SOME AMERICAN MOTOR CARRIAGES.

This is an age in which it is not safe to deride any forecast in mechanics, so that the prophecy, now often made, that in the near future the clatter of the horse's hoof shall no longer be heard on the fashionable driveways, and that the noiseless bicycle and the pneumatic tired wheels of the motor carriage shall reign supreme, while undoubtedly exaggerated, still holds true to a certain extent.

In the early part of the century there was a period of development of steam carriages, but at that time there were no such favorable conditions for success as those which surround the experimenters of to-day, as the roads were bad and only steam was available as a motive power. But since that time not only has road making been reduced to a science, but the cumbersome motor wagon and engine has given place to the steel framed pneumatic tired vehicle, and various forms of light motors have been devised, actuated by one of the many products of petroleum or by steam, gas or electricity.

In 1894 a great impetus was given to the automobile carriage by a competition organized in Paris by the Petit Journal. The course was from Paris to Rouen, 75 miles, and the prizes amounted to 10,000 francs. Fifteen competitors took part in the race, which occurred in July. The best time made was 5 hours 40 minutes. The gasolene motors, as usual, made the best showing in the contest. On June 11, 1895, occurred another race in France, for prizes aggregating 40,000 francs. The course was from Paris to Bordeaux and return, a distance of 727 miles. Sixty-six horseless vehicles competed, and the best time was made by a petroleum carriage, which made the entire journey in 2 days and 53 minutes, or at the rate of 14 9-10 miles an hour. With a laudable attempt to awake widespread interest in the motor vehicle in this country, the Chicago Times-Herald offered prizes last July aggregating $5,000. We have already published full particulars of this contest, which occurred at an unfortunate time of the year as regards the weather, so that the results obtained were not as valuable as they would have been had the race occurred earlier in the season.

It is gratifying to note that there will also be a race in this country in May. The Cosmopolitan Magazine offers $3,000 in premiums to be awarded to motor carriages presenting the greatest number of points of excellence as exhibited in a trial trip to be made from the New York office of the Cosmopolitan, City Hall Park, on Saturday, May 30 (Decoration Day), 1896, to the Cosmopolitan building at Irvington, and thence back to the starting point.

The award will be made upon the following points, the maximum being 100; speed, 50; simplicity and durability of construction, 25; ease in operating and safety, 15; cost, 10. Entries must be sent to the office of the Cosmopolitan before May 1. The names of the judges will be announced in the March issue of the Cosmopolitan.

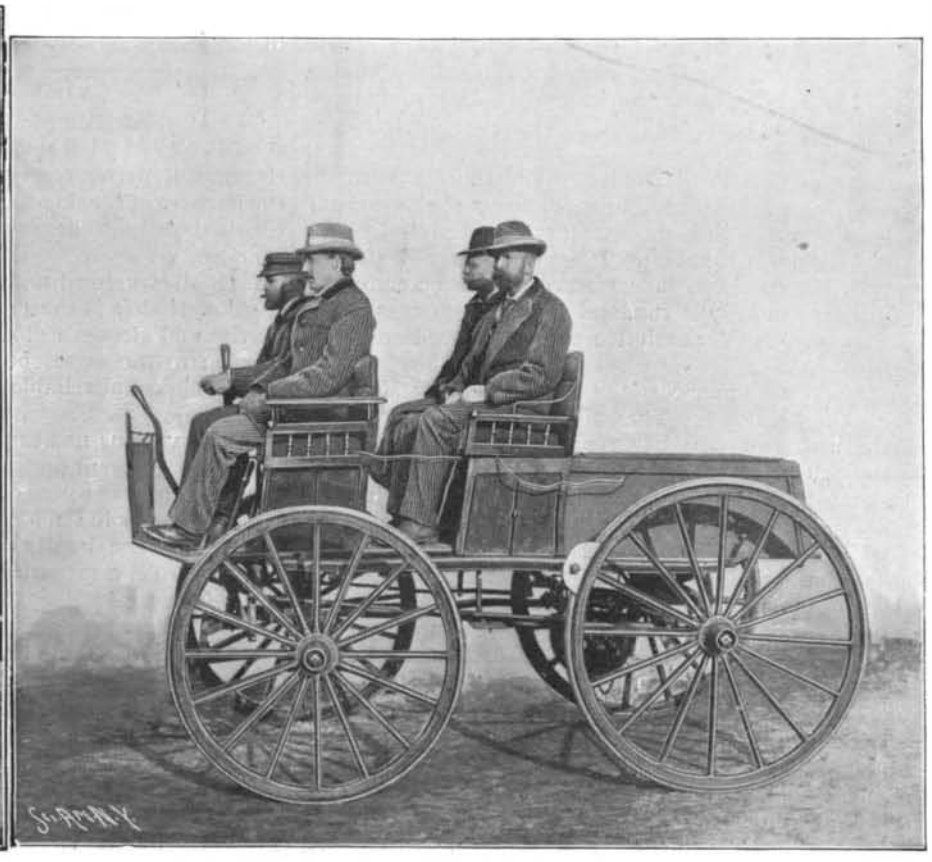
AMES' STEAM CARRIAGE.

