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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are sharp, the articles short, and the facts authentic, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

INTRODUCTORY.

The rise and growth of the automobile industry forms one of the most striking chapters in the remarkable mechanical development which has taken place in the last two generations. In some respects this development has been absolutely without a parallel, as witness both the remarkably short space of time in which the automobile has grown from the first crude conception to its present highly developed condition, and the unprecedented rapidity with which the industry has assumed proportions of the first magnitude. The steamship and the railroad required several decades to reach the mechanical completeness and financial and industrial importance which have been achieved by the automobile in just as many years.

The year 1901-1902 is likely to rank as one of the most important in the history of the automobile in America, and this for the reason that in no previous year was there evidence that the automobile industry was destined to assume proportions of the first magnitude. At the close of 1901, however, the remarkably successful Automobile Show in Madison Square Garden, in this city, served to demonstrate alike the admirable quality of the machines of American make; the large number and importance of the firms that were embarked in the automobile industry; and what was perhaps most vitally important of all, the thorough awakening of public interest in the automobile as such.

Scarcely have the echoes of that most successful venture died away before the public interest is centered upon another and equally important automobile exhibit which will be held in Chicago on March 1; and in connection with this exhibition, which gives promise of rivaling if not surpassing in importance and results the New York Show, we consider that the time is propitious for bringing out a special automobile issue of the SCIENTIFIC AMERICAN. There is no questioning the widespread public interest in the automobile, and the demand for practical information, not merely as to the construction and manipulation of the machines, but in all the collateral fields which are embraced under automobilism.

And at the outset we are free to confess that it is no simple matter to bring out an automobile number. In the first place, to be successful, it must be entirely without prejudice. From its pages must be rigorously excluded illegitimate and fake enterprises, and only such standard makes must be shown as have stood the test of time and hard usage. From the very first it was realized by the Editor that in a field so vast the choice of subjects would necessarily have to be greatly restricted, and hence it was decided to confine the issue to a description of automobilism as developed in the United States, confining the number exclusively to the description of American machines and the development of the sport and industry as affected by national conditions. Even under such restrictions it was still necessary to exercise a selective choice among the large number of American machines of undoubtedly first-class construction, many of which have had to be omitted simply on the ground of lack of space for their proper treatment. The European automobile does not figure at all in the present issue. There are, furthermore, certain conspicuous omissions which are made for the sole reason that we have so lately given them an elaborate description and illustration in the SCIENTIFIC AMERICAN that it would be superfluous to reproduce them in the special number.

THE AUTOMOBILE ON THE STAGE.

Amid the prospective spheres of usefulness of the automobile in these, the earlier years of its development, probably the most sanguine of its sponsors would hardly have claimed for it any histrionic possibilities; yet it is a fact that the automobile has at last "taken to the boards." In two of this season's most successful

theatrical productions, the automobile plays a not inconspicuous part, and curiously enough it is the "frailties and foibles" of the machine that are selected for emphasis in each case. Thus, in a play known by the classic title of "Beauty and the Beast," some gentlemen burglars make their entrance on an automobile. They are just about to settle down to the practice of their profession, when a policeman's whistle is heard. They make a dash for the machine, which promptly, at the "psychological" moment, refuses to budge. Forthwith they let down the back of the carriage and unload a repair kit (sic) which assumes the proportions of a veritable blacksmith's shop. The repairs proceed apace; tires, sparking devices, motor, and every conceivable end of the machine being attacked in turn. The only manifest result is that the harmless-looking carriage emits steam, smoke, and gas, until it develops into a positive infernal machine, finally rending asunder and blowing up with every conventional element of realism.

In one of the latest society plays running at another New York theater, the whole of the first act is supposed to take place in Central Park. Here the hero and his wife are discovered in a crippled victoria. While the chauffeur is repairing a broken controller, a friend of the wife's enters with a broken bicycle and a sadly dilapidated costume. The rescue comes in the shape of a natty little electric runabout, occupied by an opportune gentleman friend who extirpates the party from their plight. The runabout shows the electric vehicle at its best, and it is skillfully introduced on the scene to bring out the contrast between the reliable electric and the supposedly more ponderous and costly, but more uncertain gas-driven machine. Not to be outdone by melodrama and the society play, comic opera has also called in the automobile, and one of the most popular comedians of the New York stage is nightly assuming the role of a dashing chauffeur.

The burglar, the distressed heroine and the comedian have been duly presented on the boards. Surely the next thing in order in theatrical automobilism should be an up-to-date melodrama, with a real race for life or freedom in two powerful machines. Such an act could be produced with comparative ease; for the much more difficult horse-race has been successfully staged, and there is no question that such a race would be a very decided novelty.

