### THE MOTOCYCLE RACE.

The motocycle race for prizes aggregating $5,000, which were offered by the Chicago Times-Herald, and which was to have occurred November 2, was postponed until November 28, Thanksgiving day, at the request of eighteen makers, who had not been able to put their machines in readiness.

In the recent Paris-Bordeaux race it was necessary to postpone the race from its original date, and the contestants had seven months in which to get ready; the same was true in the Paris-Rouen contest; so it is not surprising that American inventors, who only had three months in which to perfect their carriages, should be somewhat behind-hand.

It was decided, however, to have a run over the course on Nov. 2, for a purse of $500, to be divided between those who covered the entire route to Waukegan and back, 92 miles, within the time limit of thirteen hours, but owing to an accident to the Duryea machine the Benz wagon had no rivals, and the judges awarded the prize to H. M. Mueller, of Decatur, Ill. Two carriages only entered the contest—the Benz motocycle, owned by H. Mueller, and the Duryea carriage, made by the Duryea Company, of Springfield, Mass. Crowds began to form along the Midway Plaisance as early as seven o'clock, and at 8:15 the two carriages started. The crowd was then so dense that the police had some difficulty in forcing the people back so as to make room for the motocycles. The two Kane Pennington motocycles arrived five minutes later and were sent across the line. Mr. Pennington announced that he did not care to compete in the special contest, but would make a run over the boulevard and across to Lincoln Park. Both the Duryea and the Benz vehicle had slight accidents before the outskirts of Chicago were reached. All Waukegan turned out to view the novel spectacle. The Benz wagon entered Waukegan at 2:40 P. M.; the motor was there replenished with gasoline and ice was dumped into the box above the motor to cool it, and in seven and one-half minutes the wagon was ready for the home stretch.

At Prairie View, one mile from Half Day, the Duryea wagon was going at a good rate along a narrow road; a little ahead of it a farmer was driving his team. In response to the whistle of the Duryea carriage the farmer determined to give up his right of way; he made a mistake, however, and turned his wagon to the left instead of to the right. The motor wagon ran to the left at the same time that the farmer swung around his horses. Mr. C. E. Duryea grasped the situation at once, and rather than have a collision he preferred to take chances with his machine, which was run down into a ditch at the side of the road. The motor wagon was disabled and out of the race, and Mr. Duryea had it hauled to the nearest railway depot and transported to Chicago. A large crowd was waiting to see the Benz carriage finish. At precisely 6:43 P. M. it stopped in front of the Grant monument and Judge Somers called out the official time of the finish. The judges then examined the motor carefully, and received a statement from Mr. Mueller of the delays he had experienced. The official statement of the judges is as follows:

The number of miles actually run was ninety-two. The gross time taken by the Benz motor in traveling this distance was 9 hours and 30 minutes. The start was at 9:13 yesterday morning and the finish at 6:43 in the evening. In making the run the only time delay allowed by the judges under the rules and conditions of the race was for stops at grade railroad crossings, where trains might temporarily block the way. The Benz machine lost seven minutes through this cause. The judges therefore corrected the running time from 9 hours and 30 minutes to 9 hours and 22½ minutes. This will be the official record of the length of time occupied, showing an average speed of approximately 10 miles an hour.

