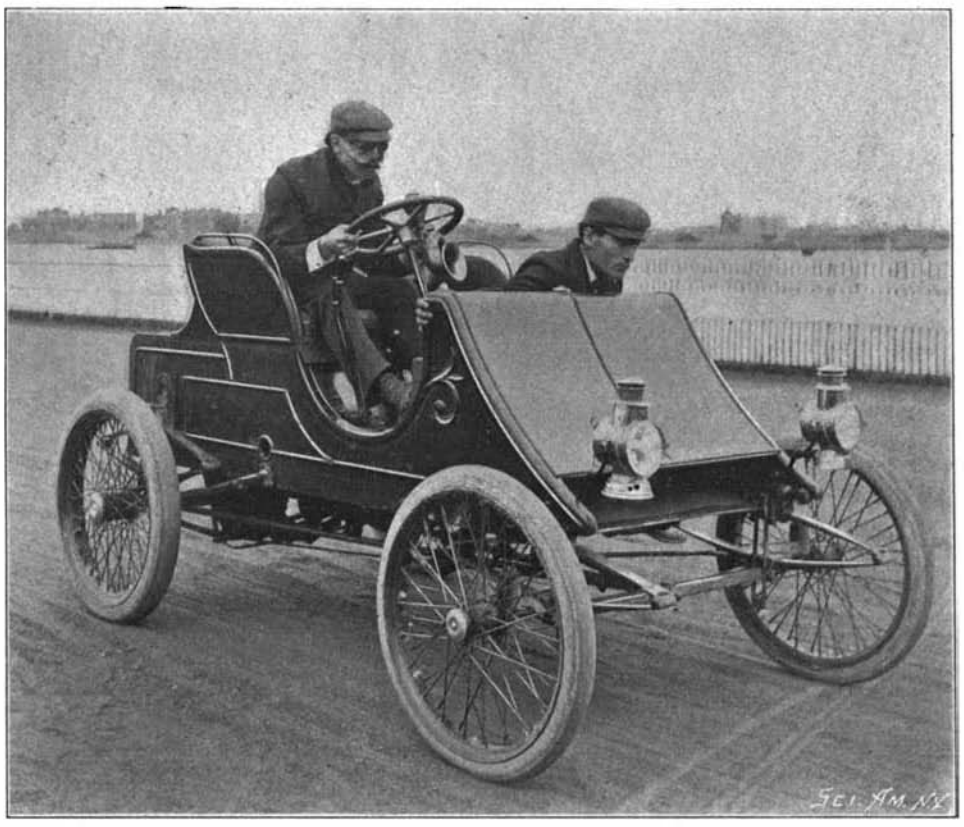
which is bored through the center of the disk. At the upper end of the pipe a hose is attached by means of an inverted U connection (this form being used to prevent cramping), and by this means a stream of water is forced to the under surface of the disk by means of a hydraulic pump. The chain is stopped to the pipe to keep the disk firmly on the nozzle, and the whole apparatus, pipe, hose, chain and disk, is supported from a davit or gaff and, therefore, easily maintained in a vertical position. The disk is lowered to the bottom until it rests upon the sand or other material in which it is to be sunk, when the pump is started. The stream of water, passing through the disk to its under or convex side, loosens the sand and allows the disk with its pipe, chain, etc., to sink into the vertical hole, which is thus continually being washed out as the apparatus descends. The apparatus being supported from a davit in the way described, it is practicable to lower the pipe to the bottom in any depth of water where anchorage may be desired, the pipe merely being long enough to steady the disk in the hole which is bored in the sand or mud of the bottom, and put a disk down from 10 to 30 feet or more below the bottom. When the disk is at the proper depth, the stoppings of the chain are cast off, by releasing a clutch, and the pipe is withdrawn. The disturbed material immediately settles back on the disk and around the chain, burying it firmly in place. It can be readily seen that the holding power of this form of anchorage is enormously greater than that which can be obtained by means of the plow point of an ordinary fluke anchor or the broad lip of a mushroom anchor, whose hold upon the sand or mud is merely superficial.