SPECIAL FEATURES AT THE CHICAGO SHOW.

The automobiles exhibited in Chicago this week will have all the improvements that are likely to be put on the various types this year. During the last three months the manufacturers have been doing their utmost to get out new designs and novelties for the March Show, as on the merits of their machines at this time depend in large measure the orders for a year ahead. All the improvements that experience has demonstrated are necessary have been put on the new models, and the fortunate possessor of a 1902 machine should have less difficulty in getting about without breakdowns than he had with the automobile of a year ago. Some of the machines which lack of space has kept us from describing, but which have many points worthy of mention, will be found noted in brief below.

The Friedman Automobile Company's new gasoline runabout has several novel features in the way of a friction disk transmission and an arrangement for starting the motor from the seat. A new form of spark plug consisting of two separate plugs, each inclosing an insulated wire, is used on this machine, the claim being made that it is not so easily short-circuited as the regular type. The motor of the double cylinder opposed type is placed crosswise of the vehicle. The Friedman machine can be seen in New York at the store of the Spalding-Bidwell Company.

The Toledo steam carriage of the International Motor Car Company has an interesting piece of mechanism in the form of a single throttle lever, which it is only necessary to move backward in order to reverse the machine. A special water-tube boiler of original construction is also employed.

The Automobile Equipment Company, of Chicago, show four sizes of Acme steam engines in operation. Boilers, burners and Moore automatic steam air and water pumps will also be shown working. Besides well-known makes of spark coils and batteries, including the Hydra double cell, the company expect to surprise the public with a new gasoline engine igniter that requires no electricity whatever.

The Brown-Lipe Gear Company, of Syracuse, exhibit several different models of their spur gear differentials. Patents have recently been allowed on this new form of equalizing gear, which has obvious advantages over the old style bevel gear type, and has given general satisfaction during the year it has been on the market.

The R. E. Dietz Company, of New York, furnish most of the automobile lamps that are used by the trade when a simple and substantial lamp is desired. Their lamps are constructed on the tubular principle, the air for the burner being

brought down from above through air passages, so that no matter how hard the wind blows this air is undisturbed and will not affect the flame.

Eastman metallic bodies for automobiles are to be seen in the Eastman booth. The metallic body offers many advantages that have not been seized upon by the American as rapidly as by the French manufacturer, who makes use of them frequently because of their lightness and indestructibility.

The new Locomobile touring car is furnished with a gasoline pump attached to the engine for the purpose of pumping the gasoline into a small receiving chamber, where it is kept under pressure and from which it goes to the burner. This does away with the necessity of pumping up air pressure in the gasoline tank, as a few strokes of a hand pump will supply sufficient pressure to start, after which the engine keeps it up.

The Auto-bi of the Buffalo Automobile and Auto-bi Company is one of the most practical motor bicycles on the market. Mr. Thomas, of this company, has had considerable experience in building motor bicycles, and the product of the new concern can be depended upon to be of the very best quality throughout.

The Prescott Automobile Company's steam carriage has been still further improved in appearance since last November by the addition of a neat dashboard to the folding box seat in front. Double-acting brakes are now fitted to the rear wheels, thus relieving the compensating gear of many strains and preventing skidding. The water level is automatically controlled in the boiler, and an improved lighter for the burner has been added.

A PRACTICAL AUTOMOBILE TOURING OUTFIT.

BY HROLF WISBY.

Quite naturally touring has become a favorite pastime with those who patronize automobilism not as a fad, but as a healthful, pleasurable sport—a class of automobilists by the way that is constantly increasing, not only abroad but also in this country. In spite of the wretched condition of American roads, the successful long distance trips made by Arthur J. Eddy and a number of less-known chauffeurs have shown that extended touring in the United States is not only possible but probably more fascinating because of the additional obstacles that are continually presenting themselves to be overcome. In the vehicles also the demand for improved touring types can readily be seen, even by inexperienced eyes, in the effort of the leading makers to produce a machine especially adapted for touring. Nearly all the standard 1902 models include a distinct touring type, and some of the largest manufacturers have made such types their specialty. The tendency in this direction has thus far had a beneficial influence, both in Europe and this country, on the style as well as on the utility of the product. By dropping the racing requirements and centering all their mechanical ingenuity on the production of touring types, in which comfort and convenience must take precedence over the speed feature, automobile makers have at length succeeded, in the 1902 models, in turning out several types of touring vehicles that are decidedly superior to what was offered as a touring vehicle twelve months ago. At the present time nothing so emphatically shows the rapid advance in automobile construction as the particular development of just this class of carriage. Bodies have become lower, wheel bases have grown longer, stouter and smaller wheels have taken the place of comparatively high wheels, and the consequent changes in the vehicle proper have been such as to afford more space for the feet, an easier seat, a handier position of the manipulating devices, and increased storage capacity not only for liquid fuel but for such luggage as may be necessary to make touring convenient and agreeable.

