

provements, of which so much is promised, are the result of 12 years of unremitting labor. In brief, it is intended by this invention to make cams, cogs, levers and electricity to do the work of brains, hands and experience; to send messages with the enormous rapidity of mechanism; to have them received and recorded automatically and without the necessary presence of an operator; to make money for the capitalized companies and to save it to individuals. If successful, it is the cheap postal telegraph system in a nutshell. The inventor calculates that messages can be sent by the new system at something less than one-tenth of their cost by the present improved Morse system, allowing for power, machinery, batteries, paper and the salaries of operators and other employes. There are, it appears, four machines, or instruments, which constitute the system. Each one of them would be useless without the other. The first is built on the general principle of the type-writing machine, but instead of printing characters cuts slits of greater or less length in an interminable strip of hard and stiff manilla paper, with pointed knives, which are raised alternately through the lower and upper edges of the paper by a system of levers worked by a series of brass keys, the strip of paper passing from a wheel through a narrow brass galley and under constant pressure over the little slots through which the knives work. Foot, hand, water or steam power may be used in running the machine, and an expert operator can strike from 150 to 200 letters per minute. The length of the slit indicates the letter to a small fraction of an inch. This strip of paper, whose marks are not those of a punch, but cut slits in a rapidly moving strip, is then placed in a machine connected with a battery, and moves quickly through it. Two constantly revolving wheels with sharp, but not keen edges, fall readily into the slits—upper and lower alternately—of the paper, and thereby make an electrical connection with a receiving instrument at another office, with a set of knives similar to those in which the original slip is placed. The knives in the second machine cut slits of a length corresponding to those in the original, and can be read by an expert, although they can be printed in the fourth machine with such rapidity as to make handwriting comparatively tedious and useless. This last instrument points on somewhat the same principle as the gold and stock automatic telegraph, but the letters are printed from the cut slip without any other interference than that of the power by which the machine is run. These messages record themselves, and the presence or absence of an operator at the receiving end is of no consequence. They can be sent with all the rapidity of which perfect mechanism is capable, and will, it is claimed, average 200 to 250 words per minute, or approximate 15,000 words per hour of constant work. All delay will be in the preparing instruments, and the work then can be accomplished by operators at such times as the wires are occupied from other stations.

Perhaps the most remarkable feature of the system and the one which will strike operators and electricians as the most improbable is the simplest. It is that all messages can be sent to any particular station, and to no other, and without being heard or repeated at any other. The "call" is so arranged in its automatic way that, while the machinery is in movement in every office, the knife-like wheel only fills the call slits on the tape in the office for which it is intended, giving an automatic reply, and the similarly-moving wheels in every other office, failing to fit the slits, have no impression.

WRITING BY SOUND.

[The printer's "copy" from which this prophetic paragraph has been set up is an old clipping from a newspaper yellow with age, and bearing other evidences that it originally appeared many years ago. How remarkable has the prophecy been fulfilled in the Phonograph and the Telephone! Another decade, and we shall see greater things than these.—Ed. C. S. W.]

The time may come, though it may seem premature to expect it, when a man's words will be made to write themselves down automatically as fast as they come from his lips—when a speech will yield a sound picture, or a sonogram, that we may gaze upon as we now do upon a light picture, and translate as we do the notes of a piece of music. Nonsense, you say? It is no nonsense, no dream. Go ask a physicist if he can conceive its possibility, and unless he be a very narrow-sighted member of his community, he will reply that he can. You who now say "nonsense," would have said the same fifty years ago, if any one had told you that some day the image of your countenance would paint itself photographically. But before you repeat your derision think of this: Light is a wave motion, and the chemist has found a substance which the waves, as they dash against it, can transform or transmute; and so we have got photography. Sound is a wave-motion; its waves are as breakers, lights are as ripples; the former large and slow, the latter small and rapid. Now, since we have got the substance that is impressible by the little, weak waves, why should we despair of finding a substance that will alter under the influence of the great, strong ones? We can make a lamp glass ring with the voice pitched to a certain note; soon we may cause the same sound to vibrate a body that will make a mark on paper as it swings, and then we can make another working body vibrate to another sound, and so on up the gamut. Thus we shall get an apparatus which will mark the notes of a melody, each as it is sung; and after this it is not difficult to conceive a series of vibrators each attuned to one of the few separate and distinct sounds that the human voice can utter. Here will be an analogue to the photographer's camera placed before a speaker, such an apparatus will sonograph all he has to say. Some who smile at this will live to see the thing done.