Opening of Fire Plugs.—The recent order of the Mayor to the Lieutenants, directing them to enforce the ordinance relative to the opening of fire plugs, except in cases of fire, is likely to work disadvantageously in some Districts. This, however, will scarcely lead his most inveterate opponent to censure him for directing the enforcement of a law which Councils should take an early step in remodeling. 38-1

Lieut. Wettmore, of the Ninth Ward, assures us that the use of the plugs is almost indispensable in certain portions of his police division. For instance, the contractor for cleansing the streets of the city has heretofore had the use of the plugs for the purpose of cleaning the market houses, which it is found necessary to wash out from two to three times a week during the summer season.

The large quantity of produce exposed for sale along Market st., from Eighth to Broad, causes an accumulation of offal in the gutter, and the use of the plugs to cleanse them thoroughly is indispensable to prevent a stench, and remove stagnated water and filth of various kinds. There can be no question of the necessity for using the public water in a case like this, but the non-enforcement of the law in this instance would form as great a subject of complaint as the subject now referred to. The ordinance should be promptly reconstructed to meet a case like the present.

water.

Trial of the Steam Engine.—Yesterday afternoon, the steam fire engine, "Young America," built in Cincinnati, by Mr. Abel Shawk, was tried in the Moyamensing Prison yard. A large number of persons gathered, and about three hundred were admitted into the enclosure. The engine was drawn from the Tobacco Warehouse by three horses, and reached the prison at 2½ o'clock, under direction of Mr. Shawk and the Chief Engineer of the Fire Department, Mr. B. A. Shoemaker. The "Young America" weighs 3½ tons; has 8 receivers for the water, and 5 pipes for discharging the water—one of which is 3 inches diameter in the clear. The steam cylinder is 11⅜ inches in diameter, the pump 7⅜ inches, with a stroke of 25 inches. Shortly after 3 o'clock the shavings and pine wood were put into the fire chamber, and at 20½ minutes past 3 the torch was applied. In 5½ minutes precisely the steam began to show; in 6½ minutes the register exhibited 15 pounds, and at 7 minutes and 20 seconds 50 pounds. At 8 minutes the engine was started, and, with 110 pounds of steam, and 36 strokes per minute, two streams were thrown, through two sections of hose 62 feet long each, a distance of 163 feet from the nozzles of the branch-pipes. One of the streams was through a one-inch nozzle, and the other a seven-eighths-inch nozzle. Subsequently a distance of 132 feet was attained by the same streams through the nozzles designated by a higher pressure of steam. A single stream out of a one-inch nozzle was also tried, and the distance reached was 176½ feet from the nozzle, or 238½ feet from the engine.

The water to supply the engine was obtained from the plugs in and outside the prison yard, and notwithstanding there were eight streams attached, soon after the engine began to work the supply failed, and during the remainder of the trial the quantity of water was totally inadequate to test the real force of the steam engine. The Diligent Engine and Southwark, Robert Morris and Vigilant Hose Companies furnished the hose.

Another trial will be made of the "Young America," in a day or two, when it is hoped a full supply of water will be obtained. The Diligent Engine will be tried at the same time. Three points have been suggested: Ridge avenue and Spring Garden street; Fourth and Wood streets, and Second and Christian streets, but the place remains to be fixed upon. 38-4

Seeing Stephen ... Republican.—The crowd

Surveying Without Instruments.

It often happens that a surveyor or engineer wishes to determine approximately distances and localities, but, having no instruments with him, is compelled to adopt such means as he can get within his reach. The following chapter from Gillespie's Land Surveying contains some good suggestions:— 38-5

DISTANCES BY PACING.—Quite an accurate measurement of line of ground may be made by walking over it at a uniform pace, and counting the steps taken. But the art of walking in a straight line must be first acquired. To do this fix the eye on two objects in the desired line, such as two trees or bushes or stones or tufts of grass. Walk forward, keeping the nearest of these objects steadily covering the other. Before getting up to the nearest object, choose a new one in line farther ahead, and then proceed as before and so on. It is better not to attempt to make each of the paces three feet, but to take steps of the natural length, and to ascertain the value of each by walking over a known distance, and dividing it by the number of paces required to traverse it. Every person should thus determine the usual length of his own steps, repeating the experiment sufficiently often. The French Geographical Engineers accustom themselves to take regular steps of eight-tenths of a metre, equal to two feet seven and a half inches. The English military pace is two feet and six inches. This is regarded as a usual average; 108 such paces per minute give 3.07 English miles per hour. Quick pacing of 120 such paces per minute give 3.41 miles per hour. Slow paces, of three feet each, and 60 per minute, give 2.01 miles per hour. A horse, on a walk, averages 330 feet per minute, on a trot 650, and on a common gallop, 1040. For longer times the difference is more apparent.

