THE PNEUMATIC TELEGRAPH LINE AT PARIS.

The line of pneumatic tubing, which was laid as far back as the year 1867, was, on the 1st of January, 1878, 20 5 miles in length, this representing from the beginning an average of 8,830 feet laid per year. Now the total length is 111 miles, to which must be added the 12·5 miles of tubing that secure communication with the centers of power. It includes a double main line, in which terminate 72 secondary ones, with various branches, plus a direct line between the central station and the Bourse.

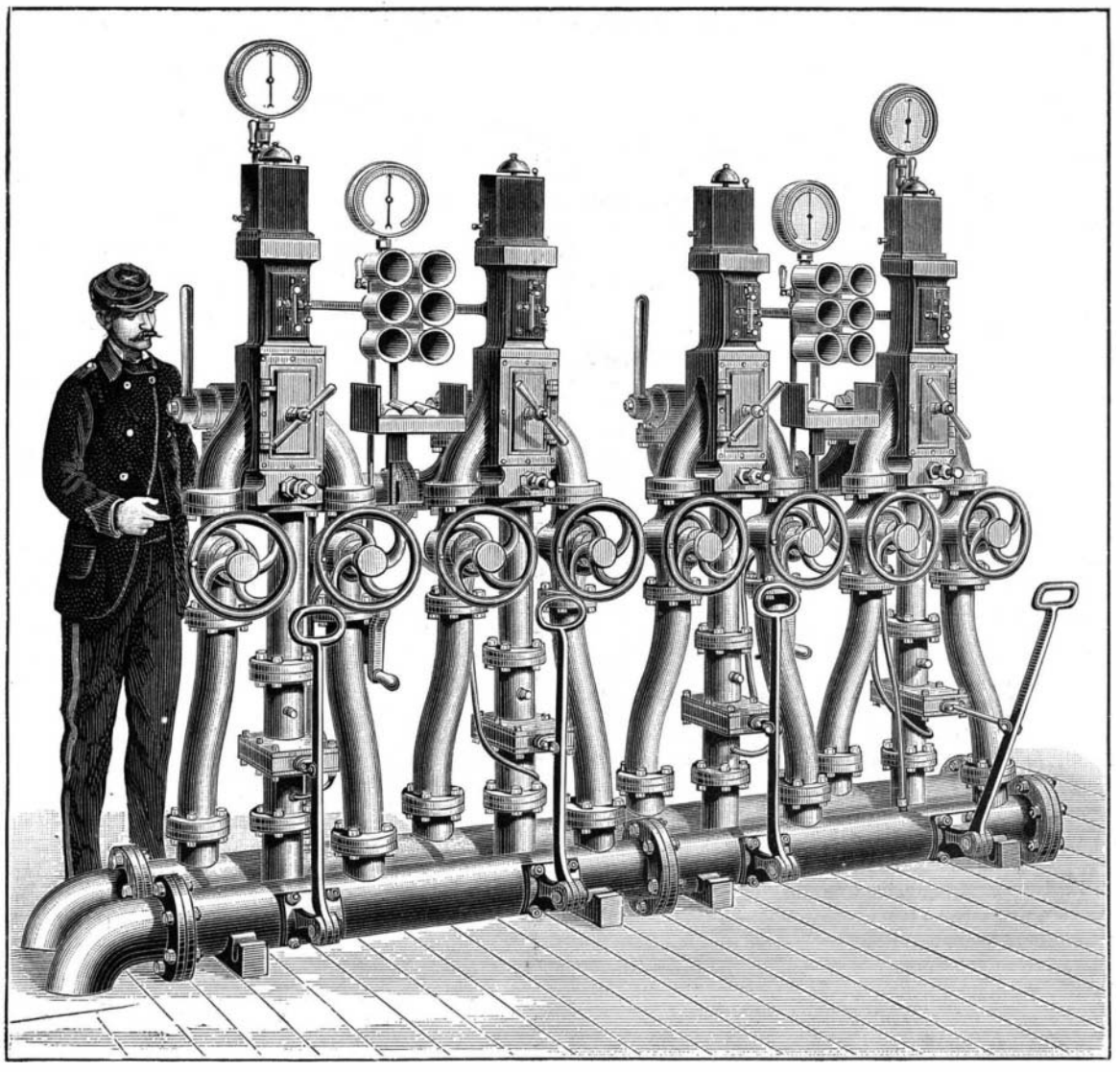
The number of offices that have been opened for the service of the tubes is 75, this including those of the Chamber of Deputies and Senate.

