you shall have been shown how to run it. The reason so many get discouraged with their first attempts to use the automobile is that the above suggestions are not carried out.

From what I have learned, theoretically and practically, concerning the automobile, I am fully convinced that it is destined to become, in the near future, the vehicle par excellence of the medical profession.

THE ELECTRIC CARRIAGE IN CITY USE.

Dr. Hutchinson, a prominent physician of Brooklyn, N. Y., and an esteemed contributor of *THE HORSELESS AGE*, has used an electric runabout for about two years, and furnishes us with the following items regarding its cost of maintenance and operation.

The original cost of the vehicle was \$700, a very low figure. Two sets of positive plates have been used in two years, and the battery repair bills per year have amounted to \$60 to \$80. A set of front tires cost \$16 and a set of rear tires \$20. The annual cost of tires is about \$30, and the annual expense of repairs to the carriage work, painting, etc., amounts to about \$50.

The total repairs have been \$160. Quite a little repair work was done by the doctor, which is in part allowed for in this figure.

The cleaning and care taking has cost \$96 per year, and the charging current \$7 per month, making \$84 per year. The total cost of operation he therefore estimates at \$180 per year. Dr. Hutchinson charges from his own plant, which has been described in a previous issue of the *HORSELESS AGE*.

The nominal mileage of the vehicle is 20, but it dropped to 12 miles in two months—a loss of capacity of 40 per cent. The doctor thinks that \$40 of the repairs should have been borne by the manufacturer, these having been made necessary by imperfect workmanship.

He has also used a steam carriage for about six months. The repairs in this time have amounted to \$15, not including renewal of ball bearings, feed water coil in muffler and pilot

burner attachments. He thinks that this carriage is too lightly built for physicians' use.

COMPARATIVE COST OF HORSE AND ELECTRIC CARRIAGE.

The following figures showing the comparative cost of the horse and the electric carriage are furnished by Dr. Hutchinson. It should be stated, however that the doctor has fitted up a charging plant of his own, and has devoted a good deal of his own time to repairs, care of battery, etc.

Board of horse per year.....	\$270
Repairs to carriage and other expenses.....	50
Total	\$320
Storage and care taking of electric carriage per year.....	\$96
Charging current.....	84
Repairs and renewals of battery.....	80
Repairs to vehicle and tires.....	80
Total	\$340

SIX MONTHS RUNNING.

Another Brooklyn physician interviewed bought a gasoline carriage last summer and ran it about six months. Owing to certain troubles with the motor, the company took back this carriage and sent him one of later design, which he has had for some time without experiencing further trouble, as the particular points which were the cause of trouble in the first carriage have been improved in the later type.

The original cost of the carriage was \$1,000. The total cost of running it six months was \$75.

USES THE HORSE STILL FOR HEAVY ROADS.

A physician practicing in one of the suburbs of New York has used a gasoline carriage for two winters, having bought his first machine in 1898, and another one in 1899. His bills of repairs to August, 1900, had been \$194, and from then up to the present \$46—plus \$14 for a set of new wheel rims. The care and keep of a horse per month comes to \$60, while that of an automobile is only \$10. The automobile is, however, he thinks, not a complete success on heavy roads and in mud, and he will use a horse hereafter when the roads are heavy.

THE PIONEER PHYSICIAN-MOTORIST.

The first physician in the United States to make regular use of an automobile in his practice was Dr. Carlos C. Booth, 230 North Phelps street, Youngstown, Ohio. In 1895 he designed and had manufactured the gasoline automobile represented here. So far as convenience and economy were concerned he reports that it was a success, but as it was the only one in the city at the time it occasioned such a commotion among the horses that after eighteen months of continuous use the doctor abandoned it and returned to the horse, which he has since used. Several local business men are about to purchase automobiles, however, and as soon as they do, and he has some one to share the responsibility, the doctor says he will purchase one.

With his vehicle he states that he could climb a grade of 17 per cent, and go through six inches of mud. He believes in electricity for level cities and gasoline for hilly places.

STEAM VERSUS GASOLINE.

Dr. George T. Cushman, Roxbury, Mass., has had considerable experience with both a steam and a gasoline vehicle in his practice. In a recent interview in the Boston

Transcript he gives the preference to the gasoline carriage for his work, as it is less care for the operator, doesn't "blow off" and frighten horses, doesn't freeze up, and can go further without renewing supplies. The steam carriage, he believes, is at present better adapted to smooth roads and parks.

MOTOR LUNCH WAGONS.

Thomas H. Buckley, president of the T. H. Buckley Night Lunch Wagon Company, Worcester, Mass., which recently absorbed the United States and New England Lunch Wagon companies, is going to build motor lunch wagons. He will equip his lunch wagons with steam engines and believes in a few years the horse will not be a considered a factor in moving lunch wagons. At a recent meeting of the stockholders of the company a semi-annual dividend of 4 per cent. was declared on \$1,000,000 worth of stock.

ELECTRIC PATROL WAGON.

The police board of Hartford, Conn., recently voted \$3,000 to be expended for a steam carriage to serve as a patrol wagon. The Springfield Motor Vehicle Company submitted plans to the board of a 12 horse power steam wagon with a maximum speed of 20 miles an hour, and running 40 miles before requiring to recharge its supplies. The cost of running is estimated at 2½ cents per mile. An electric wagon was finally ordered of the Electric Vehicle Company.



THE PIONEER DOCTOR'S AUTOMOBILE.