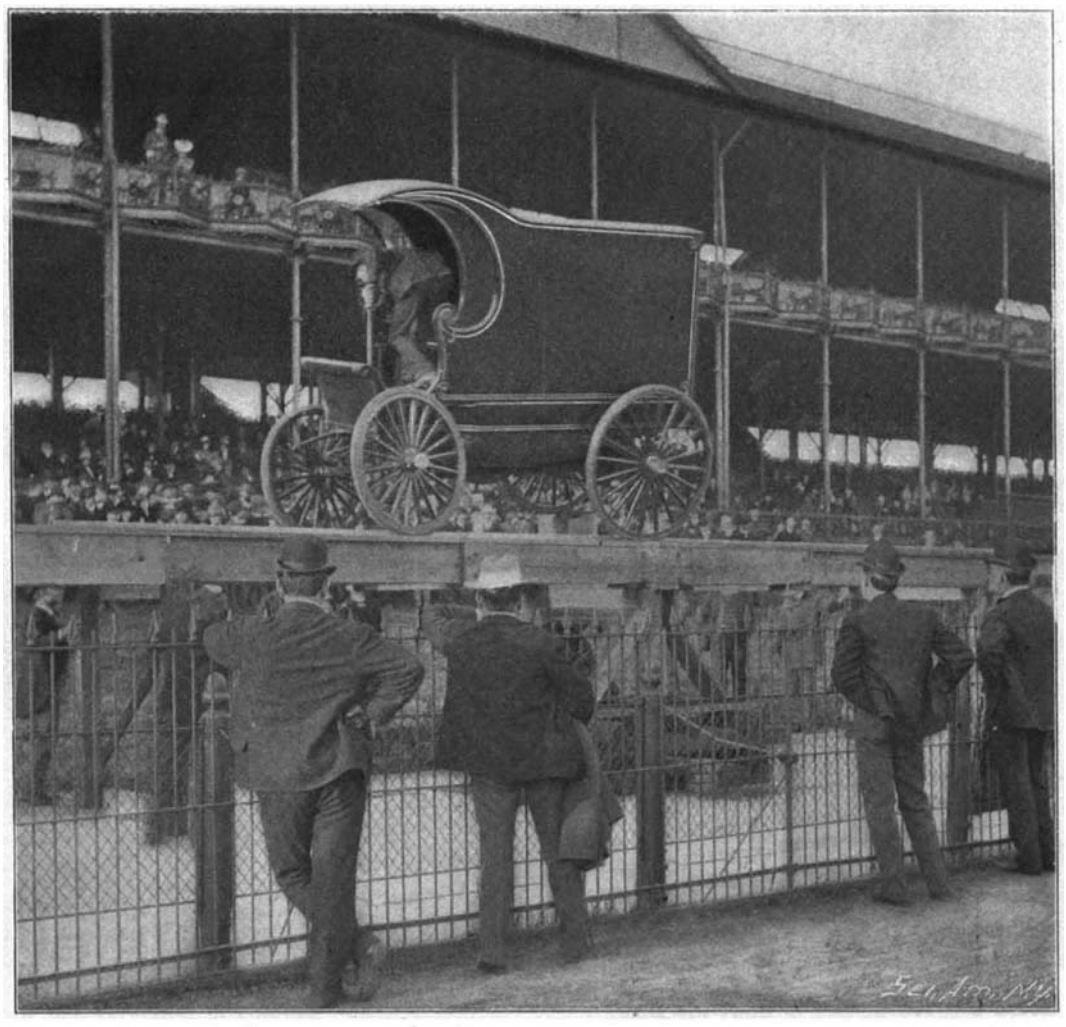
MR. ALEXANDER WINTON IN HIS RACING MACHINE ON THE WASHINGTON PARK TRACK, CHICAGO.

