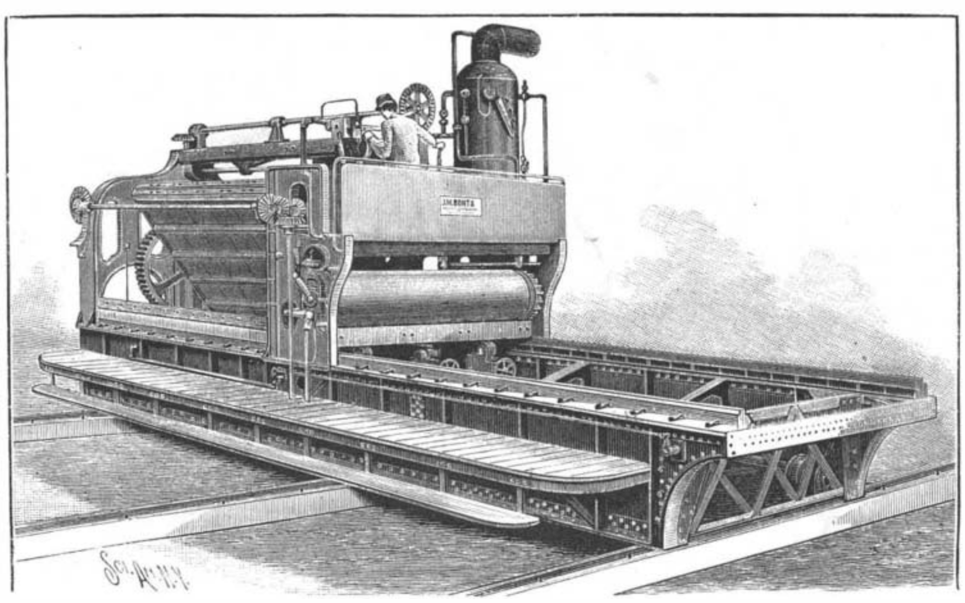
THE BONTA GLASS ROLLING MACHINE, GLASS GRINDING AND POLISHING MACHINE AND ANNEALING OVEN.

The manufacture of plate glass has hitherto been conducted by a comparatively simple process. The melted glass is poured out upon a rolling table, is rolled out by a roller, and then is immediately transferred to the leer or annealing oven. When the glass is first introduced, the leer is very hot; the temperature is gradually allowed to fall, and after a sufficient time, depending on the thickness of the plate, it is allowed to become perfectly cold. The plate is then withdrawn and ground by mechanical processes on one side. It is then turned over by hand, an operation involving the greatest danger and the cause of numerous breakages. When successfully turned, the other side is ground. For the grinding operations the plate is bedded in plaster of Paris. Owing to irregularities incident to the rolling process and to upheavals or distortions of the floor of the leer, a great quantity of glass has sometimes to be ground away before the even surface is reached.

We illustrate an improved glass-rolling machine, one presenting most striking features of novelty and ingenuity, the invention of Mr. J. W. Bonta, of Wayne, Pa. The several cuts give a good idea of the machine, whose operations will now be described.

Its base, built up of plate girders, provides two parallel roller tracks on which the iron and steel bed for supporting the glass while being rolled traverses back and forth. The movement of this bed is effected by power. Over the center of the machine rises a roller housing surmounted by a bridge. On the bridge is established an eight horse power steam engine and boiler for actuating all the parts of the machine. Duplicate beds on which the glass is rolled are provided, flat tables of metal, one of which only is in the traversing position at a time, the second bed being supported in the rear of the machine in an inverted position, some distance above the traversing tracks. In the large cut one of the beds is seen in the front and has just received its charge of melted glass. It is resting on bearers, which in turn rest on the track. Racks gearing into pinions on both sides of the roller are provided, one at each side of the bed. In the rear of the roller housing is seen the second bed, inverted and held at some distance above the track or ways. The bed so raised can be lowered and drawn up again by power applied by the same steam engine. In its rear will be seen a gear wheel. The longitudinal axis of the bed ends at the center of this gear wheel. If the gear wheel were turned, the bed would turn with it.