MORRIS & SALOM'S CRAWFORD WAGON.

We present illustrations of four American built motor carriages, some of which have been very successful. Mr. Harold Sturges, of the Sturges Electric Motocycle Company, has devoted attention to the electric motor vehicle for some three years, and he had a carriage on exhibition at the World's Fair. The carriage which we illustrate was originally a three seated sulky for six persons, weighing 2,750 pounds in running order, but the third seat was removed, so as to give increased space for the batteries, and the wheels, which were formerly provided with steel tires, are now provided with solid rubber tires. A new motor of the Lundell type has been placed in it. We understand that the manufacturer is now engaged in constructing a new carriage. The vehicle shown in the engraving has four wheels, the front wheels being 3½ ft. and the rear wheels 4 ft. in diameter. In the body are thirty-six storage battery cells, with a capacity of 250 ampere hours. These batteries actuate a three horse power motor and the power is transmitted to the axle by single reduction gears. The carriage has a speed of three to ten miles per hour on good roads, and the storage batteries enable it to travel about seventy miles on a hard level road without recharging. In the Chicago Times-Herald race, the condition of the roads was such that the wheels of the Sturges carriage slipped very badly in the six inches of snow, and nearly double the usual power was exerted, so that the carriage traveled with the speed of only 4¼ miles per hour, the batteries becoming exhausted after a run of thirteen miles. The Sturges machine received an award of $500 for the showing made in the road race.

Although the Morris & Salom "Electrobat" did not attempt to run over any great part of the course of the Chicago Times-Herald race on last Thanksgiving Day, it was still awarded the great gold medal by the judges for pre-eminence, because of the following points of merit. The award of the judges states that the medal was given "for best showing the official test for safety, ease of control,

HERTEL'S GASOLINE CARRIAGE.



STURGES' ELECTRIC MOTOR WAGON.

absence of noise, vibration, heat or odor, cleanliness and excellence of design and workmanship." The carriage which took part in the race presents a handsome appearance, and at first sight it resembles some new kind of surrey. As no machinery is in sight, with the exception of the steering lever, this motor carriage is free from the criticism which is generally passed on horseless carriages, that they look more like a box of machinery than a pleasure vehicle. The other carriage, which is shown in the engraving, seats two, and is what is known as a "Crawford wagon." The wheels of the prize winner are of wood, and are of the usual construction, except that they are fitted with pneumatic tires and ball bearings. The driving or front wheels are 40 inches in diameter, and the rear or steering wheels are 38 inches in diameter. The steering is accomplished by turning the rear wheels parallel with each other from a point about three inches inside of the plane of the wheel, and they are connected by a rod to a vertical lever at convenient height, which is operated from the front seat of the carriage. Although at first sight it might be supposed that steering from the rear might be more difficult than steering from the front, yet, as a matter of fact, it is found not to be the case, as the carriage can be moved in any direction desired with great certainty and can be completely turned around in a circle of 20 feet in diameter. The batteries are furnished by the Electric Storage Battery Company, Philadelphia, Pa., and consist of four sets of twelve cells each, having a normal capacity of 50 ampere hours per cell. They are grouped in boxes and so arranged that they can be readily and quickly pushed in place inside the body of the carriage, all of the connections being made automatically. The carriage is driven by two Lundell motors of nominal one and one-half horse power capacity. Each is attached to the front axle with pinions on the armature shafts, gearing directly into the driving gears attached to the front wheels. The weight complete with the batteries is 1,650 pounds. It is said that on good roads a maximum speed of twenty miles per hour can be obtained. The capacity of the battery is sufficient to run the carriage from twenty-five to thirty miles on one charge. The carriage shown in the engraving is of lighter build.

By far the lightest motocycle among those which were present at the contest of November last was the gasoline carriage of Max Hertel, of 103 West Monroe Street, Chicago, Ill., as the motocycle weighs only 220 pounds and seats two people. Although this carriage did not take part in the race, it was awarded a prize by the judges of the Times-Herald motocycle race of $100 for a device for starting the motor from the operator's seat in the vehicle.