In the gale which visited New York on September 5 last, when the wind attained a velocity of 65 miles an hour, striking evidence was afforded of the efficiency of this form of anchor. It seems that eleven of these disks, which have been sunk in the mooring grounds of the Brooklyn Yacht Club and vicinity, did yeoman service, not merely in holding the particular yachts that were made fast to them, but in saving three or four other boats that had dragged their anchors from being cast ashore. Forty other yachts which were not so secured dragged their anchors of the ordinary type, and were piled up on the beach between Ulmer Park and Fort Hamilton.

It was natural that this device should commend itself to the attention of the Navy and the Lighthouse Board. There are along our coast no less than 44 light vessels and 5,000 channel and coast buoys. The number of buoys that are torn adrift from their moorings every year is such as to warrant the department in investigating every new device that promises to afford a more secure means of anchorage than is at present available. Apart from the financial loss that occurs in the displacement and loss of buoys, which by the way frequently cost several hundred dollars apiece, there is the serious risk to navigation—a much more serious matter. The value of an absolutely secure form of anchorage to the navy is also obvious, for there are many locations where naval vessels can find but poor holding ground for anchors of the ordinary type. Realizing the possibilities of the Langston mooring, the Lighthouse Board and the Navy Department detailed officers to observe and report upon the practical demonstrations of its utility in New York Harbor. The last of these tests was made on September 15, at a point a little distance offshore from the Atlantic Yacht Club house at Norton's Point.

The experiment was carried out with a 12-inch cast iron disk, which was put down through water 18 feet deep, to a depth of 8 feet, in a bottom of sand and clay. The time required from the starting of the force pump until the sinking was complete was 6½ minutes. A ⅝-inch crown chain, 15 fathoms in length, was attached to the disk. The accompanying illustrations show very clearly the action of the water in cutting away the sand and clay below the disk and excavating the vertical shaft at the bottom of which the disk was deposited. The sand, etc., closes in somewhat upon the chain and pipe as the disk descends, but upon the withdrawal of the pipe the discharge of the water loosens the surrounding material sufficiently to allow of the easy withdrawal of the pipe, after which the material closes in quickly and solidly above the disk and around the connecting chain, as shown in the illustration.

Sixty minutes were allowed for the filling in of the hole, which, while it was probably not sufficient for the completion of the process and the thorough settlement of the loosened material, sufficed, as the test afterward showed, for all practical purposes. A new 7-inch hawser was attached to the chain, and 25 fathoms were paid out and made fast to the towing bits of the ocean-going tug "DeWitt C. Ivins," the newest and most powerful vessel of the Moran towing fleet. The tug has a compound engine with cylinders of 15 and 30 inches diameter by 22 inches stroke, and the boiler carries 140 pounds of steam pressure. The propeller, which is 8 feet 6 inches in diameter, was turned at 105 revolutions, and this was subsequently increased to 120, a rate which was maintained up to the conclusion of the test, or for a period of twenty-one minutes. The tug failed to produce the slightest effect upon the stability of the buried disk, and it was the unanimous opinion of the officials who witnessed it that the demonstration was completely successful. Although the holding power of the device is so great, the removal of one of these disks is a very simple matter. The hose is brought into requisition, and a double ring, shaped like the figure 8, is fitted tightly to the lower end of the hose and loosely on the mooring chain, down which it slips. As the pipe descends, the stream of water speedily cuts its way through the sand, opening a way for the pipe, until, guided by the chain, it reaches the disk, which may then be drawn up without difficulty.



AUTOMOBILE DELIVERY WAGON BREAKING AN EGG PLACED ON A BOX, THE WHOLE BEING SUPPORTED ON A TEETER-BOARD.

CHICAGO AUTOMOBILE EXHIBITION AND RACE MEET.

BY ARTHUR T. KELLOGG.