The 111 miles of lines are supplied by 8 stations, having steam engines of a total power of 315 horses, and 4 auxiliary water motors, which can eventually be used in addition. The trains run every three minutes upon the direct line from the central station to the Bourse, every five minutes upon the principal line, and every quarter of an hour only upon the few branches. The lines consists of tubes of 2½ inches internal diameter, that are bored perfectly true, so as to present no projection that might interfere with the running of the boxes. The boxes or travelers move through the tubes under the action of compressed (or rarefied) air produced by special pumps.

After the dispatches have been put into the box, the latter is closed by means of a rubber sheath which almost entirely covers it. The last box of each train carries at its back part a sort of collar formed of a flexible leather ring 3¼ inches in diameter, whose edges, being in contact with the inner surface of the tube, obstruct the latter completely without interfering with the movement of the box. The box thus arranged is called the piston box, and performs the part that a locomotive does on railways, while the simple boxes correspond to cars. There is, however, the difference that when the passengers (*i. e.*, the dispatches) are not numerous the locomotive itself carries them to their destination. Each box is capable of containing twenty dispatches.

The apparatus shown in the engraving serve as stations for the trains, and, as in all stations, there is a starting and an arriving side. The apparatus of the same line are thus grouped in pairs, and, moreover, are exactly alike, so that, if need be, the direction of the train may be reversed. They consist essentially of a vertical tube (in which the line terminates) ending in a square chamber whose anterior face is provided with a door that closes hermetically. It is through this latter that the boxes are introduced and taken out. The curved tubes that are seen here and there upon the central tube of each apparatus serve to connect the line with the vacuum or pressure apparatus by means of cocks that are maneuvered by a small hand wheel. The large collecting tubes placed horizontally communicate through tubing with the reservoirs, in which the play of the pumps is constantly renewing the stock of compressed or rarefied air.

Finally, in case a box that has reached one of the apparatus must start again through the contiguous one without getting a vacuum or pressure from the station itself (which is something that happens in all intermediate offices that are not connected directly with a center of power), it is necessary that the compressed or rarefied air shall be capable of traversing the station in order to drive the train toward the following stations. The two chambers that form the heads of the apparatus are then connected by opening a cock placed upon a connecting tube situated behind. In order to prevent a box that has reached the head of an apparatus from falling into the line, the tubist, as soon as a train arrives (which he knows through the noise of the shock), closes the line by means of a valve maneuvered by a lever that is within his reach. In the annexed figure the three apparatus to the left have their valves closed, that is to say, they are isolated from their lines. The fourth alone is in a position for receiving or sending.



NEW SYSTEM OF PNEUMATIC TUBES AT THE CENTRAL TELEGRAPH OFFICE, PARIS.

The play of the valves is likewise utilized for preventing the compressed or rarefied air that fills the line at the moment of a train's arrival from being lost in the atmosphere when the door of the apparatus is opened.

The figure also shows several indispensable accessories. The pressure gauges indicate at every moment the degree of pressure or vacuum—an attentive examination of the movements of the needle upon the dial clearly showing to an experienced agent any irregularities that may occur in the running of the "piston." A manipulator placed over the door, and an electric bell surmounting the "cap" of the apparatus, serve for exchanging starting and arriving signals.