The proper vehicle is, of course, the most important consideration in a complete touring outfit, but now that such machines can be had at a comparatively moderate price, the difficulty of getting them at all has been reduced to the problem of selecting the best one. There are other items to be considered, however. There is really no such thing on the market as a practical automobile touring outfit. Nobody makes it; nobody sells it, and yet there is an unprecedented demand for it by experienced auto-tourists, that is, those who have tried to coax pleasure out of touring without the proper outfit to make it agreeable. Such veterans generally set about making their own outfits, but many wearying experiences may have to be suffered before they possess an outfit that is complete without being unwieldy.

Everyone is familiar with the black leather clothing worn by most chauffeurs. For all-around use this is the proper and most practical clothing, and for long trips it is the only kind which has been found to be convenient and satisfactory.

Such leather clothing is usually made from calfskin, but the very best grade obtainable is invariably taken from the hide of the kangaroo—the skin being more pliable, and on account of its rather oily substance it will shed rain a good deal easier than calfskin. The latest style leather clothing is lined, not with corduroy,

but with a strong, thick flannel, especially manufactured for this use.

The proper automobile cap, with an extra long face-mask and goggles combined, and a pair of earmuffs, ought to keep any head comfortable during fast going on cold days. The hands are best protected by fleece-lined buckskin gauntlets with cuffs wide enough to take the sleeve and hold it in.

As a rule the novice chauffeur will do a great deal of thinking to make his initial tour a success, and generally he returns to his starting place—unless the railroad carries him—finding that he has been doing his most sagacious thinking on the wrong side of the problem. He thought of rain storms and took a mackintosh with him; he thought of a scorching sun and provided himself with a monster Panama hat; he thought of cold feet and added a footbag of furs to his inventory. Now, as a matter of fact, a mackintosh is a most irritating kind of garment when automobiling in a rain-storm. It has a tendency to fly up over the knees, interfere with the quick handling of levers, and is invariably stepped on or torn, on leaving the vehicle hurriedly. Between a kite and a Panama hat for automobiling there is but little choice, only a difference in the time elapsed before it flies off. Nothing equals a footbag for overheating the feet, and ensnaring them in such a way that if you leave the vehicle in a hurry, you are pretty sure of striking the ground head first.

In place of the mackintosh, which only affords partial protection, get a seaman's suit of oilskin clothes, which is sure to protect you completely under the most adverse weather and road conditions, while it is out of the way all of the time. Several of the contesting chauffeurs in the great New York-Buffalo Endurance Trial were only too happy to exchange their insufficient and impractical outer garments for an oilskin jacket, a pair of trousers and a so'wester to match.

Instead of the fur bags or similar contrivances for keeping the feet warm during the cold season, it is advisable to dress the feet so comfortably that they will be able to retain their natural heat even in frosty weather. The men employed in the ice-harvesting business on the Great Lakes have solved this problem in a very thorough manner. Adopt their footwear and you need never bother with furbags, soapstones and such cumbrances. Briefly described, this footwear consists of a coarse, heavy-soled rubber, laced boot, into which is slid a sort of thick felt stocking reaching to the knee. The leg is thrust into the felt stocking. This arrangement affords a rubber covering to fight off dampness, a felt shell to fight off the cold, and a trouser-leg and a pair of woolen stockings to retain the heat of the limb. Heavy woolen or flannel underwear under a sporting suit and a heavy-weight sweater ought to give comfort, especially when a corduroy-lined leather coat is the outer garment.

Furs are not advisable for long-distance touring, whereas they yield much comfort during a few hours of driving, and suggest an air of style not obtainable with more sensible clothing. Furs could be made preferable as an all-around winter garment if we would but learn from the Eskimos how to ventilate fur clothes, but there is no indication that we will ever take the hint.

During the summer season, instead of the ubiquitous Panama, the Japanese palm-leaf sun-hat will be found more practicable, since it will not fly off during the swiftest pace. The regulation auto cap, of extra light stock, would be the ideal headgear, if such caps could be had with the sweatband constructed in the same manner as that of the English army sun helmet—but hatters have yet to dream of this. A khaki suit with trousers cut on the cavalry order, so as to permit of canvas gaiters or leather leggings on the legs, would be one of the most practical things for summer wear.

