The Municipal Fire Telegraph.

The purpose of a Fire and Police Telegraph is to connect the various parts of a Municipality by an intelligent and co-operative law. To accomplish this it has been found necessary to adopt, for the municipal body, the precise arrangement which is found in the nervous system of the individual.

Thus, in the Fire Telegraph, now approaching its completion in Boston, there is a Central Station, which is the "brain," the common reservoir of nervous or electric force for the whole system, at which all the batteries are placed, and which is presided over by an intelligent will (the watchman or operator of the Central Station). From this centre radiate two classes of electric conductors or nerves (the iron wires carried over the houses.) The first of these, the "Signal Circuit," conveys impressions to the centre, is "afferent," "sensitive," to adopt the language of anatomy. The second of these, the "Alarm Circuit," conveys impulses from the centre, is "efferent," "motor." When any disturbance or alarm occurs at the circumference or other part of the system, it is signalized from the "Signal Boxes," which are scattered throughout the city, and which are the "sensitive extremities" of the sensitive conductors, to the Central Station, from which, after an act of intelligence and volition by the operator, an impulse to appropriate or corresponding action is sent over the "motor" nerves or conductors to the various belfries, where the electric or nervous agent animates iron limbs by means of the contraction of electro-magnetic muscles, thereby relersing powerful machinery to strike a single blow with each of the tolling hammers. By a combination of such blows, by the intelligent act of the presiding will at the Central Station, distinct signals, or any others may easily be struck.

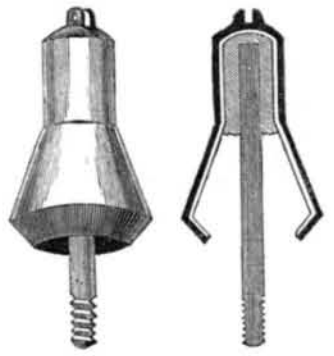
This presents at once an outline of the Municipal Fire Telegraph. The analogy with the living system has been thus wittily stated by the editor of the Boston Commonwealth: "Suppose a live coal drops on your toe: the nerves of sensation give an instant signal to the brain, that is, a feeling of pain. The brain then, by an act of will, conveyed to the muscles along the leg by the motor or alarm nerves, rouses the said muscles to their duty in the case, and the result is, that the coal is kicked off. The municipal fire-alarm arrangement is conducted on this very plan." The perfection of this analogy is a guaranty, in addition to the various ends of security and intelligent action which are thus obtained, that the arrangement is in conformity with a natural law.

A chief peculiarity of the Fire Telegraph, as a mechanical system, will be seen at once from the sketch above given. It developes the motor functions of the electric circuit, at a distance. Hitherto the telegraph has been chiefly used to convey intelligence, which is its sensitive function. Its application to the development and control of power at a distance, either by its own electro-magnetic energy, or by bringing into action other machinery, which is its muscular or motor function, is to give a wide extension hereafter to the uses of the agent—electricity. In the fire system both of these vital functions of the telegraph, so to speak, are employed, and also related to each other in their natural order. In proportion as civilization advances, the telegraph is thus to constitute the nervous system of organized social life, relating all the parts and making possible a more perfect co-operation than could otherwise be obtained.

The Municipal Electric Telegraph, applied to purposes of Fire and Police, was first described in its general principles by Dr. Wm. F. Channing, in 1845. In 1848 its adoption was recommended by Mr. Josiah Quincy, Jr., the Mayor of Boston, and some experiments were made. In 1851 an elaborate plan was finally presented by Dr. Channing to the Government of that city, which was adopted, and is the basis of the system which has been constructed and successfully tested, though not as yet publicly introduced in Boston. The present mechanism and arrangement of the system have been elaborated by Dr. Channing and Mr. Moses G. Farmer, the able Superintendant of Construction, to both of whom, herefore, the system in operation is justly to be ascribed.

We shall now proceed to describe the System in its various parts, and with its essential safeguards. The conditions by which permanent electric conductors may be established in a city, is the subject of first importance for all applications of the Municipal Telegraphs. This may be effected by the following means: 1st, by employing large wires (No. 8) of the best quality of Swedish iron. 2nd, by attaching them to the brick-work of buildings in the most substantial manner, by means of wrought-iron brackets, holding the insulators. 3rd, by selecting public buildings on lofty isolated buildings, as points of attachment. 4th, by using as long stretches as is consistent with entire safety, say from 200 to 400 feet. 5th, by using duplicate wires, following different routes, between each and every station; (in exposed situations even triplicate wires may be employed.) 6th, by avoiding the use of the ground as any part of the circuit. It is well known that the telegraph wires in our cities are very permanent. With proper guardianship and means of testing, a system of duplicate wires, constructed with the above precautions, cannot be interrupted under ordinary circumstances, by chance or design.