The vehicle is built on the lines of the bicycle, the frame being constructed of seamless steel tubing and the wheels have tangent spokes, ball bearings and pneumatic tires. The carriage is driven by a double cylinder gasolene motor of special construction, which weighs only 100 pounds and which develops two horse power at full speed. The power from the motor is transmitted to the rear wheels by means of friction gearing, which does away with all belting, chains, and sprocket wheels and insures an easy and almost noiseless running vehicle. The motocycle is guided and controlled with the aid of two levers. One lever stops and starts the motor, connecting it with the vehicle and disconnecting it, changes the speed and gear and sets the brakes, all with a simple forward and backward motion. The other lever is used to steer the carriage. The reservoir holds enough gasoline for a fifty mile run, and the cost amounts to less than one cent for each five miles traversed on a level road.

The Ames steam carriage was devised by Mr. A. C. Ames, of Chicago. The boiler is of the Scotch type, the heat from the burners passes under the shell of the boiler and passes out by forced draught with the exhaust. The fuel used is gasolene, and the burners are so arranged that one is controlled by the operator, while the other is controlled by the steam pressure or by hand as desired. When the carriage is stopped, the steam pressure rises rapidly and cuts down the flame of the burners, and when the pressure drops the supply of gasolene is again increased. The feed water passes through a heater inside the boiler jacket. The engines are fastened on the lower part of the bicycle frame and are coupled to the treadle shafts by means of crank pins. The engines are of the oscillating type and the diameter of the cylinder is 1¾ in., stroke 13 in. The trunnions are of cast iron. The weight of the entire vehicle when ready for a run is only about 400 pounds.

An Industrial Exposition in Brazil.

An exposition representative of the industries of Brazil is now in progress at the capital, Rio Janeiro. It is said to afford proofs of material progress in manufactures, particularly in the growth of small industries in the different provinces. The Rio News says: "It will be a revelation to many to find that there are so many industrial establishments in the country."

Artificial Monstrosities.

Prof. J. A. Ryder, of Philadelphia, says Dr. Eugene Murray-Aaron in Popular Science News, has recently made research of some length into the methods by which the Japanese have produced the race of double-tailed gold fish, Carassius auratus, which are such favorites with fanciers and the owners of aquaria in this country; and, incidentally, he has also called attention to some very interesting facts of a like nature regarding other allied vertebrates. The experiments of Weber, proving that the eggs of the common pike could be caused to produce double monstrosities if the recently fertilized eggs were violently shaken, were the initial discoveries that have led to the present doubling from a single yolk. This fact is known to our fish commissions, and great care must at first be used to prevent the almost entire production of monstrosities by rough handling.

More remarkable still is the conclusion reached by Von Ihering that certain armadilloes normally produce several young from a single fertilized egg. Dr. Ryder is inclined to regard the double-tailed gold fish as "the actual realization of an eight-limbed vertebrate," a thing most contradictory of our present basis of animal classification. These fish have been produced in Japan, he concludes, for at least two centuries, and they there command high prices among the wealthy classes, the finest or most abnormal variations being in great demand. By taking the eggs of the normal species of gold fish and shaking them, or disturbing them in some way, the Japanese get double monsters, some with double heads and a single tail, and some with double tails. Naturally the complete double monsters would be unlikely to live, while those with only the duplication of the tail, having the problem of life in no way complicated for them, would be quite likely to survive. These monstrosities, being selected and bred, would in all probability hand onward the tendency to reproduce the double tail, which in time would become fixed and characteristic, if judicious selection were maintained by interested breeders, as has been the case with the many breeds of dogs, horses, fowls and pigeons.

Barfurth, experimenting upon tadpoles, has found that duplication of the tail in them has much to do with the manner in which it is removed. For example, if the tip of the tail were snipped off exactly at right angles to the axis of the body, the tail was regenerated of the normal form and straight backward. If removed at an acute angle, regeneration took place, so that the new tip was directed either upward or downward, according as the inclined, regenerated cut surface looked upward or downward. These facts cannot be dismissed as useless in connection with the problem of inheritance in general; for while, as we rise in the scale of organization, the tendency to regenerate lost parts becomes more restricted, the tendency to produce monstrosities due to disturbances of development remains in full force, as is illustrated by the disposition to reproduce extra toes in the cat, the same tendency hereditary in the Dorking fowl, or even the disposition to reproduce extra thumbs or toes in the human family.

Timber Supports.

The American Association of Railway Superintendents, Bridges and Buildings, says the Architect and Contract Reporter, recently appointed a committee for the purpose of considering the strength of bridge and trestle timbers. The committee came to the following conclusions:

1. Of all structural materials used for bridges and trestles, timber is the most variable as to the properties and strength of different pieces classed as belonging to the same species, hence impossible to establish close and reliable limits of strength for each species.

