

PHILADELPHIA'S HIGH-PRESSURE FIRE PIPE LINE.

The high-pressure pipe line which has recently been installed to protect what may be termed the "congested district" of Philadelphia consists of four principal supply mains running west, and these four principal mains are connected, to form a gridiron system, by six cross lines running north and south.

One main is provided with three fireboat connections.



A Stream of Water Directed almost Vertically into the Air.

There are 139 specially constructed hydrants on the system, with two outlets at each hydrant for specially constructed 3½-inch hose.

An exhibition was arranged by the committee of the Philadelphia Fire Underwriters' Association, to show the number of effective streams which could be delivered through leads of 300 feet of 2½-inch hose with 1¼-inch nozzles from the static pressure which is to be constantly maintained on the system from the Belmont reservoir without the aid of any fireboat or pump pressure; the number of effective streams which could be obtained under the same conditions but with the aid of the pressure obtained from the fireboats; the effect of substituting 300 feet of 3½-inch hose with 2-inch nozzles instead of 2½-inch hose with 1¼-inch nozzles, under gravity pressure from the reservoir, and also the same under the fireboat pressure; and the results to be obtained by connecting the fireboat pressure with a water tower. The engineering work which made the tests possible is to be credited to the Hoffman Engineering Company, of Philadelphia, to which firm we are indebted for the photographs herewith reproduced.

The exhibition began at the corner of Broad and Sansom Streets, 1½ miles from the Delaware River, as far away as possible from the fireboat connections and where, owing to the elevation, the gravity pressure from the Belmont reservoir would be the minimum. Twelve lengths of 300 feet of 2½-inch fire department hose were connected with two hydrants on Broad Street main by means of three-way connections attached to each of the two outlets of each hydrant, thus having six 2½-inch leads of hose from each hydrant.

The exhibition of the static pressure was interesting, showing as it did the loss of pressure by friction through 300 feet of hose, and how little reliance should be placed on gravity pressures of 70 to 80 pounds at the hydrant when such lengths of hose have to be used.

The pumps of the fireboat "Stuart" were started gradually under a steam pressure of 135 pounds, the water pressure at the pumps rising to 220 pounds in ten minutes, the steam pressure being about 100 pounds at that time. The increased pressure at the pumps seemed to be felt at Broad Street about one minute later and at Race Street in less than that time. With two nozzles open at 3.06, the pressures at the boat being steam, 130 pounds, and water, 100 pounds, the streams were thrown about 70 feet, the nozzles being held at an angle of about 45 degrees. At that time the gages at idle hydrants showed: Race Street, 90 pounds, and Broad Street, 78 pounds. Six nozzles open at 3.12 with pressures at pumps being steam, 100, water, 220; and at idle hydrants, Race Street, 185 pounds, and Broad Street, 165 pounds, threw streams 175 feet at same angle. In the next seven minutes additional streams were opened successively up to twelve, during which time one of the two pumps on the "Stuart" was shut down for repairs. The water pressures at that time ranged as follows: at pump, 140 to 180; at Race Street, 95 to 130; and at Broad Street, 70 to 110; and streams were thrown in increasing numbers from 160 to 130 feet. At 3.20 the pressure from fireboat "Ashbridge" was added and at 3.22 the following water pressure at boats was obtained (the pump on the "Stuart" being again in service), viz.: "Ashbridge," 250; "Stuart," 190; which showed one minute later at Race Street, 175; Broad Street, 155, with twelve streams thrown 175 feet. The opening of the hydrant at 6th and Race Streets discharging through 50 feet of 3½-inch hose with 2-inch nozzle reduced the pressure about 25 pounds at Broad Street with twelve streams thrown about 150 feet (a loss of about 25 feet in distance). At 3.34 the fireboat "Visitor" was also added, and for four minutes water pressures were maintained as follows: "Stuart," 150; "Ashbridge," 220; "Visitor," 140 to 170; twelve streams being thrown about 150 feet, pressures at Race Street being noted at 125 to 130; and at Broad Street, 102 to 109. All boats were then stopped and hose disconnected from hydrants.

