

a sounder. The sounder was connected with a pen which was fastened above the revolving cylinder. At each tap of the forefinger on the sounder the pen recorded on the cylinder in red ink a character of the Morse alphabet. Each cylinder will carry 1,200 words. When the message is recorded on the cylinder the pen is withdrawn and an electric stylus is dropped on the cylinder at the beginning of the message in red ink. Steam power is then applied. The cylinder then revolves with great rapidity and in a minute the 1,200 characters appear on a telegraphic strip of chemical paper at Cleveland, 800 miles away. The paper is wound in a roll the same manner as an apple is pared by machinery. There were seven of these copper cylinders, and they could all be worked at once over the same wire. More than that, each could drop its dispatch at any station along the line. That is what is called the Leggo Automatic system of sending dispatches. The company claim that by it they can transmit 3,000 words per minute after the original dispatch has been transferred to the cylinder in Morse characters. For instance, a dispatch containing 3,000 words is sent to the office for transmission to a certain point. It is cut into seven parts, or "takes," and distributed among the operators, the same as the printer distributes copy among his type setters. Each operator transfers his "take" to a cylinder. When this is done the seven cylinders are set in motion, and the 3,000 words are transmitted simultaneously over the same wire. Thus the company has combined and perfected both the automatic and harmonic systems of telegraphy, discarded entirely the perforations that marked the introduction of the automatic system. It claims that it can send eight and receive eight dispatches at the same time over the same wire. By the distribution of its cylinders it claims that it can send dispatches direct to their destination from any city office without transmitting them to a central station. By the use of the harmonic system the wires cannot be tapped between the sending and receiving stations. Under the Leggo system messages can be transmitted automatically on a single wire, received automatically at the end of the circuit, and retransmitted at the same speed over any number of circuits, all from a single setting on a cylinder.

The two wires between New York and Cleveland are steel, heavily insulated in copper. They each contain over 500 pounds of copper to the mile. Each wire will sustain a weight of 2,500 pounds. The poles are 30 feet high, and of unusual size and strength. There are 40 of them to the mile. It is claimed that the wires are of such supreme conductivity that the electric current on them will not be disturbed by storms and atmospheric changes. The resistance to the electric current on these wires is only 17.10 ohms. It is averred that this brings Chicago, telegraphically, as near New York as Philadelphia, and San Francisco as near as Cleveland, compared with the best wires now in use.

Causes of Fire.

It is now known that when the air in a confined room becomes densely filled with any fine

dust of an organic nature, there is danger of explosion if a flame is introduced. Scientists declare that when any combustible substance, such as sugar, grain or wood is ground to a powder or flour fine enough to float in the air, the rapidity with which it may burn is greatly increased. Their expression is that the rate of combustion is inversely proportioned to the cube of the size of the particles. This signifies an inconceivable rapidity of burning which is so rapid that the gasses formed cannot escape fast enough by ordinary vents in a room, but they may drive out the windows, or even tear strong walls to pieces in their escape. In this manner the famous Washburn Mills in Minneapolis were destroyed in 1878. One of the processes used at these mills consisted in separating coarse from fine flour and driving the fine through a flume into a chamber where it was held in suspension in the air until it settled and could be gathered. When an accidental fire occurred, and the flames reached this room, full of flour dust, there was a most disastrous explosion.

Finely powdered wood dust has to a great extent the same inflammable quality that flour dust has in mills, and a number of fires in wood-working shops have been traced to the ignition of such dust on the roofs or roof timbers and walls. There is an especial accumulation of such dust on roofs near the room where the shavings are drawn from the wood-working machines and used in firing. The blast used carries a large quantity of the dust through the ventilating shaft and scatters it over the surrounding buildings, where it is liable to take fire from the slightest spark. The Pennsylvania road, in their Altoona shops, have obviated this by roofing the top of their shaving room by a series of porous canvas bags which, while allowing the air from the blast to pass away gradually, prevent the wood dust from following. This system is said to have given the best results.

Transmission of Electric Force.

The distance to which electric force can be transmitted without excessive waste has engaged the attention of electricians for some time past. Hitherto it has not been thought possible to transport a force beyond a mile and a quarter, with a minimum loss of 50 per cent, although thick copper wires were used as conductors. Recently experiments were made on the system of M. Marcel Deprez, the foremost of the Parisian electricians at the works of the Nord Railway. A dynamo-electrical machine transported a force equal to three-horse power a distance of twelve miles and a half by means of a single iron wire. But a more amazing result was reached in a second experiment. A force of ten-horse power was transmitted over a distance of twenty miles, less one furlong. The electricity produced by the Deprez machine is of very great tension. There is consequently comparatively much loss of power. There was a large crowd of French, English and American scientists and engineers present to witness these experiments; and it was announced that the French Syndicate of Electricity were about to construct a generating Deprez machine of 1,000-horse power, which is to

distribute, for practical application, 500-horse power over a distance of 100 miles.

Mining Profits and Dividends.

In a recent article the *Mining Review* points out that large stress in some quarters is laid upon the small number of dividend paying mines, in estimating the value of mining as a business. Many labor, says our contemporary, under the false impression that the few dividends paid represent the profit of mining, which is by no means the case. Hundreds of mines are managed by private parties and have paid large profits for years to their owners. The estimated product of gold and silver during the year 1882 is placed by the best authorities at \$80,000,000, and this does not include the value of lead which is one of the most important products of our silver mines and cannot well be separated from their output. The amount of dividends paid by the gold, silver, lead and copper mines of the United States in 1882 is a little over \$13,500,000. The disparity between output and dividend is so great that it is self evident that dividends in no measure represent the profits arising from mining operations. Only those mines owned by stock companies make any announcement of dividends, while it may be stated as a rule that those mines which are operated by private parties and never publicly declare dividends, generally make the best returns to their owners. The dividends being publicly declared their sum total may be given exactly, while the output of mines, usually estimated from transportation companies' records, never exceeds the actual amount produced and probably if largely below the real output.

Hundreds of parties, in different parts of the country are conducting mining operations at a satisfactory profit on the investment of time and money, from whom no reports have ever been obtained; and each year will add to the number of productive and profitable mines as one after another emerges from the development era which is necessary to place the best mine on a working and producing basis.

The following plan for deadening floor is reported to have been made the subject of a recent patent. It is exceedingly simple and not materially unlike plans that have been before proposed. A 3x6 inch plank is directed to be inserted between each joist, two inches from the bottom of the joists, and projecting four inches beneath them. The ceiling boards are nailed to these intermediate planks, and the space between is filled with sawdust to within one inch of the joists. By this mode of construction, the sound is said to be so effectually deadened, that the most vigorous hammering above cannot be heard in the story beneath.

Distillers in the Western States say that owing to the high price of corn, it is impossible to produce alcohol at a figure which enables them to export it at a profit. They find, therefore, that something must be done to limit production in order to keep prices up to a figure which admits of a margin for profit. An agreement to run their distilleries on half-time and thereby reduce production, is spoken of.