

way." The things we invent are children of the intellect and the affections. Man has no power to make or improve a thing without a love manifested toward the thing he desires to make better. The man who invents sees the improvement he wishes to make as we see the solar light before the sun makes his appearance in the morning.

One of the hindrances to our free use of improvements is that they have been bought up and laid aside by monopolies because they interfered with the sale of goods already in the market, and that has discouraged men of genius from trying to make appliances that would benefit the profession.

TELEMETER SYSTEM.

The uses to which the telemeter may be applied are so numerous and so varied as to render it impossible to describe them all in detail within the limits of a single newspaper article. Some of the more prominent uses to which this instrument is applied are the transmission to one or more distant points of the indications of thermometers, barometers, and pressure gauges; also for indicating at a distant point the height of water or oil in open or closed tanks, or the height of gas holders.

To accomplish the transmission of these indications two instruments are required, one for transmitting and the other for receiving and recording, the two instruments being connected by wires so as to form complete electrical circuits, which are supplied with a current from a suitable open circuit battery. A number of receiving instruments may be used in the same circuit.

The telemeter system has been in practical operation for a number of years, proving itself to be accurate and reliable in all of its applications. It has recently been much simplified and improved, both mechanically and electrically.

One of the uses to which the telemeter has been applied is that of transmitting time from a master clock to a series of dials. In this particular application its merits have been shown to the best advantage. As a time system, it has proved accurate and in every way desirable.

The transmitting instrument is substantially the same for all uses, and the receiving instrument is, in part, a copy of the transmitter, with the addition in some cases of apparatus for making a permanent record. The receiver is also provided with an alarm for giving notice when the prescribed maximum or minimum indication is reached. As indicated by the illustrations, the mechanism of the instrument is very simple and of such a character as to require no attention after being placed in position for use.

Without going minutely into detail, the operation of the apparatus may be briefly described as follows:—

The transmitter has a step-by-step motion, which is provided with two magnets, one for turning the step-by-step motion in one direction and the other for turning it in the opposite direction. These magnets are in separate local circuits, each of which is provided with an auxiliary armature and contact closer, so that when the current is supplied to the magnet its armature will be attracted, and through the medium of the pallets and motor wheel will rotate the index arbor. The transmitting instrument with the dial removed is represented in Fig. 1.

The apparatus thus described appears on the front of the base plate beneath the glass of the case. The complete mechanism is here shown, with its electrical connections. The thermometer, pressure gauge, or other primary instru-

ment whose indications are required is placed back of the transmitting mechanism in such relation to the latter that the movements of its hand will close the circuit-controlling devices.

The receiver is provided with step-by-step mechanism like that of the transmitter, but the contact makers are omitted. Each magnet of the receiver is connected by a line wire with the circuit closer of the corresponding magnet of the transmitter, the latter acting as a relay for closing the circuit through the receiver, so that every impulse of either of the magnets of the transmitter is repeated by the corresponding magnet of the receiver, thus turning the index arbor of the receiver synchronously with the index arbor of the transmitter. By this action of either of the magnets of the receiver the circuit is broken and the mechanism of both transmitter and receiver is moved one step, and the instruments are both ready for a new impulse in either direction from the primary instrument.

When it is desired to preserve a record of the indications of the receiving instrument, a toothed sector is attached to a shaft journaled in the frame of the instrument and arranged to be engaged by a pinion on the index arbor. This toothed sector carries an arm provided at its free end with a pen which rests upon a graduated paper dial carried by a clock movement arranged in the lower part of the receiver case, as shown in Fig. 2. These graduated dials and the clocks to which they are attached are adapted to either daily or weekly records, as desired. A part of a day's record is shown in Fig. 3. The circuits are shown diagrammatically in Fig. 5.

These are described as follows:—

a, hand carried by thermometer, and arranged to give the initial contact. *a'*, *a''*, insulated spring-supported contact points. *a*¹, wire connecting contact point, *a'*, to screw, 2, and magnet, *M*². *a*², wire connecting contact point, *a''*, to screw, 1, and magnet, *M*¹. 1, 2, contact screws insulated from the base of the transmitter. 3, 4, contact springs fastened to initial armature. 5, 6, light armatures connected together, pivoted between the plates of the transmitter, and normally held in the central position, so as to bear on the faces of their respective magnets. 7, 8, insulated contact screws. 9, 10, contact springs fastened to the driving armatures and electrically connected to the base of the transmitter. 11, 12, armatures carried by the pallet lever for driving the machinery of the instrument. 13, circuit-breaking lever connected electrically with the plates of the instrument. 14, spring of the circuit-breaker insulated from the base of the receiver and connected electrically to one pole of the battery, *B*. 15, lever for holding the pallets in the central position. 16, pawl for holding the driving wheel, *W*, in its normal position. 17, 18, pins in the fork to act upon the incline of the lever, 15. *W*, driving wheel pivoted between the plates and used in all instruments. *L*¹, line connecting magnets, *M*¹ and *M*², of the transmitter to the base of the receiver. *L*², line connecting insulated part, 7, of transmitter with magnet No. 3 of the receiver. *L*³, line connecting insulated part 8 of transmitter with magnet No. 4 of the receiver. 4 *B*, line connecting the base of the transmitter with one pole of the battery, *B*. *M*⁵, *M*⁶, magnets of intermediate receiver connected to lines connected with corresponding magnets of the receivers. The operation of the apparatus is as follows:—The hand, *a*, which is always in connection with the battery, moves and makes contact with the commutator point, *a*^u, thus closing the circuit. The current passes through the line, 4 *B*, thermometer hand, *a*, commutator, *a*^u, wire, *a'*, and magnet, *M*¹, then from the transmitter through line, *L*¹, to the base of the receiver; from thence