

effects were due solely to the excessive bodily exertion and fatigue. This surely suffices to demonstrate that muscular power and constitutional vigour are not synonymous and that gymnastic training may bring on decline rather than tend to longevity. Now, if an excess of exercise will induce fatal effects in the healthy, it is far more likely to do so in those whose health is somewhat impaired—and though these essays are chiefly intended to apply to the preservation rather than to the restoration of health, I will give a few illustrations of the effect of exertion, when the frame is from any cause enfeebled. I shall never forget the first—a decent-looking seaman applied to the Liverpool Infirmary, whilst I was house surgeon, for admission; he told us he had walked from a certain dock, a distance of about a mile and a half, the road being a continuous but not rapid ascent. He said that he had bronchitis and was obliged to knock off work. Seeing that he was a fit case I at once took him in, and directed the porter to see him at once to his ward—up one flight of stairs—and no sooner did he reach his bed than he lay down and died. During the same winter two such events occurred, and in all the occurrence was as unforeseen as unexpected. Since then I have known a walk across the room to be fatal, the patient falling dead between his bed and the night chair; and another only just able to reach the bed, and there dying within three hours after the most energetic means for restoration. I have known such simple exercise as walking from room to room bring on the most distressing symptoms of heart disease, which has been again quelled by the most rigid enforcement of laziness. Between the extremes thus indicated there is a great number of degrees. Some simply find that they have indigestion, which being attributed, as it too often is, to want of exercise, the individual attempts to cure by still farther exhausting himself. Many is the instance which has come under my notice, in which a man or woman, not content with the toil which his daily business imposes, undertakes to supplement it daily by an hour's walk, and often by two; thus increasing his sufferings till they force him to take a perfect rest.

SCIENCE.

Improvements in Automatic Telegraphy.

Since the 11th September, 1867, the directors of the telegraphic lines have made use, in the service between Paris and Lyons, of a new system of rapid transmission invented by MM. Chaudassaignes and Lambrigot, telegraph clerks. This telegraph acts automatically, transmitting the dispatches between the two towns at the rate of 120 or 180 dispatches per hour by a single conducting wire, a velocity three times as great as that obtained by other systems, and capable of being augmented proportionately to the diameter of the wire. The transmissions are made by a band of metallic paper on which the signals composing the dispatch are traced in insulating ink. The reproduction is obtained on a band of unsized paper, the center portion of which is impregnated with a chemical liquor necessary for the formation of the characters existing on the metallic band. In order to obtain regularity of execution in the different operations, such as the composition, transmission, and reception, they pass through several hands according to the requirements.

One instrument in communication with the line is composed of—1. A clock-work movement. 2. A double roller which sets at work either the metallic or the chemically prepared. 3. A ringing apparatus for calling the attention of the correspondent. 4. A "Morse" manipulator of ordinary construction for the exchange of the conventional signs necessary for setting in movement or stopping the rollers. The clock-work movement is set at work by a weight easily wound up by means of a pedal; it serves to maintain the rollers in movement. Near the roller round which the metallic band passes, is a point which represents the extremity of a conducting wire. The roller communicates with

the electric pile. When the band is drawn into movement by the rotation of the roller, the point is placed sometimes on one of the metallic parts of the band, and sometimes on the written parts of the dispatch where the insulating ink is, so that the conducting wire marks the message by the alternate passage, and breaking of the current. Near the roller, on which is coiled the unsized paper, is placed a cup filled with a solution of nitrate of ammonia and ferrocyanide of potassium. In the middle of this cup is a small roller which dips into the liquid in its lower portion, and the upper portion of which rises a little higher than the edges of the basin and supports the band of unsized paper which, drawn by the rotation of the two rollers, turns the small dipping roller and becomes impregnated with the solution.

A point of iron representing, like that of the metallic band, the extremity of the conducting wire, leans slightly inclined, resting by its own weight upon the damp paper band, and is in communication with the earth. The voltaic current decomposes the wet portion, and leaves a colored deposit which represents the signals of the dispatch. The working of this apparatus is entirely mechanical. The transmission and the reception of the dispatches take place automatically; one clerk superintends the machine. In order to compose the dispatches into conventional signals on the metallic band, another instrument, called the compositor, is employed, similar to that of Morse, the signals of which are employed. The band of metallic paper unrolling itself is raised by a lever so as to touch a thick roller covered with a resinous preparation in fusion, which cools suddenly as soon as it is applied to the metallic band. One clerk can prepare alone 35 to 40 dispatches per hour; the telegraphic staff acquainted with the Morse apparatus can, without any study, compose dispatches. For the service between Paris and Lyons three compositors suffice completely for the transmissions. The dispatches reproduced on a band of chemically prepared paper are handed over to other clerks, who translate them for the printed dispatches distributed to the public.

The result is that two composing clerks, two translating clerks, and a superintendent of the machines of reception and transmission, do as much work by aid of a single conducting wire as six clerks with three wires by the ordinary telegraphic system. A composing apparatus furnished with electro-magnets has been established on a line from London to Paris. When the employé in London wishes to transmit a telegram to Paris for the Lyons line, the only line in which this rapid service is installed, he manipulates as for the ordinary transmissions of the Morse apparatus; the letters or conventional signs are printed on a metallic band, and a few seconds afterwards are transmitted to the chemically prepared paper. Thus we have before us a great improvement in modern telegraphy. Up to the 11th September last the service of the Lyons line was carried on by aid of two or three Hughes' apparatus; each apparatus occupies two clerks and three batteries. By the new system five clerks do all the service with one line only. The new system works admirably and without a single hitch, and we can affirm that the invention of MM. Chaudassaignes and Lambrigot is destined to render great service to the telegraphic service. The economy of installation, and the saving effected in the number of clerks, the maintenance, wear and tear, etc., are marvelous.—*Chemical News.*

Electrical Phenomenon.

The Rochester *Union* says that one of the most beautiful electrical phenomena imaginable was lately witnessed in the office of the Atlantic and Pacific Telegraph Line. Wire No. 1 of this line was down between this city and Syracuse. Suddenly it was discovered that neither wire would work. A continuous current of electricity was then observed to be passing over the wires through the several instruments, and this while the batteries were detached. The current seemed to be of the volume of a medium-sized pipe stem, and it gave the several colors of the rainbow, beautiful to behold. With the key open, the current flowed in