FIRE BELLS.

Great Effect of Pulling a Little Hook.

Complicated Apparatus to be Seen in the Dome of City Hall.

Ingenious Devices for Recording Time and Detecting Faults.

Four strokes on the bell of the Old South Church, then two, then eight, and the passer-by pulls out his box list and knows there's a fire over in Charlestown, by Chelsea bridge. At the same instant clappers are striking, forty-seven other bells all over the city, from Charlestown Neck to West Roxbury, and the Brighton steam whistle is symbolizing the woes of the doomed and dying cattle close by. A hundred large gongs are waking the echoes of engine houses, and smaller gongs are disturbing the occupants of newspaper and other offices. And all this because but a few seconds before somebody had pulled down a little hook in the box way over on Chelsea Bridge. How did the result come about?

In that box was clock-work run by a spring. Pulling the hook tightened the spring and started the clock-work. One of the wheels had on its edge little bits of rubber, fourteen in number, in three groups, four in one, two in another, eight in a third. Through the wheel and a rod that pressed against it ran an electric current. As the wheel revolved the rod hit the pieces of rubber, and as rubber is a non-conductor, every time the rod hit a piece the current was stopped—broken, the electricians call it. The electric current was one of nineteen that ran from the City Hall out over the city in various directions. On these circuits were all the fire alarm boxes, arranged as far as possible so that they should alternate, in order that if one box shouldn't work the nearest one to it, being on another circuit, might be used to give the alarm.

To see the effect that breaking the circuit had you must go the City Hall, ride up as far as the elevator goes, then climb another flight and enter a room large, light, overlooking the whole business section of the city, and fairly lined with all sorts of

Electrical Instruments.

Here Assistant Superintendent C. A. George, who is in charge during the day time, will courteously explain to you the workings of all this complicated apparatus. Suppose, as you enter, an alarm comes in from some other box, say box 320, which is out in Harrison square. Simultaneously with the first tap on the gong a number will appear on an indicator like that in elevators, only larger. It will be the number of that one of the nineteen circuits on which box 320 is placed. Instantly, Mr. George jumps to the registering instrument, turns a switch, the clock-work starts up and a strip of paper comes out one side of the glass case on which the registering pen will have made a row of marks like this:

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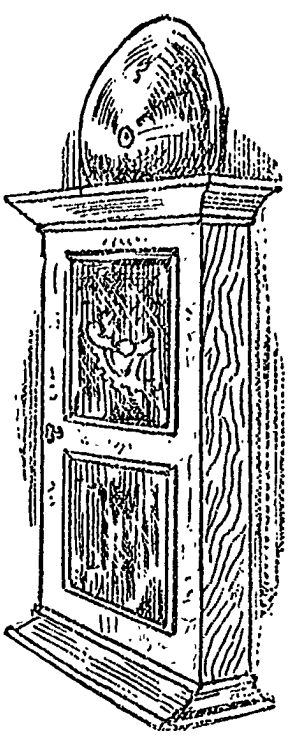
"320" is the box and the operator jumps to the switchboard, which lines that end of the room. Here on a slate back are dozens of little brass switches arranged in rows. The frame of the switchboard is elaborately



THE ENUNCIATO

and beautifully carved—the work of Assistant Engineman Harry Hoyman of Engine 22. Mr. Hoyman also carved the panels of the counter that runs across the room. The most admirable of these represents an engine going to a fire, and the execution is perfect. Other of the panels are reproductions of the State and city seals, a bas-relief head of Franklin and a man pulling in the box at a fire. Such a skilful carving does credit both to the department and the carver.

But we have forgotten the operator and his work. He has reached the switchboard, and now he takes the handles of the frames that connect the switches and swinging them to the right connects the circuit that has sent in the alarm with all the bell circuits. But two motions are necessary for this, and then he jumps to the right to the "repeater." This is an oblong case on the front of which are three dials, each perhaps a foot in diameter. On these are hands like those of a clock. The hand on one dial he turns till it points at the figure 3; the hand of the next he turns to 2; of the third, to 6, and the bells all over the city begin to ring.

As the bells are in the same circuit with the boxes, one naturally asks, "Why don't they ring when the box hook is pulled?" It is because a direct current will set the relays in the office at work, but will not move those of the bells. In an ordinary relay the iron attracted by the electro-magnet is soft. In the bell apparatus it is of steel, magnetized, and is between the poles of two electro-magnets. A direct current keeps it close to one of the magnets, and it does not move when that circuit is broken. But if the current is reversed it will spring over to the other side and give a jump every time that reversed current is broken. That jump makes the clapper strike the bell. The machine with three dials is really a "reverser," and its clock-work serves to break the reversed current at the right intervals.