The insulater used in the Boston system is Batchelder's patent (which is advertised in the Scientific American), and is here represented.



The cast-iron cap is represented by the black line in the section. This is lined throughout with glass, by the operation of blowing, or with porcelain. The shank is then introduced with a hot mass of glass or any fused or semi-fused material, by which it is firmly fixed in its place. This is represented by the shaded portion. Between the lower edge of the cap and shank, in the section, there are four inches of glass surface. The re-entering angle of the lower part of the cap protects the glass within from missiles, and is calculated, in a storm of wind and rain, to drive the latt r downward, and thus preserve the insulation. The wires pass over the top of the insulator. The shank, which should be longer than is represented, screws into a bracket or the ridge-pole of a house.

Instead of wires insulated above the buildings, they may be buried in tubes under the streets of cities, though at a great increase of expense. In Boston the wires erected (about fifty miles in length) have cost less than a hundred dollars per mile, though a plan of erection, which would cost $150 per mile, is recommended by Mr. Farmer, for future constructions. The mode of erecting wires which has been described, applies to all the forms and uses of the Municipal Telegraph, amongst others to that of furnishing uniform time to a city.

At every station (sixty in number in Boston) dischargers for atmospheric electricity are provided, by presenting points, connected with the ground, in close proximity to the conducting wires.

The circuits of the Fire System are divided, as already stated, into those of "Signal" and "Alarm,"—the one conveying intelligence *to* the central station, the other conveying the impulse to mechanical action *from* the central stations to the hammers of the alarm bells. In the Signal Circuit the battery may be either constantly on or off, the signal being made in one case by breaking, in the other by completing the circuit. Unless the wires are erected with very great care, the "closed circuit" arrangement is decidedly preferable. In this case the duplicate wires between each of the signal boxes on stations, diverge so as to resemble, in the whole circuit, the links of a chain. The signal here is made by breaking the circuit at any one of the signal boxes. Where the open circuit is used, the positive and negative wire is brought to each signal box, and the signal is made by a cross connection between them. The principle of duplicate conductors is preserved by letting each positive and negative wire form an entire circuit, and return to the pole of the battery from which it started. Each signal station is, therefore, connected with the battery at the central station, by wires following two different routes.

The alarm-bell circuit is arranged like the open signal circuit, and the power of the battery is only thrown upon it when the bells are to be struck.

In large cities great economy and security is obtained by increasing the number of circuits of each kind. Thus, in Boston, there are three signal and three alarm circuits to different parts of the city, which come in separately to the central station, and which may be kept and used entirely distinct.

In case of fire, the operation of the system begins at the signal box or station. Of these there are forty in Boston, distributed at distances of one hundred rods apart. They are so constructed that police communications may be had backwards and forwards between each of these stations, and the centre, in addition to their function of signalizing an alarm of fire. By a similar coincidence, a Fire and Police Telegraph has been constructed in Berlin, Prussia, at the same time with that in Boston: this resembles simply the signal circuit and apparatus of the Boston system, but has not the novel and remarkable feature of the latter—the motor or alarm circuit, by which the bells are struck. In Berlin the public alarm continues to be given in the ancient mode, by blowing horns. It is stated that in Berlin there are forty-six signal stations for the private communications of the police and fire department, connected with the centre.

[We shall conclude this article next week.]

Forces---Scientific Terms.

Many misunderstandings arise, owing to the latitude which philosophic authors have given to terms, and this appears to us to be the case with the discussion between Mr. Conger and Mr. Schetterly about Forces. The greatest care should be exercised in the use of terms by authors of philosophic works. *Momentum* is a term used to convey an idea of the quantity of force in a moving body. This quantity consists of the mass multiplied into the velocity, and that velocity is known by the time the moving body takes to pass through a certain amount of space in a certain amount of time, such as 40 miles per hour. But momentum is not force; force is a principle about which we are ignorant; we know that it exists by its effects. Many mistake the operations of force for the principle itself, and this was the error of the "centrifugal-force-from-nothing" philosophers. Mr. Conger and Mr Schetterly are too well versed in philosophy to make such a mistake, but they have used terms like all authors on works of mechanics, and to this we wish to direct attention for a few moments.