Next in importance to practical clothing comes such luggage as the chauffeur may care to take along, either for his personal comfort or for camping by the roadside. The best of sportsmen in Europe are already beginning to patronize the "camping-out" idea.

To fit out an automobile for a long continuous tour, camping by the roadside, is equivalent to making the machine your nomadic home for the time being. There is nothing impracticable about it, for when a soldier is able to carry on his back his entire camp outfit in addition to his weapons, the smallest automobile on the market ought to carry everything needed to make its passengers comfortable in camp.

Breakables should be avoided entirely. Things that may be duplicated in any country store should not be given space unless "unknown regions" are to be invaded. Combustibles are to be discountenanced. A canvas tent on the military order with a folding center pole will house two people in good shape. A rubber air-mattress furnishes the best possible resting device. It is easily and quickly inflated, and can be rolled snugly to the size of a man's arm, taking up but a minimum of space. It is the best protection against ground moisture. An air cushion for a headrest, and an army blanket for bed covering, complete the camp bed. Before going to bed, be sure to lock the manipulating devices on your automobile so that no one may

appropriate the carriage while you sleep. You might also place a good six-shooter under your pillow. You will sleep just as well, and it might come handy. When you make up in the morning, your breakfast is, or ought to be, in the basket you are carrying with you strapped to the stern body of the vehicle. Most of the basket outfits made for touring are most adorable objects of admiration, fit almost for a jeweler's showcase, but when you come to use them on the road your fancy is made to take many a sad shock. A better auto basket than any of those retailing from fifty to two hundred dollars can easily be improvised for a small amount of money. A wicker basket of the size of a small steamer trunk will do. Have a water and dust-tight cover of rubber made to fit it snugly with leather mounting on the corners. Arrange straps on the inside of the lid to hold several plates, forks, knives, cups, saucers, etc., together with the necessary cooking utensils for making meals readily and conveniently. All such utensils should be of aluminium. A moderate supply of spices and groceries may be packed in a wooden box so as not to be mixed up with the other contents. If the tour is through a hunting or fishing region, the chauffeurs ought to be able to supply their own "table" by some skill with the rod and the gun. In fact, this would give a genuine zest to the entire undertaking, and afford the intrepid sportsman a solid feeling of having gone to the bottom in the matter. If the tour is through populated country districts, most of the camping is likely to be done in village inns, while the cooking, in such a case, would be entrusted to the inn-keeper's "chef." To make an automobile camping trip a success you must choose an out-of-the-way route that will compel you to camp out and "do" yourself.

Something that is almost always invariably overlooked in making up an outfit is a supply of drugs, medicines and plasters. Accidents are liable to happen in a hundred unthought-of ways, and sometimes minor bruises and scars from slipping or falling become quite annoying from not being attended to promptly. A man not accustomed to use his hands for manual labor is practically doomed to hurt himself more or less during a long-distance trip involving the going into camp nightly.

A canvas folder with pockets for various-size bottles, boxes and rolls, containing drugs and medicines, would in the majority of cases be found to be of practical use.

The personal effects of two passengers could easily be packed in two portmanteaus, as all that is needed, besides the clothes they are continually wearing, is changes of underwear and stockings, handkerchiefs, extra pair of shoes, and such little extra items as the taste of the chauffeur may fancy and the season of the year may require. The point should be to take along as little as possible and yet be comfortably fitted out.

Having followed this outline in the main the intending auto tourist should take special care in packing his outfit. Careless packing will make the most ingeniously chosen outfit sound like a barrel of tin cans. Everything needed can be packed in three pieces. First, the rubber-covered basket. Pack the rubber mattress, tenting, and the blankets in that to prevent rattling of the eating and cooking utensils. Second, the portmanteaus with clothing, medicine, etc. Third, a canvas-incased rod and gun strapped together, and put in a cylindrical leather case with rubber covering.

AUTOMOBILE NOTES.

A motor exhibition will be held in Copenhagen from April 11 to 27 next.

Italy's King has passed an examination before the Commissioners of Police and has been granted a license to operate his vehicle within the limits of the Eternal City.

It is said that Fournier, the celebrated French chauffeur, received \$50,000 for the use of his name alone, without services, in the recent incorporation of an American company bearing his name.

Entries for the international blue ribbon event of the year will this year be confined to English and French machines. Several American firms had expressed an intention of entering vehicles but failed to do so.

