THE WAGNER REGULATOR.

THIS electric regulator, invented by Mr. Frank C. Wagner of Ann Arbor, Mich., consists essentially of a high-resistance wire stretched tightly between two supports, and carrying a weight at its middle. The actuating current passes through this wire, which is selected in such a manner as to heat thereby, thus allowing the weight to descend a fixed amount for each strength of current. The weight carries a bar adapted to make contact successively with a number of spring contact-pieces, which are in electrical connection with a number of resistance-coils so arranged as to shunt varying portions of current around the device requiring regulation.

The field for the application of this form of regulator is very wide. Up to the present time, it has been applied practically to only two cases. The first was to compensate for extreme variations of speed in an incandescent dynamo. The wire of the regulator was placed in series with an incandescent lamp fed from the main conductors. Any increase of voltage due to an increase of speed immediately increased the expansion of the wire, thus dropping the weight, and throwing additional resistance into the field-circuit of the dynamo. Before the application of the regulator, lamps were being burnt out continually by sudden increase of speed. This regulator, although very crudely made, has been in use for nearly a year, and with excellent results.

The second application is in connection with an electric meter, also invented by Mr. Wagner. This meter uses the heating action of the current for the actuating force, and in consequence the direct readings are proportional more nearly to the square of the current than to the current itself. The regulator is employed to shunt such portions of the entire current around the meter proper as will render its readings directly proportional to the current strength.

There are many other ways in which the regulator can be applied, especially in connection with alternating currents. Its extreme simplicity, and the very small amount of energy consumed, are greatly in its favor.

HEALTH MATTERS.

The Hughes Crematory.

THE city of Savannah, Ga., is soon to have a crematory for the destruction of garbage by fire. The model selected is that known as the Hughes Crematory, and is thus described by the *Savannah News*:—

The crematory will be about 30 feet long, and from 15 to 20 feet wide. The main body of the kiln or furnace is a vertical shaft built of brick. At its base will be two hydrocarbon-burners. Upper and lower triangular flues extend across the middle of the shaft, and also an upper and lower set of baffles or side-wings, which are connected by means of wall passages or flues. Underneath these is a shelf, forming a retort in which air may mix with the flames from the burners. Flues are provided for the return of the gases arising from the incineration to a smoke-stack at the side of the shaft. A hydrocarbon-burner is placed at the bottom of the shaft conveying the gases to the chimney, which deodorizes them before they pass out into the air. Perforated steam-pipes are located over the top drop-shelf of the shaft, connecting the burner with the boiler, so that the fluids may be carried off.

The operation of the crematory is simple. When the furnace is brought to the required degree of heat, a load of the material to be burned is emptied into the top of the shaft. It falls on the first drop-shelf. After a suitable period this shelf is dropped, and the mass of material is allowed to fall on the second shelf, and a second is dumped into the kiln. After another interval the second drop-grate is allowed to fall, and the material is thrown upon the baffles and flues below, whence the residuum finally drops down into the ash-pit at the bottom of the shaft. The capacity of the crematory will be 50 tons of garbage per day, and the cost of the process is from 18 to 20 cents per ton.

In Montreal it costs just $43,000 to destroy by fire a year's miscellaneous refuse, and $8,000 additional for the burning of its night-soil. The destruction of the latter costs 75 cents per ton, and of the former 25 cents per ton. In Minneapolis it is estimated that 15 to 20 cents per ton of refuse pays for the labor employed and the fuel used. Within five days recently the refuse cremated consisted of 33 horses, 59 hogs, 103 barrels of hotel and commission-house refuse, 12 loads of market offal, and 70 loads of manure. The aggregate weight was 200 tons, but the ashes deposited in the course of consumption weighed considerably less than 1,000 pounds. The total cost of labor and fuel for this five days' period was $38.25.

THE MORPHINE HABIT. — Erlenmeyer says that children born of women addicted to the morphine habit are practically morphine-eaters from birth. During the first few days of life, unless morphine is given to them, they are very apt to suffer collapse; and this condition may end in death, the child being too weak to withstand the violent symptoms, which are similar to those which follow the sudden withdrawal of the drug in adult opium-eaters.

SCHOOLROOM SPACE. — Mr. H. Courthope Bowen, whose opinions on all matters connected with the proper construction of schoolrooms are entitled to great weight, and are regarded as authority by the leading medical journal of England, expresses somewhat as follows what, in his judgment, should be considered a good schoolroom. Taking the case of a room 14 feet high, fairly ventilated and always well aired in recess, he would assign two thirds of the floor-space to the scholars and their desks, and keep the other third for the teacher, the blackboard, etc. With single desks, 22 inches should be allowed from side to side, and 3 feet from back to front, for each scholar. The passages need not be more than 18 inches for those running from back to front, and 1 foot for those running from side to side. In such arrangement, counting the passages, each scholar has (without reckoning the share of the space allotted to the teacher) a trifle more than 40 inches from side to side, and just 4 feet from back to front. In a room 25 feet by 20 feet the floor-space for scholars' desks will be 16 feet by 20 feet, with 4 feet from back to front per row, and accommodation is provided for twenty scholars. The whole floor-space is 500 square feet, and the cubic contents of the room 7,000 cubic feet, with 20 square feet and 280 cubic feet per person.