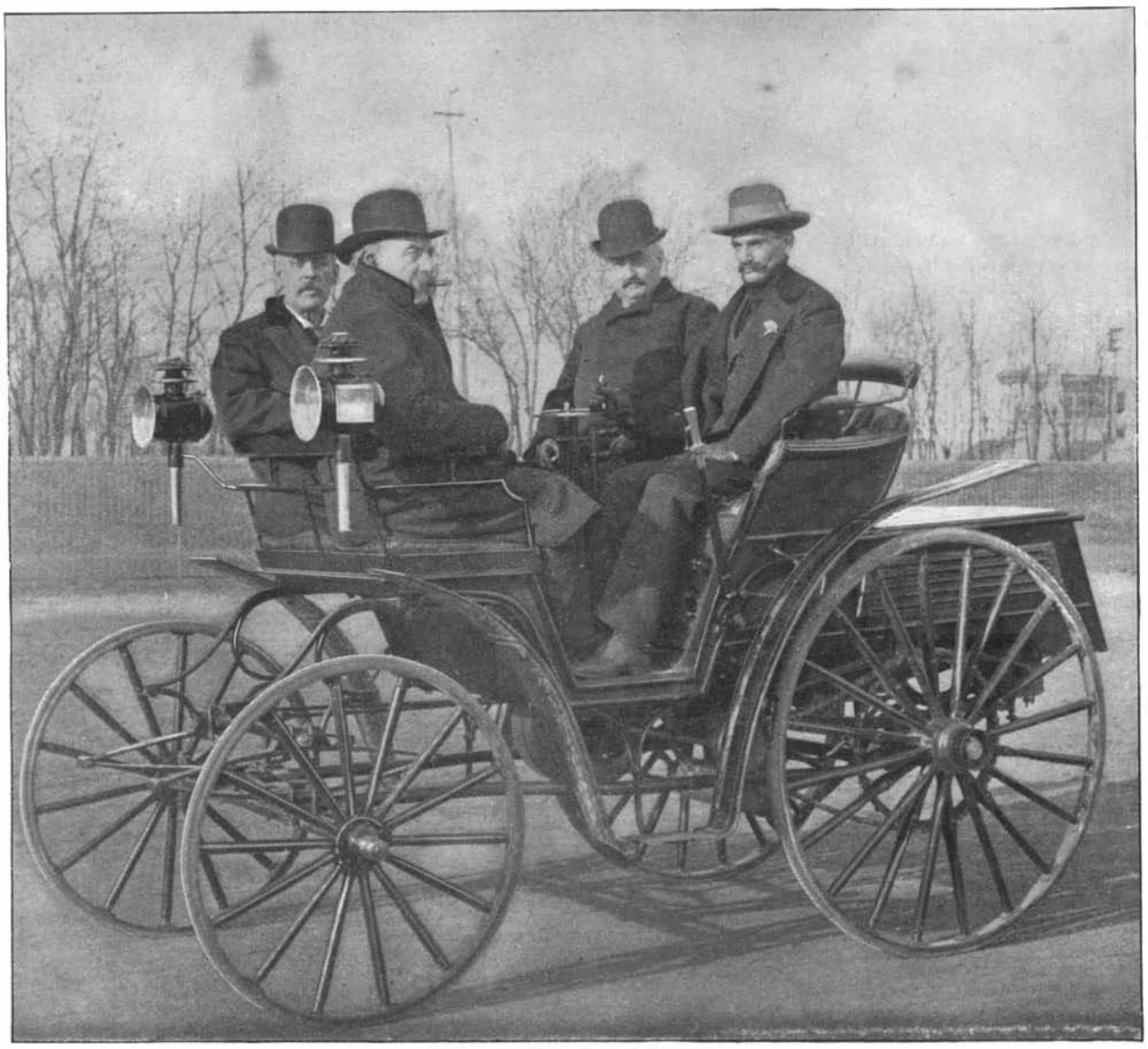
But the machine lost other time than that at grade crossings. Its total loss of time was forty-six minutes, making its real running time for the entire distance 8 hours and 44 minutes. The time losses enumerated were: By sparking machine, 2; by loss of tire, 7; adjusting tire second time, 3:30; by sparking machine, 2:30; taking water, 4; by sparking machine, 3:30; lost road by fault of bicycle guides, 4; taking supplies at Winnetka, 5; taking supplies at Waukegan, 7; loss at grade crossings, 7:30; total, 46.

The total consumption of gasoline for the ninety-two miles was 5⅛ gallons, representing an expense of less than $1. The result of this preliminary contest shows that a great interest will be taken in the race on Thanksgiving day.

MORRIS AND SALOM'S ELECTROBAT.

We present an engraving of Mr. Mueller's Benz motocycle, which won in this preliminary race. The wagon was made under the Benz patent, and was imported from Mannheim, Germany, in May, and has since been in constant use. The motor is built on the same plan as all the Benz motors. The principle is that of the gas engine; crude gasoline is used, and the gas generated from it is exploded by an electric spark. It carries four passengers and is controlled by a person sitting on the rear seat. In Germany, the Benz motor wagon is very popular, and not long ago Emperor William, of Germany, rode on one from Maxau to Lauterberg, a distance of fifteen miles, in 35 minutes, an average speed of 2 minutes and 20 seconds per mile. Director William Esswein, of the Bavarian railroads, owns two of the Benz wagons, one with a top and one without, so as to be prepared for all kinds of weather, and travels in them 60 miles a day, going to business from his house at Durkheim, 15 miles from Ludwigshafen, and returning for his lunch. He makes an average speed of 2 minutes and 40 seconds per mile, and has been doing this almost daily for eighteen months.

