tion be maintained for the forty per cent yet to produce before the vessel is ready for trial, it will result in all records for battleship building being at least equaled if not surpassed.

The accompanying line drawing, which has been reproduced from the working plans of the ship, gives an excellent impression of her general appearance when viewed from abeam, and also reveals for the first time many interesting particulars of her construction. The most striking feature is the two lofty steel lattice masts, each built up of hollow steel tubing running in reverse spirals from deck to top platform. This platform will be occupied by the officers who will have charge of fire control; and it will be their duty to record the fall of the shots, determine the range, and telephone the results down to the officers in the various gun turrets. Note should also be made of the three openwork towers, each surmounted by a large searchlight. Compared with previous battleships, there is a distinct absence of top hamper in the way of lofty flying bridges, boat cranes, and superstructures. The turrets are all arranged on the longitudinal center line of the ship, consequently the whole strength of the battery can be concentrated on either broadside. The secondary battery of fourteen 5-inch guns is mounted on the gun deck. Probably in future ships these guns will be mounted one deck higher, in order to lift them clear of spray and broken water. The "North Dakota" will displace 20,000 tons on her normal draft of 26 feet 11 inches. She will be driven by Curtis turbine engines of 25,000 horse-power at a speed of 21 knots. Her coal supply when the bunkers are completely filled will be 2,500 tons.

SUCCESSFUL TEST OF NEW YORK'S HIGH-PRESSURE FIRE SERVICE.

(*Concluded from page 332.*)

the valves at the pumps are adjusted to 100 pounds pressure at the outset, and until otherwise ordered this pressure is maintained at the pumps. It must be remembered, however, that with pressures in excess of 50 pounds at the nozzle it is impossible for firemen unaided to direct the stream or even to hold the nozzle, which must be made fast in some way or a turret nozzle or water tower must be employed. It is just this that at present limits the efficiency of the high pressure, as often a fireman may gain a difficult but advantageous position where a small stream properly directed will do great execution. The nozzle holders now used by the New York fire department have iron spider legs with prongs, which when fastened in the asphalt, or wood, or between granite blocks furnish a firm support for the nozzle, which can be directed by two or three firemen. While there is always available a sufficient volume of water to drown out any fire, yet it must be remembered that damage by water is just as serious as damage by fire, so that it will take some little time for the firemen to learn how to use the high pressure judiciously; but against any large fire where a large volume of water is needed, or in the case of an incipient conflagration, the usefulness of the high-pressure service is not open to the slightest question. For from eight hydrants with but six of the ten pumps at the two stations in operation can be discharged some 23,000 gallons per minute at a station pressure of 270 pounds, or at the rate of 33,000,000 gallons in 24 hours. There could be concentrated at such a point as the corner of West and 12th Streets a greater volume of water and at a greater pressure than could be supplied by practically all the available engines on Manhattan Island. From eight hydrants could be taken thirty-two lines of hose, affording water to twenty-six nozzles either 2 inches or 1¾ inches in diameter, six of the 2-inch nozzles being supplied by siamesed connection from two lines of hose. Or the same eight hydrants might be used to supply both the high nozzle and the deck pipe of a water tower, and the turret nozzles of four hose wagons, in addition to ten 2-inch nozzle streams siamesed from twenty lines. Streams thus furnished can be sent without difficulty to the top of a twelve-story building, but for a building of this height or even higher the method to be followed, where possible, would be to fight the fire from the inside, connecting the high pressure to the standpipes of the building, and those of neighboring structures if necessary, as each high building is required to have such standpipes and an adequate supply of hose on each floor, through which powerful streams of water could be delivered even on the highest stories.

In its ability to deal effectively with any possible fire in a large high building and to prevent absolutely any large fire becoming a general conflagration or extending beyond its point of origin in a district where the number of fireproof buildings is all too small, the New York high-pressure service as now in operation marks a distinct epoch for a fire department even as efficient and well equipped as that of New York city, while as a piece of well designed and executed municipal engineering the entire installation has received unstinted praise.

Correspondence.

THE WALSCHAERT VALVE GEAR.

To the Editor of the Scientific American:

In your paper dated October 31, 1908, I note what you say in regard to the Walschaert gear in your engineering column on page 295. You speak of its being adopted recently. If you mean that it has been adopted in America inside of ten years, I wish to call your attention to an interesting fact.