The automobile exhibition and race meet promoted by The Chicago Inter-Ocean, while an interesting affair, fell short of being the success for which the promoters and all interested in automobiles hoped. The exhibitors of complete automobiles numbered twenty, of whom eleven showed vehicles or cycles propelled by hydrocarbon motors; five exhibited electric vehicles, and four steam vehicles. The steam vehicles were all very much alike, not only in general appearance, but in their mechanical construction. All had fire-tube boilers, with about 300 tubes; two-cylinder, single-acting, vertical engines, and burners fed with vaporized gasoline and working on the Bunsen principle. One firm had two racers on the grounds, which showed themselves remarkably speedy over comparatively short distances. Within fifteen yards they would be going at full speed, in contrast to the electrics, which were much slower, and in still more marked contrast to the gasoline vehicles, which took an eighth to a quarter of a mile to attain their best speed. One of these little steam racers was reported to have gone a mile in 1 minute and 6 seconds. This time was not official, however.

The electric vehicles were, by all odds, the handsomest vehicles in the show, judged from the standpoint of a carriage builder. One make is equipped with an electric brake which worked admirably. Another make is notable for having motors which work at higher pressure than that generally accepted as the correct thing. This necessitates the use of more than the usual forty cells to the vehicle, which forty cells can be charged from the 110-volt, direct current circuit, such as is common in the larger cities. The use of a greater number of cells necessitates the use of a booster, or, as the exhibitors preferred to call it, a "motor-generator."

The high pressure automobiles carried off the majority of prizes offered for electric vehicles, thus showing them to be of high efficiency.

The eleven makes of gasoline vehicles differed widely from each other. Almost the only feature common to them all was that they all employed the four-cycle principle in their motors. The speediest vehicles on the grounds—for any considerable distance, at least—were among these gasoline vehicles. Of these, the speediest of all were the little tricycles, all built on the accepted French lines. While these little vehicles were speedy, they proved themselves unreliable.

Among the larger vehicles there was only one machine that made any pretensions to speed sufficiently high to make a showing against the little tricycles, and that was the racer with which Alexander Winton vainly attempted to win the championship of the world in France this past summer. It ran with a commendable consistency, unlike the tricycles, never showing a greater variation than ten

seconds between the fastest and slowest mile in a fifty mile jaunt. This machine covered fifty miles in 1 hour 17 minutes and 50 seconds against 1 hour 15 minutes and 57⅘ seconds for one of the tricycles.

The other gasoline vehicles were of various types. They were designed for use on public roads, and were not equipped with sufficient power or sufficiently high gears to make a creditable showing against the racing machines. One thing was noticeable, and that was the tendency to equip these vehicles with motors of higher power than is ordinarily needed, and of regulating the speed of the vehicles, principally through controlling the speed of the motors by varying the amount of the explosive charge and the time of firing that charge. This, of course, does not permit the motors to work at their highest efficiency except during a small portion of the time. Almost all were equipped with reducing gears to facilitate hill climbing and progress over exceptionally bad roads. The road-going qualities of these vehicles are attested by the fact that two made the journey from New York to Chicago on their own wheels and two others made the trip from St. Louis to Chicago in the same manner.