SULPHUR FUMIGATION. — Fumigation by the burning of sulphur is the most common method employed by boards of health in the disinfection of apartments in which contagious disease has existed, and the clothing worn by the patients during their illness. In an address delivered by the distinguished chemist, Dr. E. R. Squibb, before the Kings County Medical Association, he called attention to the fact that there must always be an abundance of watery vapor in the room to be disinfected; otherwise the sulphurous-acid gas generated by the burning of the sulphur is not an efficient disinfectant. The same is true of chlorine gas when used for disinfecting purposes.

DRIED POTATO. — In the *Voënno-Sanitarnoië Dëlo*, Dr. Jakov M. Shmulevitch emphatically draws attention to dried potato as an important food-article, possessing some very valuable advantages in comparison with the vegetable in fresh state. The advantages claimed for the article are these: (1) while fresh potatoes easily rot, blacken, and sprout, dried potatoes, when kept duly protected from moisture, remain in the best condition for a very long time; and (2), being by far lighter and less bulky than fresh potatoes, are by far more convenient for preservation and transportation, which point has a great practical importance, especially in time of war. To be fit for culinary use, the article requires a preliminary maceration in water for about ten or twelve hours.

SPONTANEOUS COMBUSTION. — The following case of spontaneous combustion is reported in the *British Medical Journal* by Dr. Booth: "On the morning of Sunday, Feb. 19, I was sent for to examine the remains of a man, aged 65, a pensioner of notoriously intemperate habits. I found the charred remains of the man reclining against the stone wall of the hay-loft. The main effects of combustion were limited to the corpse, and only a small piece of the adjacent flooring and the woodwork immediately above the man's head had suffered. The body was almost a cinder, yet retained the form of the face and figure so well that those who had known him in life could readily recognize him. Both hands and the right foot had been burnt off, and had fallen through the floor into the stable below, among the ashes; and the charred and calcined ends of the right radius and ulna, the left humerus, and the

right tibia and fibula, were exposed to view. The hair and scalp were burnt off the forehead, exposing the bare and calcined skull. The tissues of the face were represented by a greasy cinder, retaining the cast of the features, and the incinerated mustache still gave the wonted military expression to the old soldier. The soft tissues were almost entirely consumed. On my return from other work, later on, I found that the whole had been removed. The bearers told me that the whole body had collapsed when they had tried to move it *en masse*. From the comfortable recumbent attitude of the body, it was evident that there had been no death-struggle, and that, stupefied with all the whiskey within and the smoke without, the man had expired without suffering, the body burning away quietly all the time."

THE SUPPRESSION OF SMALL-POX. — An outbreak of small-pox is reported to have occurred recently in Minneapolis, and the health-officer of that city is credited with having summarily and successfully dealt with it. According to *The Journal of the American Medical Association*, as soon as a case was announced, a consultation was called to determine if the disease was small-pox. That being settled, the patient was removed to the quarantine hospital for treatment. The house where he lived was quarantined, and all the people directly exposed were confined in it. Dr. Kilvington's assistants then began to look up all people indirectly exposed, and vaccinated them. Quarantine houses had guards stationed about them, who allowed no one to go in or out during the season of quarantine. The quarantine people were vaccinated, and during the time until it could be determined whether the vaccination would take, they were supplied with food. When the vaccination took, the person under quarantine was bathed, given new clothing in the place of the old, which was burned, and he was then discharged. When a house had been emptied of people under quarantine, the bedding and curtains were burned, sulphur burned in all the rooms, and the walls sprayed with corrosive sublimate. None of the inspectors or guards were allowed to enter any of the houses under quarantine, when there was danger; and *the doctors that did the vaccinating saturated their clothing with the corrosive sublimate before and after entering a house where there had been small-pox*. The clothing and bedding were either paid for at a reasonable price by the board of health, or were replaced by new articles. In one of the houses quarantined, *there were 31 laboring men who were inclined to object to the rules of quarantine*. One escaped, but he was taken back when found, *and a guard, with a rifle and instructions to shoot* should he attempt to escape, was put over him. Since Jan. 13, six thousand people have been vaccinated, and the schools, public and private, have been systematically visited, and unvaccinated children vaccinated. The absurdity of saturating the clothing of the vaccinators before and after entering each house where there had been small-pox is self-evident. Nor do we believe that in this enlightened age any guard would be instructed by a health-officer to shoot a laboring man who, after being shut up forcibly in a house where a case of small-pox had been, should attempt to escape, especially when the house had been disinfected, and the man himself vaccinated. The account above given must, we think, have been obtained from some source outside the health-office of Minneapolis.