Mr. William Mason, builder of locomotives and cotton machinery in Taunton, Mass., built in the early sixties an engine called the "William Mason" for the Boston, Clinton & Fitchburg Railroad. This engine was a six-wheeled bogie, and was equipped with Walschaert gear or valve motion as it is sometimes called. Unless I am mistaken, two or three other locomotives were built, equipped with the same valve motion, for some other railroads. I have a picture of this locomotive at home, and the next time I return, I shall be glad to send it to you if you desire. One interesting thing may be noted, however, that Mr. Mason was laughed at and ridiculed when he built this locomotive. But the railroad officials said that there was not her like for pulling. Mr. Mason was a man who knew how to build locomotives; for proof ask any engineer who has run one of his locomotives. If he were alive to-day he could and would probably laugh at the builders who build these enormous locomotives, as much as they did when he equipped his locomotives with the Walschaert valve gear. Charles E. Fisher.

Hanover, N. H., November 1, 1908.

SOLID VS. PNEUMATIC TIRES.

To the Editor of the Scientific American:

Having noticed an article in your issue of August 29, on comparative tests made between solid and pneumatic tires, I am prompted to give a little of my experience as the patentee of twenty-two different types of both solid and pneumatic tires and as the promulgator of crosswire tires which now are well known in all countries on the globe and which tires constitute no less than 90 per cent of all solid tires used on motor-driven vehicles.

Before commenting upon the report on tests made, I wish to say that we will admit generally that there is no tire as easy riding and will cause less vibration on a motor-driven vehicle than a pneumatic tire, provided the same is not too highly inflated.

In reporting tests, however, between solid and pneumatic tires, it is the plain and honest duty of the reporter to state at what pressure the pneumatic tire was inflated when the test was made, as well as the solidity to which the solid tire was cured and the shape thereof. Solid tires can be cured to such a carrying capacity that one cubic inch will carry 500 pounds without yielding ¼ inch, while it can be also cured so that a cubic inch of rubber will only carry 5 pounds to yield the same distance, and without the reporter giving the consistency or carrying capacity to which the solid tire was cured, the report is of no account and cannot be used to enlighten the inexperienced.

The writer's experience has proven that a solid tire not properly formed, that is cured so hard that it will, on a rough pavement, bounce from one cobblestone to the other and will not keep down to the roadbed, is very little better than a steel tire; but on the other hand when the tire is molded in such a manner so that there will be one portion of it always compressed, so that when the wheel strikes an obstacle in the road (which has a tendency to raise the wheel off from the roadbed), this portion of rubber will pop down and keep in contact with the roadbed and prevent the wheel, which would be off the ground, from acquiring a very high speed while the car almost comes to a stand-still, thus losing power and grinding off rubber unnecessarily when the wheel again comes down to the earth, will show entirely different results.

We insist that solid tires must be kept down to the pavement in order to ride comfortably and in order that you can acquire a high speed. It is no difficult task whatever to acquire a speed of from 25 to 45 miles an hour on solid tires, provided there is a bead on the tread of the tire which will, with a normal load, be compressed to the extent of ½ inch, so that when you strike an object that has a tendency to raise the wheel ½ inch, this bead can relieve itself and assume its normal shape and reach down and keep the wheel in contact with the road.

The writer had at one time designed tires that were placed on high-speed cars capable of running 50 miles per hour. The tires were smooth treads and cured rather hard. They were cured with a view of acquiring carrying capacity rather than comfortable or fast riding and it was impossible to make more than from 18 to 19 miles per hour on reasonably good pavements, as the tire was off the pavement nearly half the time, and when it would come down the tire had acquired such a speed that when the wheel struck the pavement it was as though an emery wheel would come in contact with a piece of chalk—the roadbed would grind the face of the tire down so that there soon would be nothing left on the rim.

Finding this unsatisfactory, we removed the tires and placed upon the same wheels tires with a center bead measuring about ½ inch high. This bead was compressed completely out of sight as the car stood on the pavement.

While running the car, we found it a very easy matter to acquire a speed of 40 miles per hour over the same pavement on which it was impossible to get a speed of 20 miles per hour with the hard, smooth-face tire, and we would acquire this 40-mile speed with less fuel than was used with the hard tires when we were scarcely making 19 miles per hour.

After having made this experiment, and found that the speed to be acquired on solid tires depends upon the tires being softly cured and provided with a bead that would quickly adapt itself to the unevenness of the roadbed, we have decided that the art of successfully making use of solid tires will depend greatly upon the judgment exercised in shaping and curing the rubber and the proper application of the same to such loads as they are adapted to. All solid tires should be loaded, in order to acquire a rapid speed (without too much vibration) to nearly their full carrying capacity, with good buoyant springs between the axle and body of the car. Tires for electric cars used on pavements generally should have narrow treads.