An instrument called a pecometer has been contrived, which counts the steps taken by one wearing it, without any attention on his part. It is attached to the body, and a cord passing from it to the foot, at each step moves a toothed wheel one division, and some intermediate wheel work records the whole number upon a dial.

DISTANCES BY VISUAL ANGLES.—Prepare a scale, by marking off on a pencil what length of it, when it is held off at arm's length, a man's height appears at different distances, (previously measured with accuracy,) of 100, 500, 1000 feet, &c. To apply this, when a man is seen at any unknown distance, hold up the pencil at arm's length, making the top of it come in the line from the eye to his head, and placing the thumb nail in the line from the eye to his feet. The pencil having been previously graduated by the method above explained, the portion of it now intercepted between these two lines will indicate the corresponding distance.

DISTANCES BY SOUND.—Sound passes through the air with a moderate and known velocity; light passes almost instantaneously. If, then, two distant points be visible from each other, and a gun be fired at night from one of them, an observer at the other, noting by a stop watch the time at which the flash is seen, and then that at which the report is heard, can tell by the number of intervening seconds how far apart the points are, knowing how far sound travels in a second. Sound moves about 1090 feet per second in dry air, with the temperature at the freezing point, 32 deg. Fahrenheit. For higher or lower temperatures add or subtract 1 1-7 foot for each degree of Fahrenheit. If a wind blows with or against the movement of the sound, its velocity must be added or subtracted. If it blows obliquely, the correction will evidently equal its velocity multiplied by the cosine of the angle which the direction of the wind makes with the direction of the sound. A gentle, pleasant wind has a velocity of 10 feet per second; a brisk gale 20 feet per second; a very brisk gale 30 feet; a high wind 50 feet; a very high wind 70 feet; a storm or tempest 80 feet; a great storm 100 feet, a hurricane 120 feet; and a violent hurricane, that tears up trees, &c., 150 feet per second. If the gun be fired at each end of the base in turn, and the means of the times taken, the effect of the wind will be eliminated.

If a watch is not at hand, suspend a pebble to a string (such as a thread drawn from a handkerchief) and count its vibrations. If it be 39⅛ inches long, it will vibrate in one second; if 9 inches long, in half a second, &c. If its length is unknown at the time, still count its vibrations; measure it subsequently; and then will the time of its vibrations, in seconds, equal the square root of the length of the string divided by 39⅛.—*Railroad Record.*

A Sad Disappointment.

Great indignation has been raised among the advocates of the party in power, in consequence of the re-election of Frederick Graff as Chief Engineer of the City Water Works. "A dead set" was made at Mr. Graff, in consequence of his contumaciousness in refusing to join "the Order." It was thought that it was not judicious to allow any person to perform a service for the city who was not bound by the strictest obligations. Mr. Graff refused to "join," and, although it was universally admitted that his scientific attainments and experience were such that his displacement would be very disadvantageous to the general interests, still his stiff-necked rebelliousness was so flagrant that the good of the city was considered nothing to the necessity of administering to him a rebuke, which would have also been of most impressive significance to others in like cases offending. In "American" caucus it was determined to support Frederick Erdman for Chief Engineer. At the election on Tuesday last, by Councils, that candidate received the Know-Nothing support, but quite unexpectedly the Democrats voted for Mr. Graff in solid force, some of the Whigs joined them, and two or three Know-Nothings "bolted" from the caucus nominee. The result was that Mr. Graff received 49 votes, while Mr. Erdman could only count up 44. Weeping, wailing and gnashing of teeth has been the consequence, and much indignation at their defeat is manifested by the "American" politicians. The public, we imagine, will be well satisfied with the result. In capacity, fitness, and practical knowledge, Mr. Erdman is not to be compared to Mr. Graff, and the removal of the latter would have been regarded as an injury to the public. 38-2

ARTISTICAL AND ARCHITECTURAL.

Size of Joists.—Will you allow me to ask what the usual method is for calculating the strength of joists required for any given space, and if a floor with a bearing of 15 feet is properly supported by joists 6 × 2 ?—P. P.

*** Tredgold gives the following rule:—"Divide the square of the length in feet by the breadth in inches, and the cube root of the quotient multiplied by 2·2 for fir or 2·3 for oak will give the depth in inches." According to this the joists for the bearing named should be 10 inches by 2¼ inches, or 9½ inches by 2¾ inches, 12 inches apart. 38-3