The Automobile Club of America will inaugurate the next summer's campaign with a 100-mile endurance run and mile and kilometer time trials. No date has as yet been set for the "carnival," which will consume two days.

An honest enemy has at least the respect of his adversary. San Francisco boasts of an association of stable and carriage owners, and at a recent meeting the members came out flat-footed with a resolution to the City Council asking that body to forbid the use of the public parks to self-propelled vehicles!

An evidence of the growth of the automobile industry in this country may be had from the statement that the repair and disposition of second-hand vehicles has become a most important part of the business of every dealer. As was the case in the palmy days of

the bicycle, wealthy automobile operators "trade in" their old machines each year for new ones of the latest pattern.

Those in charge of Cleveland's parks have no non-sensical notions regarding self-propelled vehicles. The privilege of operating lines of public conveyances therein is let out annually to the highest bidder, and the powers that be have intimated that they would prefer to have automobile service.

American automobilists entering Canada from the United States in their own vehicles may now do so duty free. The regular duty of 25 per cent is still assessed as usual when crossing the boundary line, but it is returned if the vehicle recrosses the frontier within six months. A full description of the machine, together with a statement of the probable time it will remain in the country, must, however, be filed with the customs authorities.

An automobile tire of the single-tube pneumatic type that is meeting with much favor has the tread "armored" with vulcanized rubber. This armor is in four parts, its central portion being supported by a core of pure rubber, side pieces of slightly vulcanized rubber supporting the core, the whole being incased in an outer covering of tough, thoroughly vulcanized rubber. The feature of this tire is that, despite the fact that it is practically non-puncturable, it still retains all the resiliency of an unarmored tire.

An interesting instance of the application of the automobile principle to commercial uses is given in the outfit recently furnished by the Electric Vehicle Company, of Brooklyn, N. Y., to the Hall Safe Company, of the same city. A heavy truck supplied with three motors—two of which drive the rear wheels, the third used for hoisting safes—makes possible a great saving of time and labor in the work of installing heavy receptacles for valuables. A comparison of the utility of the new scheme with the former plan of installation shows that in placing a 4-ton safe on the seventh floor of a building but three men are required as against eight, and but 6½ minutes are necessary as against 2½ hours.

A punctured tire is rendered a practically negligible quantity by the combination pneumo-cushion tire of F. W. Skinner, of Valley Falls, R. I. A transverse section of this tire shows an inner air chamber taking up about half the space within the tube, the outer or tread portion having its inner face (resting on the covering of the air chamber) shaped like an arch, the center of this arch being hollow. This and the space on either side of the crown of the arch form a cushion which protects the inner pneumatic section from puncture unless the penetrating object be quite long and the angle direct. This combination of the pneumatic and cushion principles is said to possess all the resiliency of the average pneumatic tire designed for heavy automobile use.

One of the inconveniences connected with the operation of a gasoline vehicle is the necessity of starting the motor from the outside by means of a crank. Among the various devices to obviate this, that of Walter Mitchell is not the least meritorious. Keyed on the motor shaft is a hub having a ratchet face that can engage with corresponding teeth on the hub of a disk that supports a spiral spring. This hub and disk are free to turn on another hub extending into it from the right and having at its right side a face that is adapted to engage a friction clutch keyed to the shaft. The engaging of the friction disk with its corresponding male member, and moving the spring disk and the teeth on its left and longitudinally on the shaft are done by means of a clutch lever. Longitudinal separation of the hubs of the two disks is provided against by a pin or pins in the one engaging an annular groove in the other—the two disks being thus left free to revolve independently. One end of the spiral spring is fastened near the periphery of the spring disk and the other (inner) end to the hub of the clutch disk. On the peripheries of both the spring and clutch disks are ratchets which are engaged by spring pawls connected with the clutch lever. When the clutch disk is revolved by contact with the friction clutch it coils up with the spring, the spring disk being held stationary by engagement of the ratchets with the spring pawls, whose outer ends are immovably connected with the vehicle frame. When fully wound up the friction clutch is disengaged and the spring pawl prevents reverse rotation of the clutch disk. The parts remain in this position in readiness for use. When it is desired to start the engine the clutch lever is moved to cause the toothed ratchet on the hub of the spring disk to engage the ratchet on the hub that is keyed to the shaft. This hub has an inclined face that causes an arm on the spring disk to release the pawl that holds this disk against revolving. The release of this permits the coiled spring to act directly on the shaft and to throw the engine over, compressing the charge, until one or two charges have been exploded, when the engine is in operation.