My experience has also led me to believe that while pneumatic tires generally prevent vibration, they can be inflated so highly and solid tires can be cured so softly and built so high above rim that when the two are passing over the same obstacle side by side at the same speed, the pneumatic tire will rise 50 per cent higher in passing over the obstacle than the solid tire will, and consequently cause more vibration.

J. A. Swinehart.

Akron, Ohio.

The Current Supplement.

The current Supplement, No. 1715, opens with a brief illustrated article by Frederic Blount Warren on the recently completed Walnut Lane bridge at Philadelphia, which is the largest concrete bridge in the world. The effect of motors on macadam roads is ably set forth by L. W. Page, director of the Office of Public Roads. What the electric furnace is doing in Germany is explained in a simple convincing way that reduces the whole matter to dollars and cents. At the Franco-British Exposition held this year, the display of modern ordnance attracted a large share of public attention. The most complete display in this department was that of Vickers, Sons & Maxim, which display, in addition to several models of battleships and armored cruisers, included a very complete exhibition of rapid-fire guns, ranging from the heavy 7.5-inch piece down to the little rifle-caliber automatic, capable of delivering 500 shots a minute. In all, 22 illustrations of these wonderful weapons are published in the current Supplement, together with a brief article in which their purpose is explained. The military use of the airship and aeroplane is capably discussed by Major Goebel of the German army. Mr. E. J. Munby contributes an article on "Further Improvements in Coal Washing Jigs," in which he amplifies Mr. Driescher's information. Sir Hiram Maxim has been busily engaged in exposing the fallacy of systems for breaking the bank at Monte Carlo. His convincing scientific arguments against such folly are presented. The usual Trade, Electrical, and Engineering Notes will be found in their accustomed places.

Official Meteorological Summary, New York, N. Y. October, 1908.

Atmospheric pressure: Highest, 30.58; lowest, 29.56; mean, 30.13. Temperature: Highest, 84; date, 17th; lowest, 38; date, 31st; mean of warmest day, 73; date, 17th; coolest day, 42; date, 31st; mean of maximum for the month, 66.3; mean of minimum, 52.9; absolute mean, 59.6; normal, 55.5; excess compared with mean of 38 years, + 4.1. Warmest mean temperature of October, 61, in 1900. Coldest mean, 50, in 1876. Absolute max. and min. for this month for 38 years, 88 and 31. Average daily excess since January 1, + 1.7. Precipitation: 1.92; greatest in 24 hours, 0.86; date, 25th and 26th; average of this month for 38 years, 3.65. Deficiency, —1.73. Accumulated deficiency since January 1, —0.21. Greatest precipitation in October, 11.55, in 1903; least, 0.58, in 1879. Wind: Prevailing direction, northeast; total movement 8,470 miles; average hourly velocity, 11.4 miles; max. velocity, 50 miles per hour. Weather: Clear days, 14; partly cloudy, 6; cloudy, 11; on which 0.01 inch or more of precipitation occurred, 9. Frost: Light, 13th and 14th.

Volcanic Ash as a Building Material.

Consul George H. Scidmore, of Nagasaki, forwards a pamphlet, printed in English, issued by a Japanese company, which describes the use and importance of volcanic ash in combination with Portland cement, especially for construction work in salt water. The advantages claimed for this volcanic ash are that in combination with Portland cement it gives a greater tensile strength than cement mortar alone. It is also claimed that the mortar is denser than cement mortar and does not permit the percolation of water, thus obviating the injurious action of sea-water salts. This density gives it a superior quality for construction of water reservoirs and reinforced concrete for the protection of iron from oxidation. The consul adds that should the correctness of the Japanese company's claims be proved by trial, it is highly probable that the enormous volcanic resources of the Philippines will provide for a new and profitable industry.

Bleaching Soda.—I. 5,000 parts of soda-water glass are heated and thoroughly mixed with 2,000 parts of calcined soda. The resultant hard mass is reduced in a stamping mill. II. Mix 2,500 parts of soda-water glass, 3,500 parts of calcined soda, 300 parts of pulverized borax, 400 parts of powdered soap, 300 parts of potato starch. III. Mix 8,000 parts of pulverized soda crystals and 2,000 parts of powdered water-glass.