We recognize two forces in the physical universe, viz., "attraction and repulsion," and these terms should always be used to impart an idea of the operations of bodies under certain conditions, not the principle of force in the bodies. There are *centripetal* and *centrifugal* forces recognized in Mechanical Philosophy, but there are no such forces in existence. Centripetal force is a term used to convey an idea of the action of one body on another, viz., an attraction to a centre: the other term, centrifugal, is one used to convey an idea of a body repelling or resisting the centre attraction. By these scientific terms we understand the direction in which bodies, so acting upon one another, will move, but that is all—direction is not force.

When we see a ball, weighing one pound, projected upwards from a cannon, we see that piece of metal acted upon by a repulsive force. When we see the same ball describe a curve, and at last come to rest on the lap of mother earth, we have seen it acted upon, secondly, by an attractive force; but these two terms only serve to give us an idea of the action of force, not what force is. If there was only one globe in the universe, in motion, the size of the sun, and it were all composed of pure iron, gold, or any simple substance, it might drift on forever through space, with great velocity, in a straight line, but the terms attractive, repulsive, centripetal and centrifugal, forces, would be like cyphers without a unit, and yet who can deny but that the said globe of metal would be possessed of a great force, as we understand it? We call steam power a repulsive force, because it acts by expansion; we call water an attractive power, because it acts by gravitation; but what does any man know of the chemical principle of expansion, or who can tell what gravitation is?

We know that there is such a thing as electricity, but what electricity is we know not. We know that water is composed of two gases—oxygen and hydrogen; but when we ask the question, what is the gas oxygen—what is the gas hydrogen? we can go no further, we have attained to that limit beyond which the human intellect cannot go; here we must pause—the wide, the unbounded prospect lies before us, but darkness hovers o'er it. The most learned men, and the best read among us know how true the words of St. Paul are, "he who thinketh he knoweth something, yet knoweth he nothing that he ought to know."

We regret, exceedingly that so many authors of philosophical works have mistaken terms for things, and the operations of bodies for properties. Two weeks ago we received a letter from a correspondent, with some quoted but rough verses, which embraced the sentiments, "how could there be a God before time began." Now this is an evidence of that want of deep and correct thinking which characterizes many philosophic works so named, for there is no such a thing as *time;* it is a mere term to convey an idea of a succession of events. There is certainly something in a name; a wrong term conveys a wrong idea and is calculated to lead to misunderstandings.

Recovering Gold from the Alkaline Cyanide.

Evaporate the solution to dryness, powder the residue, and mix it with an equal bulk of litharge. Place the mixture in a Hessian crucible, and heat it to a bright red. By this operation, one part of the oxide of lead is reduced to the state of metallic lead, which unites with the gold, and forms with it a fusible alloy of great weight, which remains at the bottom of the crucible. When the crucible is cool, break it and separate the metal from the scoriæ, treat it with pure nitric acid diluted to sp. grav. 1·2 and heat. The whole of the lead will be dissolved as nitrate of lead; and the pure gold, in the shape of a brownish yellow spongy mass, remains unattacked by the acid. This process is only applicable to the solutions of gold prepared with the alkaline cyanide.

New Jersey Zinc Manufactures.

We had the pleasure, on last Saturday, of meeting with the members of the New Jersey Legislature and a number of gentlemen of the press, and others belonging to New York, and visiting the zinc works of the New Jersey Zinc Company, at Newark, N. J. We examined the work from end to end, and derived both instruction and pleasure from witnessing the various processes through which the rough zinc ore undergoes until it comes out in snowy-white paint, far surpassing any carbonate of lead. After examining the works, a fine dinner was served up to the company at Wykoff's Hotel. Col. Curtis, President of the Company, presided with grace and ability, and many able speeches were made. We will describe the process of reducing the zinc ores and making the paint, next week. It is a subject of very great interest to our whole country.

Cultivation of Basket Willow.

Considerable attention is beginning to be paid to the cultivation of basket willow in the United States. The annual importation of the article into our country amounts to $5,000,000, and this, large, as it is, does not satisfy the consumption. The supply is derived from France and Germany mainly, and costs here from $100 to $180 per ton weight.

A number of ladies and gentlemen of Boston have subscribed $100 each, to purchase, in Paris, a complete set of anatomical and physiological instruments for the New England Female Medical College.