AN ACCURATE AUTOMATIC TIME RECORDER.

The illustration represents an improved time-recording mechanism, operated in connection with a standard clock, which gives in permanent printed form the hour and minute at which persons arrive and depart in the morning, at meal time, or at any time of the day or night. It is designed for use in factories, shops, stores, offices, or wherever the time of the employes is required to be noted.

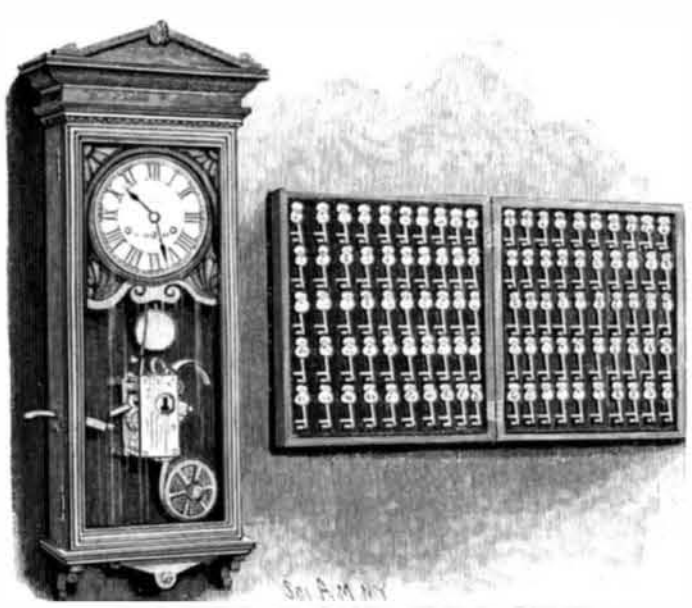
KEY OF TIME RECORDER.

The recording mechanism is arranged in a suitable casing within the clock case, below the dial and behind the glass panel of the door, so that the works can be plainly seen, there being a central opening in the glass in front of the recording mechanism for the admission of the registering key. The clock works are of the best variety made, being the Seth Thomas 100 beat pendulum movement. The ink ribbon is within the casing with the mechanism, and the paper reel is just below it to the right.

To the right of the clock, as shown in the main view, is an open case or keyboard fixed against the wall, in which are hung numbered keys, such as shown in full size in the accompanying cut. Each workman or employe whose time is to be taken is given a number, and when he goes to work he takes his key from the keyboard, inserts it in the keyhole of the recorder, turns it one-quarter around, and then removes and hangs it up again, before passing on to his work. By this movement of the key he has recorded upon the paper ribbon within the machine the number of his key and the exact hour and minute of his arrival. If he is going out instead of coming in, he holds down the lever projecting through the clock case on the lefthand side, and a star is then printed in front of the hour on the paper strip, as shown in some of the instances given in the accompanying illustration. According to the record shown, it appears that No. 21 arrived between 47 and 48 minutes after 6 o'clock; No. 75 at 6:53; No. 28 at 6:56; No. 56 going out at 10:30, and No. 97 going out at 12:3, etc. The paper strip can be readily removed for filing away as often as desired, thus forming a perfect and indisputable record of the workman's time. A bell rings as each record is made, thus preventing one man from registering for another without the act being detected, and after the key is once inserted it cannot be taken out until it registers, neither can a second registry be made without removing the key.

RECORD STRIP—TIME RECORDER.

This time recorder is manufactured by the Bundy Manufacturing Co., of Binghamton, N. Y., and more than a thousand of them are now in daily use in various manufacturing industries and mercantile establishments. In one instance the time of over 1,400 employes is thus kept, five of the recorders being used for this purpose, and in several establishments employing over 1,000 hands the time is thus kept, the instruments in every case giving entire satisfaction.



THE BUNDY AUTOMATIC TIME RECORDER.

Sea Shore Sands.

The sand of which the bulk of the masses of sea beaches is composed is vastly more durable than the seemingly more resisting pebbles. Pebbles wear out rapidly. Scarcely any, even the hardest, can stand a year of steady thrashing on the shore, but these sands endure for ages. The reasons for this are simple. In the first place, each grain of sand is an admirable illustration of the principle of the survival of the fittest. If it be not perfectly coherent and very hard, it will not be carried far before its weakness is found out and it is broken into mud on the pebble beaches, where it is generally made and borne away by the sea to the deeper water. Then, because of their smallness, the grains lie with so little interspaces between them that they hold the water next their faces by capillary attraction. When a wave strikes the shore the grains of sand are pounded together, but they do not touch each other. If we press on the wet sand with the foot we see that the mass whitens as the pressure is applied, and a part of the interstitial water is poured out; take the foot away, and the water returns to the crevices between the grains. Only dry sand will rub grain against grain and give the audible sound which, when it is sharp and clear, is called singing. No beach will thus creak or sing beneath the foot when it is wet.

This curious endurance of rocky matter, in its comminuted form, of the erosive force of the sea makes the sand the natural protector of the land against the fierce assaults of the sea. If sand were easily pulverized, if it were readily floated away, if it had, indeed, any other than its actual assemblage of properties, it is doubtful if the lands could have made good their place in the contest with the ocean. These doughty little champions have certainly kept for our use empires which, but for their good work, would long ago have vanished beneath the waves.—*Prof. Shaler, Scribner's Magazine.*

The Telephone System in Belgium.

