Hydraulic Power.—The Great Brooklyn Organ.

The new organ just put up in Rev. Henry Ward Beecher's church in Brooklyn, N. Y., by the builders, Messrs. Hook, of Boston, is the largest ever built in this country. Its bellows is driven by hydraulic power. The machinery of the motor is simple, and can hardly be put out of order; the motive power is derived from the reservoir on which the Brooklynites depend for water, and will be absolutely reliable, though, in case either machinery or water give out, it can also be worked by hand. The water is governed by a crank at the side of the organist, who has before him a water-gauge and four bellows' indicators. The hydraulic engines in the cellar are four in number, consisting each of an upright cylinder, into which the water is admitted by a double-acting valve, which throws the jet alternately above and below the piston. The pressure of the Ridgewood water is about 45 pounds to the square inch; and the piston is of 6 inches diameter, and has a 12-inch stroke. The air is thus pumped up into the bellows on the ground floor, and its supply is regulated by the same contrivance which graduates the hight of water in a steam boiler. When the organist is using the full range of the instrument, the levers connecting the bellows with the working-valves below are depressed and let in the full power of water; and as the quantity of wind decreases, the levers proportionately regulate the rapidity of the piston-stroke by closing out the water. So that it is thoroughly automatic, and effective throughout the whole compass of power. This apparatus is used in the organ of Plymouth church for the first time in the United States. It is the invention of an English organ-builder named Cox, and has been patented in this country. Messrs. Hook have purchased the patent.—*American Artizan.*

Steel Rails.

Steel has many important advantages over iron beyond that of its superior durability. It is a consideration of much importance that steel rails would not involve more than one-fifth the interruption of the line consequent upon relaying. But it is a very much more valuable property of Bessemer steel that it is secure against breaking. For when we speak of steel rails we assume that they are made under a contract by which any bar, taken at random, must withstand the blow of a weight of one ton falling 25 feet, the rail being laid upon 3 feet supports. Steel rails may be taken up during a hard frost and bent double under a steam hammer without breaking, although steel that would stand this test without cracking would be somewhat softer than would be desireable. The test by a ton weight on a 25 feet fall should be enforced under all contracts for steel rails. Any good steel rail will withstand it perfectly, while an iron rail would be broken with the same weight on a 5 or at most a 10 feet fall. Steel rails, besides their greater durability and tensile strength will bear, as girders, nearly twice the load of iron rails of the same section, as carefully ascertained by Mr. George Berkley, the engineer to the Great Indian Peninsula Railway Company, and who has ordered many thousand tons of steel rails. The greater stifness of the steel rail enables it to distribute the weight upon the wheels of a train over an increased number of sleepers, and thus over an increased surface of ballast. The line, therefore, remains in better condition than when laid with iron rails, and there is far less weakness at the joints. The ends of steel rails, especially when they are not fished, have been fully proved to be at least ten times as durable as the ends of iron rails, being at once stiffer, harder, and tougher. Old steel rails, too, bear at least as high a proportion to their original value as iron rails. It is a fact that steel plates worth £30 per ton in the market are rolled from the crop ends of steel rails, and these, which will pile and weld, are now worth from £7 to £8 per ton, new rails selling at prices varying between £12 and £16. Old steel rails can be melted in a cupola into white iron; they can be reconverted along with new metal in the converter; they can be cut, piled, and welded; or they can be at once heated and be rolled into bar steel and plate steel of good quality. Considering, therefor, that they have no disadvantages as compared with iron rails, unless it be their greater first cost, which is much more than compensated by there far greater durability, it is not remarkable that they are coming into rapid use, nor that the London and North Western Railway Company should have established large and costly works of their own at Crewe, capable of making 360 tons of steel weekly. Sixty-three miles of the company's line were already laid with steel rails at the time of the last half-yearly meeting. The Great Northern Company have decided to lay steel rails through their principal stations and upon all the inclines upon their line; but when we consider that, with the exception of a short length of 1 in 110 near Kingscross, none of their inclines are steeper than 1 in 178, and that they are mostly 1 in 200, we cannot doubt that steel will soon be adopted for the whole line. As for other lines, we may say that at least 1,000 tons of Bessemer rails are made weekly in England and Wales, and probably 400 tons on the continent of Europe. The evidence in favour of steel is now become so clear, and the reasons for its immediate adoption so obvious, that we cannot but think that it is a most mistaken policy for engineers and railway managers to longer postpone the use of steel, whether upon the ground that it will yet become cheaper or otherwise. A generation of iron rails will have worn out before any considerable reduction can be expected in the price of Bessemer steel. One cannot doubt that the time will come when iron rails will be obsolete, just as the old cast-iron tramps and, after them, the fish bellied rail passed out of existance.—*Engineering.*

Purifying Water.

Mr. Bird, of Birmingham, has patented the use of the neutral sulphate of alumina for purifying water. Its action depends upon the presence of carbonate of lime in the water to set free hydrated alumina, and as carbonate of lime is almost universally present, the process is as universally applicable. The advantage of the use of this compound is, that beyond converting carbonate into sulphate of lime it introduces no new salt, while the organic matter is carried down with the hydrated alumina.