We also illustrate the "Electrobat," which Morris and Salom, of Philadelphia, who are representing an electric storage battery company, have entered for the great race. They have coined the new word "electrobat" to describe their machines and give them a distinctive name. The termination, "bat," is derived from the Greek word "bainein," "to go." In the large "electrobat" which we illustrate, for they have entered two carriages, no machinery of any kind is in sight with the exception of the steering lever; the carriage seats two, but is arranged to have another seat on the back. There are two Lundell motors of nominal 1½ horse power each, attached to the front axle, and pinioned on the armature shafts, geared directly into the driving gears attached to the front wheel; 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 connected by a rod to a vertical lever of a convenient height to be operated from the front seat of the carriage. It can be turned completely around in a circle of twenty feet in diameter; the wheels are of wood and are fitted with pneumatic tires and ball bearings.



THE BENZ MOTOCYCLE.

The front wheels are 40 inches in diameter and the rear or steering wheel is 28 inches in diameter. The batteries are furnished by the Electric Storage Battery Company, of Philadelphia, and consist of four sets of twelve cells, each having a normal capacity of fifty ampere hours per cell. The controller is operated by means of a small hand wheel. There are four speeds ahead and one backward, which are obtained by various groupings of the batteries and motors in series and parallel. It is said that the carriage has a maximum speed

of twenty miles an hour on good roads, and the capacity of the battery is sufficient to run the carriage for twenty-five miles. It weight complete with battery is 1,650 pounds.

Remarkable evidence of the widespread and growing interest which is felt in the development of automobile conveyances was afforded at the exhibition of horseless carriages by Sir David Salomons, at Tunbridge Wells, England, on October 15. The exhibition brought interested spectators from London and all parts of the country. The number of vehicles shown was not large, but was fairly representative; with one exception all of the carriages were of French manufacture and design.

### Maple Sugar.

In the last issue of the Experiment Station Record, Vol. 7, No. 2, some interesting data are given concerning maple sugar and sirup, which were taken from the New Hampshire Experiment Station Bulletin No. 25. Messrs. A. H. Wood and F. W. Morse reported their conclusions based upon the analyses of twenty-six samples of maple sirup and of nineteen samples of maple sugar. Their conclusions are given as follows:

Experiments in letting sap stand for several days before boiling, filtering sap, and rapid and slow evaporation had no decisive effect on the composition of the sirup.

The sirups from soft maples were somewhat inferior to those of rock maples both in color and flavor.

Boiling the sap did not seem to affect the color of the sirup, but injured its flavor. Sap that was kept five days and then boiled gave one of the lightest colored samples produced.

The rapidity of boiling had little influence on the color, samples of sirup from saps that we allowed to slowly simmer away being as light colored as those from similar saps boiled rapidly.

The lightest colored samples were produced by boiling a quantity of sap until finished, without addition of fresh sap. One sample produced by boiling two quarts of sap in a large glass beaker until it was thick sirup, without addition of sap and without skimming, had little more color than the sap from which it had been made. This sap was from covered buckets, and was thoroughly strained through cloth before boiling.

Sap filtered through quartz sand produced a sirup in no way superior to the preceding, while one filtered through boneblack lost almost entirely the characteristic maple flavor.

Sap mixed with rain water gave a sirup objectionably dark colored.

Dark sugars contained less saccharose and more reducing sugars than light sugars, and had a much lower purity coefficient.

### Photography as a Cure for Drunkenness.

We commend this story to the attention of our temperance contemporaries, "merely adding," as Mr. Richard Swiveller would say, that "if it isn't true, it's very good": "A woman in Salemville, Pa., determined that her husband should know how he looked when he was drunk. She knew how he looked well enough, and needed not that any man should tell her. Her children also knew by sad experience, but the man himself had a very imperfect idea of the state of his case. So once, when he came home and fell into a maudlin slumber, she sent for a photographer to come forthwith, and on his arrival she set before him his work. She ordered the photographer to photograph her husband as he sat in the chair. The photographer did his work, and did it well; and when the photograph was finished and laid beside the husband's place at breakfast it was a revelation, and the sobered gentleman experienced a decidedly new sensation. There was no need of explanation; the thing explained itself. There was no chance for contradiction; the sun tells no lies. There was no room for argument; a reform has taken place."