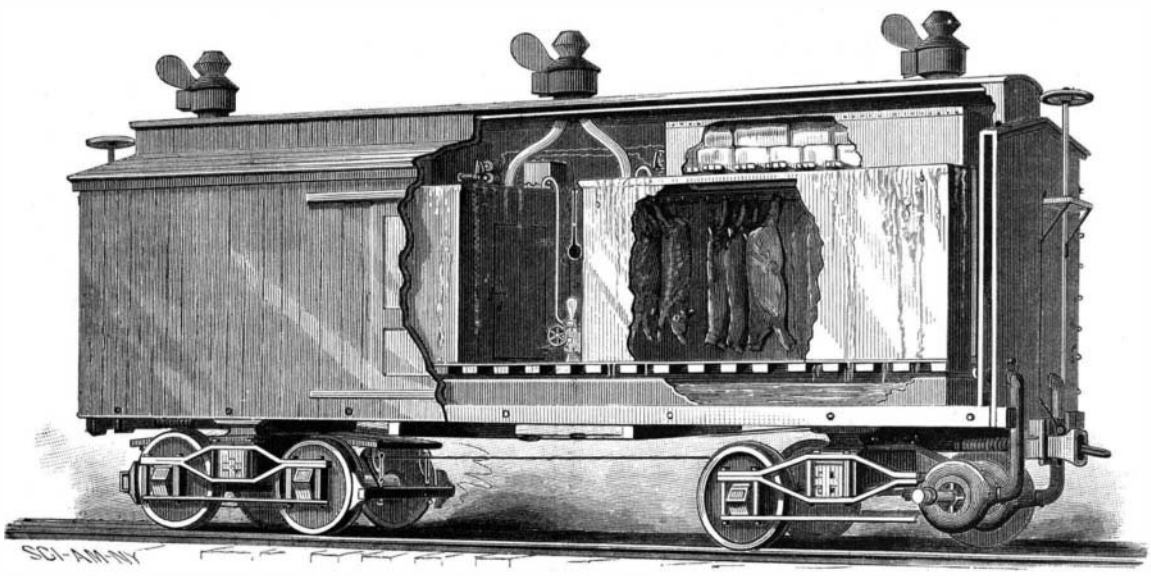
Finally, a series of iron plate sheaths serve for holding the exchange boxes. The velocity of the boxes varies with the length of the line and the amount of power that determines their motion. Under favorable circumstances, that is to say, upon very short lines, and with a difference of pressure of 40 centimeters of mercury, the velocity may reach six-tenths of a mile per minute.

The entire line will be finished this year, and telegram cards will soon be circulating in all the wards.—*La Nature*

ACCORDING to the theory of F. Siemens, flame is the result of an infinite number of exceedingly minute electrical flashes, which are caused by the swift motion of gaseous particles.

IMPROVED REFRIGERATING CARS.

The object of an invention recently patented by Mr. Henry Tallichet, of Austin, Texas, is to provide an improved system of refrigeration and apparatus for applying the same to practical use. The body of the car has any approved double or packed walls serving as non-conductors of heat, and suitable side doors. The car is fitted with two chill rooms, one near each end, and of a size to afford free air spaces at the sides and ends, the center air space being wider for access to the rooms through their doors. These rooms are jacketed with a porous material, and rest upon a slat floor, beneath which are water tanks in which may be stored water or ice, with the drippings of which the porous jackets are kept saturated by a pump located in the center air space, and having suitable pipe connections for discharging the water on to the top of the rooms. The pump is operated from one of the car axles. The bottom of the tank descends each way to a well formed by a depression, and into which the suction pipe extends. Air is forced into the space between the top of the tank and floor on which the rooms rest by one or more blowers, driven from the car axle, for evaporating the water from the jackets to lower the temperature of the rooms. The water not evaporated flows back into the tank, and as but little escapes, a continuous supply is not needed. To increase the air draught the roof of the car is provided with ventilating fans, and although these may induce sufficiently strong air currents, the blowers are a valuable auxiliary. When the car is not moving the blowers are inoperative, and to guard against a rise in temperature, ice chambers opening near their tops for supply of ice are located over the the chill rooms. The devices described provide for cooling the rooms in every exigency of travel and without recourse to independent motors.



TALLICHET'S IMPROVED REFRIGERATING CAR.

Near the bottom of the ice chamber is placed the central portion of a continuous pipe, having a zigzag construction, which serves as a rack to hold the ice and keep it above the drip water. This portion of the pipe is set in an inclined position, and at one end has a branch passing outward and downward and opening to the outer air, and at the other end has a branch passing down into the chill room. Air enters the pipe, and as it passes through the zigzag part in the ice chamber is deprived of its moisture by condensation, and appears in the chill room in a pure, cool, and dry condition, best suited for purposes of ventilation. The incline of the worm permits of a self-discharge of the condensed vapors. At a point as far removed as possible from the cold air outlet, there is passed into the chill room the open end of a pipe the other end of which opens into the case of one of the exhaust fans at the roof. This pipe acts constantly to exhaust and circulate the air of the chill room, thereby avoiding the deleterious effects of "dead air." An arrangement is provided for reducing the temperature of the chill room by saturating its top and side walls with the cold water drip of the ice chamber; this is accomplished automatically and at any premeditated temperature by an electrical contrivance acting on a valved outlet from the ice chamber. The water escaping from the ice chamber fills a shallow tray formed on the chill room roof by narrow ledges, and flows down the sides of the room, materially reducing the interior temperature.

This apparatus is automatic in action, and uses no chemicals as refrigerating agents. The quantity of ice used is reduced to a minimum, as its effects are required only, or principally, when the other means fail by stoppages of the car.