ELECTRICAL NEWS.

Canal-Boat Propulsion.

A PAPER read by Mr. H. C. Vogt at the last meeting of the British Association for the Advancement of Science brought out some interesting and remarkable facts. It gave the results of some experiments made with air-propellers at Copenhagen. A steam-launch was fitted with a windmill with steel blades, carried on a frame above the deck, and provided with steam machinery to rotate it. The *London Electrical Review*, in describing the experiment and suggesting a modification of the method, says that at first sight the method would seem an extremely inefficient one as regards application of power to so unstable a medium as the air; but when it is remembered that recent investigations of the marine propeller have established it as a true re-action engine, in which a large slip is not necessarily an accompaniment of inefficiency, it will appear that there is nothing wrong in the principle indicated by Mr. Vogt. An air-propeller is a pure momentum or re-action machine. Practically it was found that a twenty-foot launch of five and a half feet beam could be driven at a speed of five knots per hour in calm weather, and against a fresh breeze at four knots. The engine producing this effect indicated one and one-half horse-power. For a single indicated horse-power, the thrust of the propeller was 36.7 pounds, or about the same as a water-propeller. It might be supposed that in a contrary wind this thrust would disappear; but, on the contrary, through 75 per cent of the horizon the thrust was found to be augmented by the wind. With a larger launch, having a displacement of five tons, a speed of over six knots an hour was obtained, against the wind. In some of the trials, canvas-covered wings were used, but they were found inferior to steel.

To replace the steam-engine used in these experiments, the *Review* suggests an air-propeller carried well above the decks on a standard, driven by an electric motor which is carried on top of the frame, supplied with current from a wire running along the canal, and connected with the motor through flexible conductors and a carriage travelling on the main wire. The blades of the propeller should be of steel, accurately shaped, and arranged to be turned at a greater or less angle according to the direction of the wind. Thus equipped, a canal-boat could make her way with a speed exceeding that generally used, and with no greater proportionate expenditure of power than that existing in all cases where the trolley system of actuating electric motors is in use.

The advantages of the system are obvious. The hull of the vessel would be entirely clear of machinery, and the entire weight of the propelling apparatus carried by the boat need not exceed that of an ordinary tow rope. No disturbance of the water of the canal would be produced, except such as would be due to the progressive movement of the hull of the vessel. It would seem as though in this suggestion might be found a solution of the mechanical driving of canal-boats, — one that, from the points of view of simplicity, non-occupancy of the hull of the boat, and minimum disturbance of the water, would be nearly perfect.

The air-propeller works with an entire absence of vibration. It requires ten or twelve times the area of the corresponding water-screw. As the thrust is a perfectly quiet one, and, if due to the motion derived from a dynamo, would be free from the jarring inseparable from the motions of a heavy reciprocating engine, and as it is cushioned in all its motions by the high elasticity and mobility of the air, a very light frame would serve to carry the wheel. A thrust of 75 to 150 pounds would be all that the frame would be required to resist, — a thrust that would always be brought on it gradually, and would be gradually released. In steam canal boats a very considerable portion of the hull is occupied by the engine, boilers, and coal-bunkers, while the constant eddies and currents produced by the propeller are destructive in their effect on the sides and bottom of the canal. This is all done away with in aerial propulsion. The establishment of a line of poles and wire would not represent the tithe of the cost of a fixed or travelling towing-cable.

INFLUENCE OF LIGHT ON MAGNETISM. — A preliminary notice of a very interesting experiment has been given by Mr. Shelford Bidwell. The investigation was undertaken to determine whether a piece of iron could be magnetized by allowing a ray of light to fall on it. Of course, if light is an electrical vibration, and if an effect was sought using an ordinary piece of iron, there would be no result, since the opposite vibrations would exactly neutralize each other's effects. But iron can be prepared so that it is more susceptible to a magnetic force acting in one direction than to one acting in the other. Ewing has shown, that, if a piece of iron which is being magnetized in what we call the positive direction has the magnetizing current reduced to zero at such a point in the operation that the current and the magnetization of the iron become zero at the same instant, then that piece of iron, although apparently in a neutral condition, is more susceptible to a negative than to a positive magnetizing force. So, if a piece of iron prepared in this way be submitted to the action of a ray of light, the positive and negative magnetizing forces produced, although equal, will not balance with one another, but the latter should produce an effect. On trying the experiment in this way, Mr. Bidwell ob-