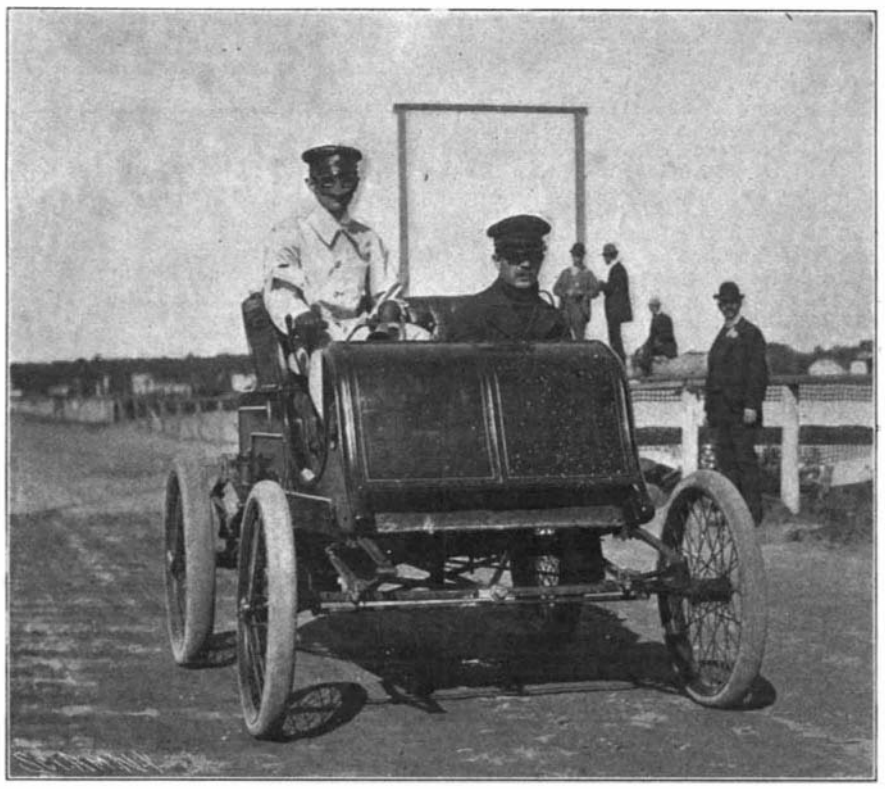
There was one make of gasoline vehicles exhibited that performed some remarkable feats, designed to impress the spectators with the perfection of control which has been obtained. These feats consisted in climbing the grades, in turning and maneuvering in remarkably close quarters, in wandering over a three-foot pile of loose timbers, and in performing a number of feats on a "teeter board." This teeter board consisted of a number of stout timbers spiked together so as to form two runways twelve inches wide. These two were braced together at a proper distance to accommodate the gage of the wheels, and were laid over a stout support, some eight feet high. With one end of this teeter resting on the ground and the other high in air, the vehicle would start up the incline, stopping at the center in such a position as to balance the teeter.

After the vehicle had played "see-saw" all by itself for a while, stevedores would put supports under either end of the teeter, a roller would be placed under one of the rear wheels of the vehicle, and it would be driven back and forth within such narrow limits as to keep the wheel on the rolling piece of wood. Then a ten-inch cube of wood would be substituted for the roller, and the vehicle would be made to climb back and forth over it, or to stop with the wheel in apparently impossible positions. To cap the climax, the vehicle would be backed over the block of wood and lowered until it was just close enough to the teeter board to crack the shell of an egg placed by an attendant, without doing more damage to it. All these feats were performed in the presence of hundreds of spectators. The vehicle is equipped with a powerful motor and friction transmission. In climbing grades the steam and gasoline vehicles showed themselves capable of overcoming grades of from 25 to 40 per cent. None of the electrics attempted a trial on the artificial grades.

In the races none of the electrics entered for any contest of more than five miles in length, and the steam vehicles—the little racers, at least—could not be dragged into an event of more than ten miles in length. In a five mile contest between road machines the three types of vehicles were all represented for the only time. An electric led for two miles, when it was passed by a steam runabout, which held its lead to the finish, although being rapidly overtaken by the electric at this point. The steam machine started with a steam pressure of 225 pounds and finished with 25. The electric, which was gaining at the finish, was not going within ten per cent as fast as it did in the earlier part of the race, showing that the consumption of current had been considerable. This was largely due to the heavy condition of the track. The two gasoline vehicles were far in the rear, but were going as fast, or faster, at the finish than in the early part of the race, and could have kept the same gait for fifty to a hundred miles more.

THE TRI-STATE FAIR AUTOMOBILE RACES.