2. The various names applied to one and the same species in different parts of the country lead to great confusion in classifying or applying results of tests.

3. Variations in strength are generally directly proportional to the density or weight of timber.

4. As a rule, a reduction of moisture is accompanied by an increase in strength; in other words, seasoned lumber is stronger than green lumber.

5. Structures should be, in general, designed for the strength of green or moderately seasoned lumber of average quality, and not for a high grade of well seasoned material.

6. Age or use does not destroy the strength of timber, unless decay or season checking takes place.

7. Timber, unlike materials of a more homogeneous nature, as iron and steel, has no well defined limit of elasticity. As a rule, it can be strained very near to the breaking point without serious injury, which accounts for the continuous use of many timber structures with the material strained far beyond the usually accepted safe limits. On the other hand, sudden and frequently inexplicable failures of individual sticks at very low limits are liable to occur.

8. Knots, even when sound and tight, are one of the most objectionable features of timber, both for beams and struts. The full size tests of every experimenter have demonstrated not only that beams break at knots, but that invariably timber struts will fail at a knot, or owing to the proximity of a knot, by reducing the effective area of the stick and causing curly and cross grained fibers, thus exploding the old practical view that sound and tight knots are not detrimental to timber in compression.

9. Excepting in top logs of a tree or very small and young timber, the heart wood is, as a rule, not as strong as the material further away from the heart. This becomes more generally apparent in practice in large sticks with considerable heart wood cut from old trees in which the heart has begun to decay or been wind shaken. Beams cut from such material frequently season check along middle of beam and fail by longitudinal shearing.

10. Top logs are not as strong as butt logs, provided the latter have sound timber.

11. The results of compression tests are more uniform and vary less for one species of timber than any other kind of test; hence, if only one kind of test can be made, it would seem that a compressive test will furnish the most reliable comparative results.

12. Long timber columns generally fail by lateral deflection or "buckling" when the length exceeds the least cross sectional dimension of the stick by 20; in other words, the column is longer than 20 diameters. In practice the unit stress for all columns over 15 diameters should be reduced in accordance with the various rules and formulas established for long columns.

13. Uneven end bearings and eccentric loading of columns produce more serious disturbances than usually assumed.

14. The tests of full size long compound columns composed of several sticks bolted and fastened together at intervals show essentially the same ultimate unit resistance for the compound column as each component stick would have if considered as a column by itself.

15. More attention should be given in practice to the proper proportioning of bearing areas; in other words, the compressive bearing resistance of timber with and across grain, especially the latter, owing to the tendency of an excessive crushing stress across grain to indent the timber, thereby destroying the fiber and increasing the liability to speedy decay, especially when exposed to the weather and the continual working produced by moving loads.

Prize Offered for a Fuse Design.

The Verband Deutscher Elektrotechniker is offering a prize, consisting of a diploma and $75, for the best device by which mistakes, such as placing the wrong size fuse in fuse terminals, and the interchanging of fuses except by authorized persons, shall be rendered impossible. The standard sizes of lead fuses adopted by the Verband at its last annual meeting are to be employed. These, according to the Electrical Engineer, are:

Amperes.	Distance between centers of fuse terminals in inches.	Diameter of terminal screw in inch.
50	2·8	¼
100	3·2	5/16
400	3·8	3/8
1,000	4·4	½

The designs are to remain in every respect the property of the individual, and must be sent in not later than April 1, 1896, addressed to the Verband at 3 Monbijouplatz, Berlin, N., and marked with a motto. The result will be made public at the next annual meeting of the Verband.

Blast Furnace Charges as Lightning Conductors.

Repeated instances are said to have been noted in Germany of lightning flashes, instead of being attracted by the lightning conductor on a blast furnace chimney, taking the charge of the chimney itself as a conductor, and passing down through the furnace charge, through the pig bed and into the earth, without doing any damage. It is said that this has occurred several times at one furnace, where a good conductor extends above the top of the chimney, the explanation being that a column of smoke containing much water and carbon dust extended up to a considerable height, and thus furnished a better conductor of electricity to and through the charge itself than was afforded by the outside conductor.

His Collar Exploded.

William Benjamin, a brakeman on the Erie Railroad, caught a spark on the back of his celluloid collar as his train entered the station at Hillsdale, N. J., January 2. The collar took fire and exploded with a loud report. Benjamin seized the collar with both hands and tore it from his neck. He was burned severely on the face, neck and hands. He was taken to a drug store, where his wounds were dressed, and later was taken to his home in New York. He will be disabled for some time.