Meanwhile what is called "the box-gong circuit" has been

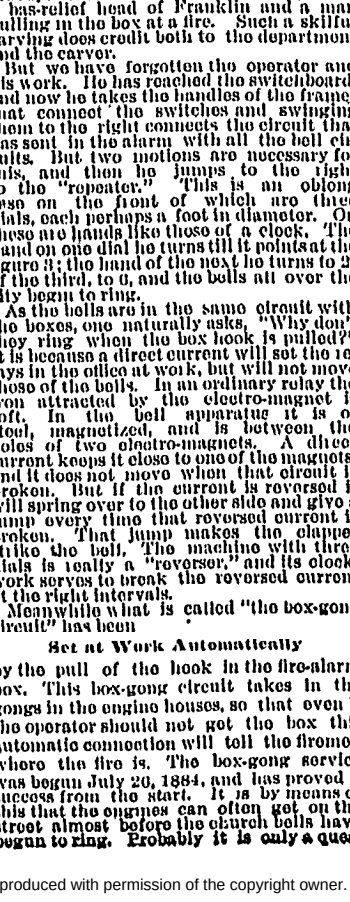
Set at Work Automatically

by the pull of the hook in the fire-alarm box. This box-gong circuit takes in the gongs in the engine houses, so that even if the operator should not get the box this automatic connection will tell the firemen where the fire is. The box-gong service was begun July 20, 1864, and has proved a success from the start. It is by means of this that the engines can often get on the street almost before the church bells have begun to ring. Probably it is only a question of time when the box-gong service shall entirely supplant fire bells. At present these are only needed for the benefit of the call force in the suburbs and to tell the general public of the location of fires. To do away with ringing the bells would save about half the battery power of the fire alarm department, and would save the operators a great deal of trouble and responsibility.

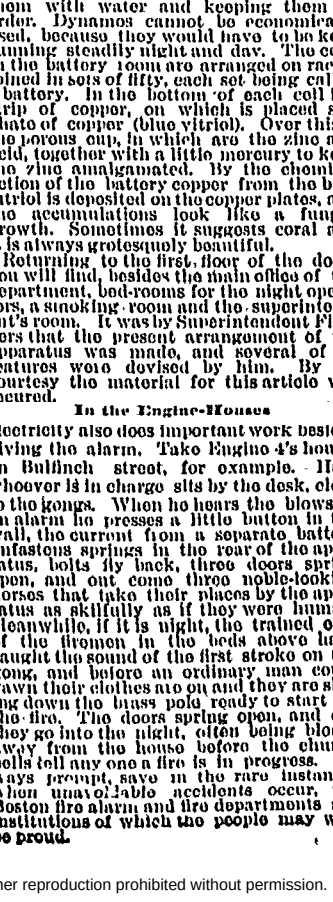
The latest ingenious device put in the office is an automatic time stamp. As the paper comes out of the register, the operator presses a stamp, and on the paper will be printed a clock dial with the hands indicating just the time the stamp was pressed.

Another new and wonderful mechanism is the automatic fault detector. By clock work a hand is rotated like an hour-hand, making the round in an hour. Every minute and and a half it passes over a bit of copper connected with one of the circuits. If that circuit is crossed or grounded a vibrating bell will be started and kept going till the operator stops it. Then a lineman is sent out to remove the trouble. By means of delicate galvanometers the operator can tell approximately in what part of the circuit the fault lies, and when the lineman opens a box and telegraphs to the central office, the operator can tell him whether it is to his right or left.

By far the greater part of the work of the department consists of tending to the instruments and circuits. Every twenty minutes the operator has to test the relays of the box circuits to see that their adjustment is correct. A sort of watchman's indicator shows whether the night operators attend to this. There are four operators in all. Mr. George has charge from 8 a. m. to 4 p. m.; then another comes on and stays till 10 p. m.; a third stays till 3 a. m., and a fourth till 8 a. m. The night men sleep in the office when not on duty, and that every possible precaution may be taken against the operator's falling asleep, dropping in a fit, or dying suddenly, a vibrating bell is set a going in the bed-room by the ringing in of an alarm. The operator's first duty then is to turn the switch and save his comrade from having to get up and see what is the matter.



SETTING THE ALARM.



CHARGING THE BATTERIE

All these instruments and circuits are run by batteries in the battery room above, in the second story of the dome. Here are over 1000 cells of the Serson-Kauffer battery, a combination of the gravity and the Daniells. The cells have to be renewed every eight months, but it keeps one man busy all the time filling them with water and keeping them in order. Dynamos cannot be economically used, because they would have to be kept running steadily night and day. The cells in the battery room are arranged on racks, joined in sets of fifty, each set being called a battery. In the bottom of each cell is a strip of copper, on which is placed sulphate of copper (blue vitriol). Over this is the porous cup, in which are the zinc and acid, together with a little mercury to keep the zinc amalgamated. By the chemical action of the battery copper from the blue vitriol is deposited on the copper plates, and the accumulations look like a fungus growth. Sometimes it suggests coral and it is always grotesquely beautiful.

Returning to the first floor of the dome you will find, besides the main office of the department, bed-rooms for the night operators, a smoking room and the superintendent's room. It was by Superintendent Flanders that the present arrangement of the apparatus was made, and several of its features were devised by him. By his courtesy the material for this article was secured.

In the Engine-Houses

electricity also does important work besides giving the alarm. Take Engine 4's house, on Bulfinch street, for example. Here whoever is in charge sits by the desk, close to the gongs. When he hears the blows of an alarm he presses a little button in the wall, the current from a separate battery unfastens springs in the rear of the apparatus, bolts fly back, three doors spring open, and out come three noble-looking horses that take their places by the apparatus as skilfully as if they were human. Meanwhile, if it is night, the trained ears of the firemen in the beds above have caught the sound of the first stroke on the gong, and before an ordinary man could yawn their clothes are on and they are sliding down the brass pole ready to start for the fire. The doors spring open, and out they go into the night, often being blocks away from the house before the church bells tell any one a fire is in progress. Always prompt, save in the rare instances when unavoidable accidents occur, the Boston fire alarm and fire departments are institutions of which the people may well be proud.

THE SWITCH BOARD.