The mile track at Guttenberg, N. J., was the scene of most interesting automobile races on September 8, which were held on the occasion of the Tri-State Fair. While most of the contests were important, the race between the machines of Mr. A. C. Bostwick, Mr. D. Wolfe Bishop, and Mr. A. L. Riker was the most valuable. The machines were run under the rules formulated by the Automobile Club of America. Mr. Bostwick's racing machine, which is of 24 horse power and weighs 3,000 pounds, was built by Panhard & Levassor, and was originally owned by M. Renée de Knyff, and has many times shown in France that it is capable of great speed. Mr. Bishop's machine was made by the same firm, but is slightly lighter, weighing 2,200 pounds and propelled by 16 horse power motors. The race for gasoline vehicles weighing over 1,000 pounds was 5 miles. Mr. Bostwick succeeded in covering the distance in 7 minutes and 43½ seconds. At the start of the ten mile "championship" race, Mr. Bostwick was first, Mr. Bishop second and Mr. Riker third. The Riker electric racing machine weighs 2,300 pounds. Mr. Riker gradually overtook and passed the others and finished the first lap many yards in the lead. His batteries then became short-circuited, and the machine came to a stop. Mr. Bostwick gained rapidly on his remaining competitor, and at the end of the 10 miles was more than 7 furlongs ahead, the last mile being made in 1 minute 27⅘ seconds. Mr. Bostwick also operated his Winton racing machine, shown in our engraving. The machine is of about 20 horse power. The following is a summary of the principal races:



MR. BOSTWICK IN HIS WINTON RACING MACHINE.

Gasoline vehicles, four wheels, American make; five miles—Won by T. Walsh, New York; F. Nagel, New York, second; A. C. Bostwick, New York, third. Time, 10:10⅘.

Gasoline vehicles, four wheel, of less than 1,000 pounds, any make; five miles—Won by C. J. Field, New York; F. T. Craven, New York, second; J. Lauveguez, New York, third; C. S. Henshaw, Brooklyn, fourth. Time, 11:43⅘.

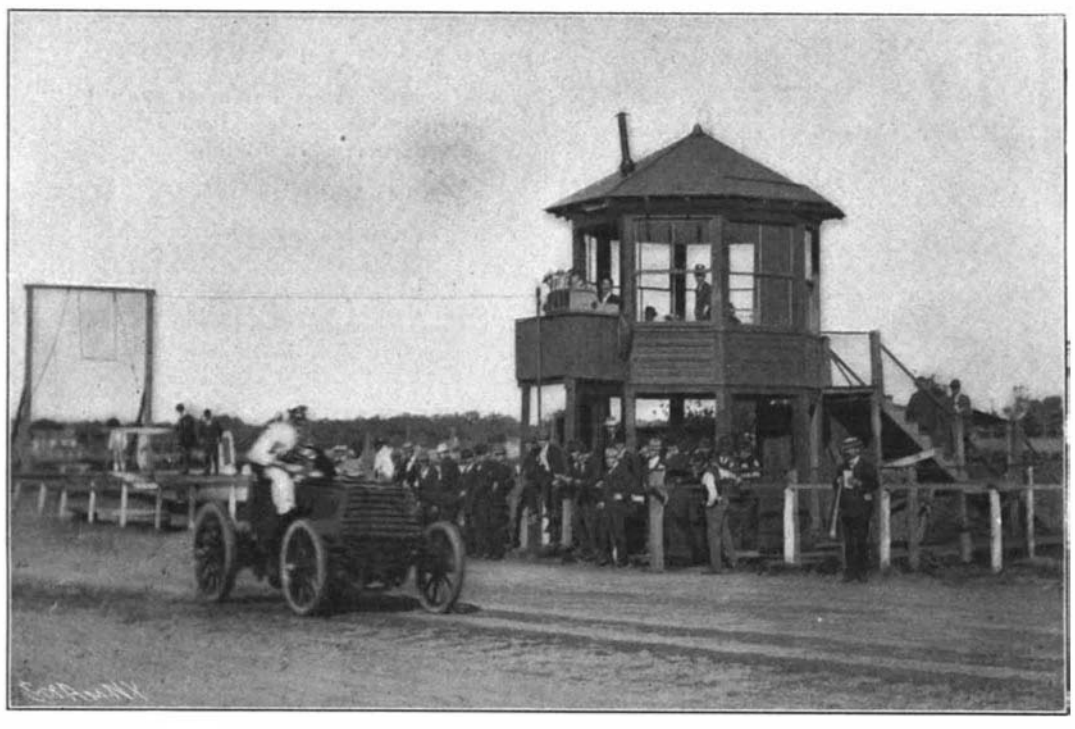
Gasoline vehicles of more than 1,000 pounds, any make; five miles—Won by A. C. Bostwick, New York; D. Wolfe Bishop, Newport, second. Time, 7:43⅘.