### Navy Estimates—Captain Sampson's Report.

The annual report of Captain W. T. Sampson, chief of the Naval Bureau of Ordnance, contains an estimate of $6,457,984 for carrying out the plans of the bureau for the fiscal year ending June 30, 1897. Included in this amount are items of $25,000 for arming and equipping the naval militia, $500,000 toward the armament of auxiliary cruisers, and $4,390,204 toward the armament of vessels authorized.

He says: "The wisdom of the department's decision in favor of 13 inch caliber for the new battle ship has been conclusively demonstrated by recent armor tests."

The California Powder Company has succeeded in manufacturing excellent powder for the 8 inch as well as for the 5 inch guns, and is now in a position to make prismatic powder for all calibers.

Relating to the adoption of the Lee rifle as the naval small arm, Captain Sampson says: "The change in the navy caliber from 0·45 to 0·236 will result in a lighter gun, less shock of recoil, almost double muzzle velocity and danger space, more than double penetration, and a more than double quantity of ammunition carried on the person. These are actual results."

### Cements in Mason Work.

A representative of the Brickbuilder, in an interview with Mr. William Peck, of the H. Wales Lines Company, Meriden, Conn., an authority on mason construction, obtained the following information:

"Do you favor the first or second setting of cements for mason work?" asked the interviewer.

"That depends," answered Mr. Peck, "upon the work I have in hand. Generally, however, I prefer the second setting. The truth is that masons very seldom use the first or even second setting of cement, but, owing to their ignorance of the action of cement, generally use it in its third setting. Laborers usually mix up a bed full at a time and temper it as it is used, sometimes once, very often twice; thus by the time it gets into the wall it is in its second or third setting.

"For sidewalks or cement floors I prefer the first setting, as it works better and does not become so spongy under the trowel."

"What do you consider the best mode of putting down cement floors?"

"I think the best manner to do a good job is, first, to have the ground underneath well tamped down and solid; second, to use screens instead of strips to get the proper thickness of cement; third, to have help enough to keep putting down all the time and not have to wait between batches, thereby causing a break or joint between the settings, which is liable to make a crack; fourth, to float the first coat or layer as little as possible, thereby preventing the rising of the sand to the top of the cement, and insuring a good bond between the rough coat and finish."

"What is one of the common errors of contractors?"

"One great mistake they make is in not keeping their walls properly covered during construction, especially in the winter. A few dollars expended for tar paper or canvas and the time required to cover them will often prevent hundreds of dollars' worth of damage by elements, and will not leave a dark streak there when construction is continued."

### New Method of Refrigeration.

Considerable advances have taken place in the last few years of the processes adopted for artificially producing low temperatures, and, as the reports of the various experiments made by Professor Dewar at the Royal Institution have shown, degrees of cold can now be obtained with a facility which a few years ago would have been thought impossible, and such permanent gases as oxygen, nitrogen and hydrogen are liquefied without difficulty. Hitherto the necessary reduction of temperature to the critical point of such a gas, or rather a mixture of gases, such as is contained in the atmosphere, has been effected by the successive employment of liquefied gases boiling at lower and lower points on the scale, the latent heat of evaporation being employed as the medium for abstracting heat from the gas experimented upon, the final decrement of heat being obtained by the rapid evaporation of the liquid product itself. The precise modus operandi has been described at various times in our columns.

By a new process, however, the laboratory methods that have so far been employed for the liquefaction of gases having a very low boiling point appear likely to be supplemented, at all events, in producing such products on a commercial scale. The process, which is the invention of Herr Linde, a man of experience in refrigerating machinery methods, has been described in a recent issue of the London Times.

The new apparatus dispenses with the use of intermediate cooling agents, and relies entirely upon initial compression by powerful engines and subsequent partial expansion of the compressed air under carefully regulated conditions.

Most people probably have seen at one time or another the familiar lecture room experiment of forcing a piston suddenly down a cylinder, and showing the ignition of a scrap of touch paper by the heat thus produced. If while the compression is maintained the cylinder and its contained air be cooled to the original temperature, then, on suddenly withdrawing the piston and allowing the air to regain its original volume, there will be a fall of temperature corresponding to the rise on compression.

If now the cooled air could be used to reduce the temperature of a second quantity of air before expansion, it is evident that, starting from a lower point than the first batch, the second would on expansion reach a lower point.

This is the principle of the new liquid air apparatus. A powerful engine compresses air, which is cooled as far as possible by ordinary refrigerating methods, and passed into a spirally coiled pipe, over 100 yards long. This pipe is inclosed in a second spiral. By means of a valve at the end of the inner spiral a certain proportion of the compressed air is allowed to expand in the space between it and the outer pipe. Thus the stream of air flowing to and also from the pump is cooled by the compressed portion which has been allowed to expand, and arrives in its turn at the valve in a colder state than the portion that preceded it. Consequently it reaches a still lower temperature on expansion, cooling yet more powerfully the advancing stream in the inner tube.

