

Electric Fire Alarm System of Toronto.

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This system is best made plain by a description of the different instruments used, and then by a short account of the work performed by each. First, then, the batteries, the prime source of power, and at which the working of the whole system depends are placed in

FIRE HALL, NUMBER ONE, ON BAY STREET.

Within a room on the second floor of the hall, arranged on shelves occupying two sides and one end of the room, are rows of glass jars. The kind of battery used is that known as the gravity battery, which consists of a glass jar about 8 inches high and 6 inches in diameter, having a zinc casting suspended near the top, and a copper plate placed on the bottom, and provided with a gutta-percha-covered wire leading out of the jar. One or two pounds of sulphate of copper are placed on the bottom of the jar and enough water is poured in to cover the zinc about one inch. As the name of the battery indicates, its action is dependent on the separation of the sulphate of zinc, which is formed at the top of the jar, and the sulphate of copper solution which gravitates towards the bottom of the jar. When the water in the upper part of the jar becomes saturated with sulphate of zinc, the sulphate crystallizes upon the zinc plate, stopping the action of the battery. The conducting power of a solution of sulphate of zinc is greatest when the sulphate is diluted with an equal quantity of water. Part of the solution, therefore, is from time to time removed by means of a syphon, and replaced by water. On a stand in the room is a large box filled with sulphate of copper, from which the batteries are replenished when required. The city is divided into five fire districts, so that five distinct batteries are necessary. The district having the greatest length of wire is provided with the largest battery, composed of 60 cells, while that district lying nearest to the battery station has only 30 cells. It is found that the current of electricity generated by this kind of battery is the most regular that can be obtained; and since the cells require cleaning but once a month, both on this account and also in regard to cost, it is preferable to all others. The metallic copper deposited on the positive pole often shows the crystalline nature of the metal. The strength of these batteries is well exemplified by the story related by the foreman of the Bay Street Hall of an occurrence that happened on Temperance Street. One time during an alarm of fire, the wires became by some accident broken, and a man passing attempted to repair the mischief. While endeavoring to do so he grasped one end of the broken wire in his right hand and the other end of the wire in his left. Immediately he did so the current of electricity traversed his body, and coming from such a

powerful battery he was rolled over and over in the mud on the roadway, till some one more conversant with the subject passed along and by placing the two broken ends of the wire in contact with each other, released the unhappy man from his miserable plight. From the batteries five wires pass out into an adjoining room where they are in connection with *Galvanometers*, by which the intensity of the current is registered, and any weakness in a particular battery is made known that it may be remedied at once. In this room are also the *automatic repeaters*. These are instruments by means of which when the current is broken in a wire from one of the five districts, the effect is conveyed to the four other districts. These repeaters consist of four brass instruments placed side by side, the construction of which is as follows:—Near the end of the case in which they are contained is an electro magnet on the first or longest circuit. The armature of this magnet is in connection with an india rubber cylinder, on one part of which is placed a plate of iron. On this plate of iron rest two platinum points, joined on to the wires from the second electric circuit. When the two platinum points (separated by an interval of one-quarter of an inch), are resting on the iron plate, the electric current passes between the two points. When the current is broken in some part of the first line the armature is released, the cylinder revolves, and the two platinum points rest on the india rubber cylinder, which is a non-conductor, and the current is broken in the second line. This broken current releases an armature from a magnet on the second line which causes the second cylinder to revolve, thus breaking the connection in the third circuit, and so on through all the lines in the five districts. This causes the alarm to be given at all of the stations in the city simultaneously, but as each station has only a certain number of boxes to attend, no confusion is caused by a general alarm. From the batteries we follow one wire only, as the arrangements in one district are that of all the others. After leaving hall number one, the wires, placed on poles, run along the tops of these till a corner is reached, where a fire alarm box is placed. Here the wire bends down along the pole, traverses the box and is again carried up to be continued along other poles and through all the other boxes in that district till it communicates with the fire hall. In this building it is in connection with the large bell, the gong and the doors in front of the horse stable, whence it is continued out of the building again and back to Bay Street to the battery. So that each fire district is traversed by a perfect current of electricity, the only means of communication with the currents of other districts being at the repeaters and that only in case of an alarm being given.

THE FIRE ALARM BOX.

The internal arrangements of three boxes only have been examined, but as they are

all constructed on the same principle a description of one will suffice. Internally connected with the handle which comes to view when the outer door of the box is opened, is a collection of clock work, so arranged as to be wound up when the handle is pulled down. Part of this clock work is a brass wheel, on the periphery of which a number of cogs are fastened, having different arrangements for different boxes. At the box under consideration, No. 129, the cogs are situated in this fashion: One cog, a long space void of cogs, then two cogs with an interval of half an inch between them, then a long space followed by nine cogs, also with spaces one-half an inch long between each two of them, then a long space. When the handle is released, the clock work, which has been wound up, begins to run down, the wheel with the cogs on its circumference revolves, and each time the two platinum points ending the incoming and outgoing wires slip off a cog, the electric connection is broken all along that circuit, the large bell rings, the gong strikes, and the door in front of the horses flies open. Then the two platinum points are raised on the next cog, thus completing the electric connection, again to be broken in the next space. It can easily be seen how that the number 129 is struck on the large bell when the alarm is given from box No. 129. The clock work is so arranged that the same number is struck four times (in Canadian boxes), five times in American boxes, the brass wheel revolving four or five times. It is unnecessary to enumerate the many mistakes that are continually being made by people who are ignorant of the working of the system, pulling the handle in the wrong manner. One example is sufficient to illustrate this point. During a certain fire, a man went to the box, which was No. 15, and after opening it gave the handle fifteen different pulls, thus deranging the whole system.

THE GONG.

This is an apparatus inside the hall on which the numbers are struck so that the firemen may know at which box the alarm is given and thus are directed where to drive. As only five of the stations in the city have large bells it is necessary for all the others to be provided with this apparatus (and indeed some of them have both large bells and gongs). Each gong is composed of an elongated box under which is placed a bell or soulder. The wire enters the top of the box, passes through an electro magnet and again issues at the top. When the current is broken, the armature falls back from the end of the bar of soft iron and releases a weight of about twenty pounds, wound up after every three alarms. This weight causes a hammer to strike the bell, then the electric connection is again made, the armature is attached to the end of the bar of soft iron and the weight remains stationary till the connection is again broken, when another blow is sounded upon the gong. As from the numbers struck on this cog or on the large bells the fireman must gather