Tricycles; five miles—Won by C. S. Henshaw, Brooklyn; J. Lauveguez, New York, second; Stanley R. Atkinson, New York, third. Time, 8:24⅘.

Electric vehicles, any kind; five miles—Walkover for A. L. Riker. Time not taken.

Steam vehicles, four wheels; five miles—won by W. J. Stewart, Newark; W. L. Hibbard, Bridgeport, second; S. T. Davis, New York, third; S. Houston, Newark, fourth. Time, 11:48.

"Championship," open to first and second prizewinners in the preceding events, except the first and that for tricycles; ten miles—won by A. C. Bostwick, New York; D. Wolfe Bishop, Newport, second. Time, 15:09⅘.



HIGH SPEED MADE BY MR. A. C. BOSTWICK IN HIS PANHARD & LEVASSOR RACING MACHINE, GUTTENBERG.

Disposal of Household Waste at Paris.

The question of the household waste of the city of Paris is treated by M. Vincey in a communication recently presented to the Society of Sanitary Engineers. The amount of household waste collected each day is about 3,200 cubic yards, or nearly 56 cubic yards per mile of street; the production increases from year to year in the proportion of $\frac{1}{50}$. In 1895 the 20 districts of the city produced about 1,020,000 cubic yards of waste, whose weight gave an average of 1,235 pounds per cubic yard; the annual weight was thus 570,035 tons, or an average of 1,562 tons per day, or 1·38 pounds per day and per person. The monthly production is variable, being considerably higher in winter than in summer; it is the same for the density. In 1895 the average for January was 1,450 pounds per cubic yard, and for September, 1,200 pounds; in that year the removal of the waste cost the city of Paris nearly $600,000, or $1.08 per ton. As the previous contract expired in July, 1899, a new one was made, and the expense has risen to over $800,000 annually.

MM. DESGREZ and Balthazard of Paris have been carrying out some elaborate experiments with the object of regenerating respirable air in a confined space, and have communicated the results of their researches to the Academy of Sciences. They have constructed a diving dress of aluminium which weighs in all about twenty-five pounds. Inside this dress they place a quantity of bioxide of sodium, and a diver wearing this apparatus can walk about for a considerable length of time under water, without coming to the surface to replenish his supply of air. It is claimed that the invention will be of inestimable value to persons engaged in mines, chemical industries, or to reach certain points surrounded by a poisonous atmosphere.

The Current Supplement.

The current SUPPLEMENT No. 1292 has a number of articles of remarkable interest. "The French Navy" is an elaborately illustrated article accompanied by many fine engravings and plans. "The Westinghouse Gas Engines" is a fully illustrated article showing the internal construction of the engines. "The Inaugural Address of Sir William Turner" is continued. "Roman and Gallo-Roman Flour Mills" is a most interesting article. "Mechanical and Technical Education in the United States," by Prof. C. F. Chandler, is also continued.

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