Four 300-foot lengths of 3½-inch hose with 2-inch nozzles were then connected to the same hydrants and one stream opened at 3.56 under gravity pressure from Belmont reservoir only. This stream was thrown 75 feet, the nozzle being at an angle of about 45 degrees and the idle hydrant gages read: Race Street, 60; Broad Street, 55. With two streams in operation water was thrown about 50 feet, the pressure being 53 at Race Street and 47 at Broad Street. When at 4.03 the "Stuart" began to pump into the system and reached a water pressure of 225 pounds with steam pressure of 120 pounds, two streams were

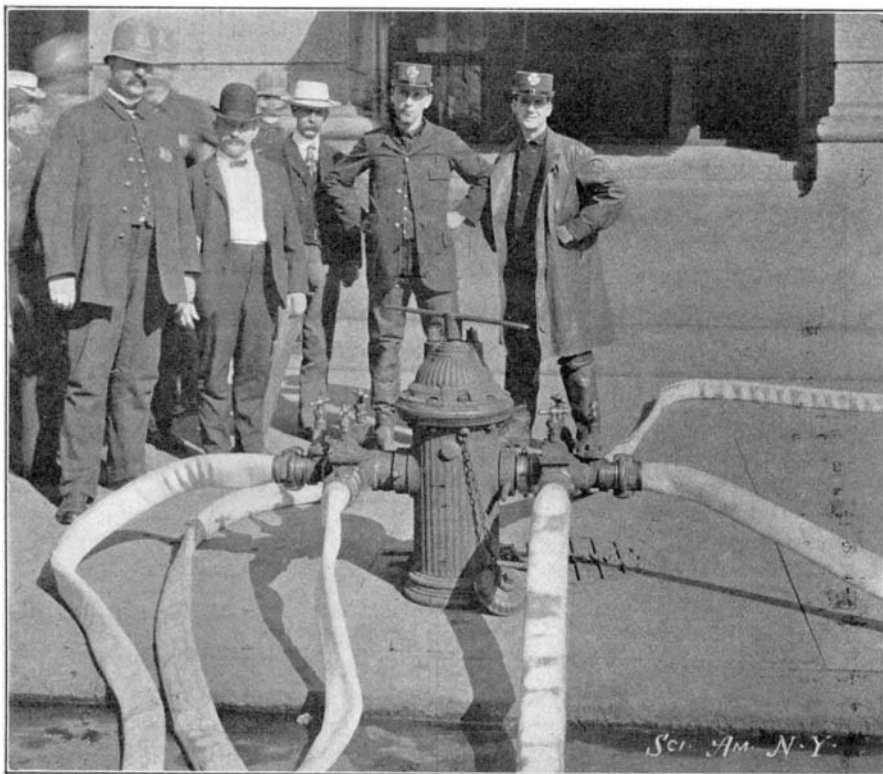
forced 230 feet and the hydrant pressures were: Race Street, 200, and Broad Street, 178. At this time the gage at the base of the play-pipe showed 44 pounds, but it is doubtful if this gage was registering correctly, as in view of the streams thrown and the pressures at the hydrants such a showing seems inconsistent. (Experiments made by Mr. S. A. Charles would indicate that the nozzle pressure should have been at least 98.) With



A Water Tower at Work.

from 190 to 195 pounds pressure at the pumps, three of these large streams were thrown 175 feet and four streams 150 feet. With the "Ashbridge" and "Visitor" added these four streams were thrown 190 feet; three streams, 200 feet; two streams, 225 feet; and one stream, 262 feet; the pressures ranging as follows: "Stuart," 210 to 220; "Ashbridge," 260 to 270; "Visitor," 220 to 250; Race Street hydrant, 170 to 210; Broad Street hydrant, 145 to 195; play-pipe, 36 to 50 (doubtful, as explained). While a single stream was being thrown the hydrant at Race Street was opened as before, which reduced pressures at Broad Street about 30 pounds and the length of the stream about 50 feet.

A Hale (largest size) water tower, with a 2-inch nozzle elevated 65 feet above the street, and two 2-inch nozzles on the truck about 4 feet above the pavement, was then connected to the hydrant by two 100-foot leads of 3½-inch hose, and under 200 to 250 pounds water pressure from pumps on the "Stuart" alone, the elevated nozzle threw a horizontal stream about 200 feet and at the same time the two nozzles on the truck threw streams about 250 feet in an angle of about 30 degrees.



One of the Six-Hose Hydrants.



Twelve 2-Inch Streams of Water, Thrown 200 Feet.

PHILADELPHIA'S HIGH-PRESSURE FIRE PIPE LINE.