By carrying this cumulative cooling effect sufficiently far the circulating air is at last brought down to its critical point, and liquefies, after which a continuous stream of liquid air is merely a question of engine power. It is impossible without the aid of diagrams to explain clearly how the continuity of the process is maintained, but the cycle of operations can be readily apprehended. There is compression, expansion in a closed chamber and utilization of the cold thus produced to repeat the cycle from a lower initial temperature.

During the process just described the air becomes steadily richer in oxygen until that gas forms some 70 per cent of the product. This relatively pure oxygen is sufficiently good for certain purposes, and it may be further purified from nitrogen if desired. The price of oxygen gas thus obtained compares, it is said, favorably with that produced by the methods now in use. It would have been gratifying (the Times remarks) to have been able to announce that this commercial application of recent scientific ideas, so closely associated with the Royal Institution, had been made in England. But, unfortunately, in this, as in so many other cases, it has been "made in Germany," where there is at present far more alertness and a far higher standard of technical knowledge than among ourselves.

### Wood Pulp Fruit Cans.

Wood pulp fruit cans are among the latest applications of wood fiber to a useful purpose.

The preparatory machinery, the American Wood Worker tells us, consists of a beating engine, for disintegrating the pulp, and a compressed air pump and an engine for pumping the fluid pulp. The soft pulp produced is placed on the fine netting and the moisture driven out by compressed air, the mesh holding the fiber permitting the water to escape. The pulp, while yet in a soft state, is gathered upon a large roller in sheets about 8 × 10 feet square, until about a quarter of an inch thick. It is then cut off the roller and carried up on a canvas carrier to a drying chamber nearly 100 feet long, through which it slowly passes, requiring about ten minutes to make the trip. When the sheet arrives at the other end it is partly dry and may be handled readily. It is placed next between pressing rollers, then shaped into cans about as ordinary tin ones are, the edges being connected with a special glutinous matter. Then the cans are finished off in the machine. This is one way, but it makes a seam. Another mode, adopted later, in which no seam on the side is made, consists in taking the soft pulp direct from the wire netting and moulding it into cylindrical form, about the length of a dozen cans, and keeping it on the hollow tubes until ready for cutting and heading.

### A New Star in Carina.

Dr. Edward C. Pickering announces in Harvard College Observatory Circular, No. 1, that from an examination of the Draper Memorial photographs taken at the Arequipa Station of the Observatory, Mrs. Fleming has discovered that a new star appeared in the constellation Carina in the spring of 1895. On sixty-two plates, the first taken on May 17, 1889, and the last on March 5, 1895, no trace of the star is visible, although on some of them stars as faint as the fourteenth magnitude are clearly seen. The exposures of these plates varied from 10 to 242 minutes. On nine plates, the first taken on April 8 and the last on July 1, 1895, the star appears and its photographic brightness diminishes during that time from the eighth to the eleventh magnitude. This star precedes A. G. C. 15269 (photometric magnitude 5·47) 0·5m., and is 0′·7 north. Its approximate position for 1900 is therefore in R. A. 11h. 3·9 m., Dec. —61° 24′. Two stars of the eleventh magnitude are near the Nova. One is nearly north, 110″ distant, the other is 80″ south preceding.

### Sealing Bottles Electrically.

In a recent number of La Nature, M. A. M. Villon describes a novel method of sealing champagne bottles. The loss and deterioration of champagne due to the escape of gas has long, he says, made some process of perfect airtight sealing desirable. M. Villon accomplishes this by covering the cork and part of the neck with a thin layer of copper electrically deposited. For this purpose the neck of the bottle is coated with a conducting substance such as blacklead, zinc or copper powder, and plunged in a galvanic bath. This bath has a cover of paraffined wood with conical holes, which are lined with copper rings. All these rings are connected among themselves, and with the negative pole of the dynamo, while a copper sheet in the bath is connected to the positive pole. The bottles are simply inserted in the holes, neck down, and when a layer of two-tenths to three-tenths of a millimeter has been deposited the current is stopped. The deposit may be gilt or silvered, or given any desired shade in special baths. The process, of course, can be employed to seal bottles for mineral waters, preserves, and a variety of products.