In the early days of the telephone its working in Belgium was entirely in the hands of private companies, but excessive competition among them, and the uncertain character of the concessions granted by the state, retarded its development. It was not until 1883 that the State Department of Post and Telegraphs took the matter seriously in hand, and obtained a law authorizing the government to undertake themselves, or to concede (under fixed conditions) to others, the establishment and working of lines. Thereafter, the Bell Telephone Company bought up the interests of the existing rival companies in Brussels, and secured concessions for the other large towns. Other companies have since obtained concessions in various parts of the country. The charges compare very favorably with those in force in this country. In Brussels and Antwerp $50 a year is the ordinary charge, and this is the highest rate current in Belgium. In Louvain, Courtrai, and Maline, only $25 a year is charged, and on the state lines open the rates vary from $30 to about $40 a year. This includes the free transmission of telegrams, home and foreign, over the wires, a privilege which is much valued. In 1890, nearly 800,000 telegrams were thus telephonically transmitted.

AN IMPROVED ORE SAMPLING DEVICE.

The illustration represents an ore sampler arranged to produce two samples of ore which shall be alike, one serving as a duplicate or check to prove the accuracy of the work performed. The improvement has been patented by Mr. R. C. Hawley, of Pueblo, Col. The ore to be sampled is supplied through a hopper, in which is a rotary screen, or it may be supplied direct from a crushing machine. Below the hopper is mounted a swinging wing, so that the ore passing down is divided and passes in equal parts into branch hoppers, the latter discharging into the upper end of a casing divided by a partition into two compartments, as shown in the sectional view. The casing is set on a base containing an outlet into which the lower ends of the central compartments discharge, the bulk of the ore passing through this outlet by a door to one side, while in the base are two compartments receiving the samples from either side. Four sets of oscillating wings, as shown, are arranged below the respective hoppers, each dividing the ore into two equal parts, so that the portion finally passing through the outer channels into the sampling compartments will be both alike in quantity and quality.

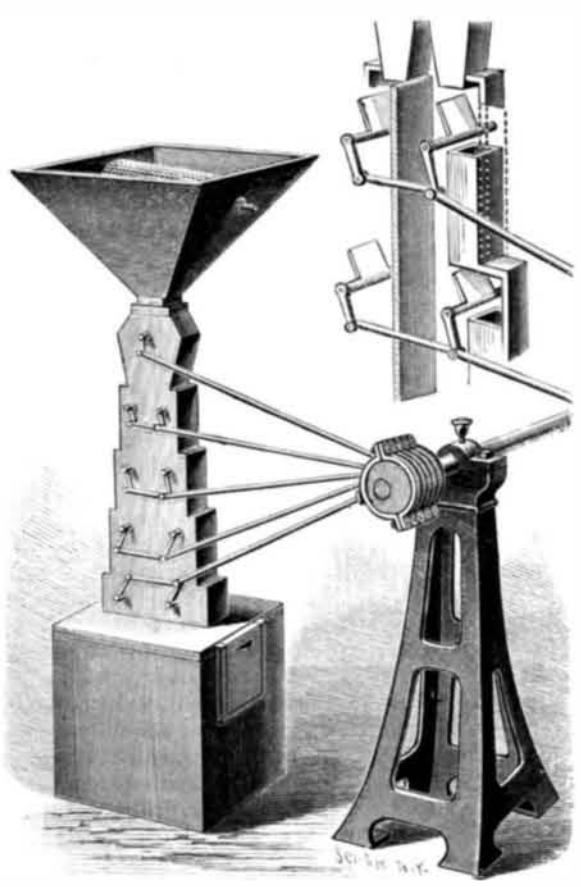
The several shafts of the oscillating wings have arms on their outer ends connected with each other by links, and also connected by rods with eccentrics on a common shaft, by which the wings are oscillated to cross the stream of ore, preferably about a hundred and fifty times a minute, thus insuring an accurate division of the dust as well as the coarser particles of the ore, the travel of the wings being so short that no draught of air is formed

ATTACHMENTS FOR SWIMMERS' USE.

The illustration represents the use of readily applied attachments, fitting the upper and lower limbs of a swimmer, and designed to facilitate the rapid propelling of the body through the water when the legs and arms are moved in the usual manner. The improvement forms the subject of two patents issued to Mr. Patrick Curran, of Hoquiam, Washington. A wristband and bands encircling the hand, but leaving the thumb free, afford support for a plate to which is hinged a paddle-blade of thin sheet metal, as shown in Fig. 3, the hinged connection being such as to allow the joints to flex and the blades to fold inwardly toward the palms when the arms and hands are retracted after the stroke. In making the stroke the blades rock outwardly and lie in planes coincident with the flat sides of the extended hands. Equivalents for the hand attachments are furnished for the lower limbs, two fans being applied on each leg, one inside and one outside of each foot, a little above the ankle, reaching well down on the foot when feathered and almost forming a circle when extended. The fans are attached to the legs, as shown in Fig. 2, by means of one piece of canvas buckling in front with three buckles, two below and one above the hinges, and a strap passing across under the foot and fastened to the canvas on both sides. To compensate for the weight of the attachments and to give buoyancy to the body, a life preserver belt may be worn around the breast, or float attachments, may, if preferred, be secured near each elbow and on each shoulder. The entire equipment is designed to reduce fatigue and conduce to safety, while greatly increasing the speed with which a swimmer can propel himself through the water.

CURRAN'S SWIMMING EQUIPMENT.

DEAD BLACK.—To 2 grains of lampblack add 2 drops of gold size and thoroughly mix. Then add 24 drops of spirits of turpentine and mix. Apply with a thin camel hair brush.



HAWLEY'S ORE SAMPLING DEVICE.