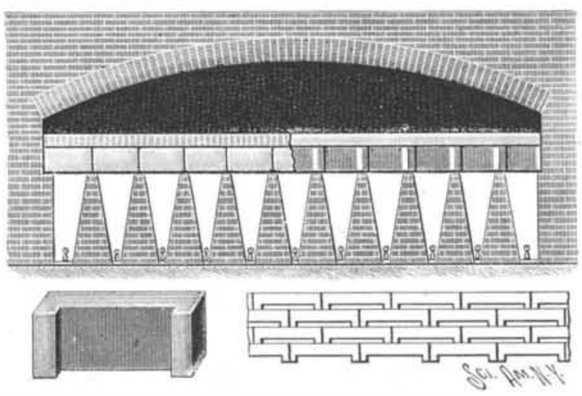
The description of the operation of the machine will explain its construction further. Taking it in the position shown in the large cut on the front page, the engine, which is kept in continuous motion, is thrown into gear with the roller, set at the desired height according to the thickness of glass to be produced. The roller begins to turn, and the end pinions operating on the racks draw the bed and glass toward the rear of the machine under the roller, thus rolling out the molten mass into a plate. When the rear of the machine is reached, the roller is stopped; the upper bed, which, it will be remembered, is in an inverted position, is lowered on top of the hot glass, and the two beds are clamped together. They are then raised, the glass being held between them, and rotated. This phase of the operation is shown in the small cut on this page. As soon as the horizontal position is reached, the beds are lowered again on the bearers; the upper one, on which the glass was rolled, is lifted, the rollers is tarted in reverse motion and the plate is drawn back again beneath it, so that the glass is rolled upon the other side. Nearly everything about the machine is done by power, one engine actuating the whole mechanism, even to the clamping together of the beds. Throughout the most ingenious details of construction obtain, for whose description we have not space here. This much applies to the rolling of plate glass. The feature of reversing the beds leads to the manufacture of embossed glass of the largest size. Thus, in place of the flat plate on which the glass is first rolled, may be substituted a mould of any desired design and of any size within the limits of the structure. Upon this surface the melted glass is poured and the mould is drawn as described, under the roller, which forces the material, or "metal" as the glass workers call it, into the minutest detail of the design. Reaching the rear of the machine, the plate is clamped between the beds as described; they are raised and reversed, the mould is lifted, leaving the relief plate complete and resting on its back, design upward, ready to be run to the front of the machine, the roller being lifted out of the way, and thence to be transferred to the leer or annealing oven.



THE BONTA GLASS ROLLING MACHINE—ROTATING THE BEDS AND PLATES.

To effect these transfers the entire machine, which weighs some seventy tons, is mounted on traversing tracks, by which it can be brought in front of any one of the series of leers. By chains operated by hand windlasses in front of the machine, the plate of glass is drawn into the leer for annealing.

This system of rotating a great sheet of glass is so efficacious that its use in the grinding process was almost a foregone conclusion. Accordingly, another of Mr. Bonta's inventions is for a glass-grinding machine, which is represented in principle by the rear section of his glass-rolling machine. The great sheet of glass taken from the cooled leer is covered with plaster of Paris, and one of the beds of the grinding machine is lowered on it. After setting, it is clamped between the beds and turned over by the machine and its other surface is ground and polished. Plaster of Paris is then poured over it and the second bed is lowered upon it.



General section of oven. Ventilating bricks. Plan view of ventilating brick section.

J. W. BONTA'S ANNEALING OVEN FOR PLATE GLASS.

When all is set, the mechanism rotates the two beds with the plate clamped and secured between them, lowers them, and lifts off the upper bed. The plaster of Paris is then removed and the remaining surface of the glass is ground and polished. When it is remembered of what large size glass is now rolled, the immense advance in the grinding apparatus over the old system of turning the great plates by hand will be perceived. Another advantage is incident to this system. The plaster of Paris being deposited on the glass, and not on the bed, forms a more perfect union with the glass, to the exclusion of air bubbles. These air bubbles are bad in their effects, as where they exist the glass yields in the grinding process, and more grinding is required to bring all to a level.

In the leer devised by the same inventor, a system of ventilation beneath the floor is introduced in order to prevent the floor from upheaving. Referring to the sectional cut, immediately beneath the chamber of the leer is seen the floor of fire bricks laid close. Beneath these come a range of fire bricks of the shape shown in the lower left hand figure of the cut, placed vertically. The plan view of these bricks is shown in the lower right hand figure of the cut. These flues open only downward. The substructure is a series of brick piers or foundation walls. At the bases of the spaces between the piers are blast pipes; air being blown through them keeps the foundations cool and prevents any upheaval of the floor.

It is anticipated that by rolling both surfaces of the glass and by annealing it on a leer with perfectly level floor, a saving of very large amount in the glass to be removed by grinding will be effected. By the improved grinding table, the superior embedding in plaster of Paris of the glass, together with the absolutely safe method of reversing, will insure a great saving from loss by breakage. The rolling machine also, it will be seen, opens entirely new possibilities in the rolling of embossed glass. The saving of manual labor throughout will also be very great.

As a test object, a highly artistic mould of "Lincoln's Cabinet at the Reading of the Emancipation Proclamation," from the well known sculptor, E. A. Kretschman of Philadelphia was employed. From it an embossed relief plate of glass, 10 feet long by 8 feet wide, giving the minutest details of the subject, was successfully produced. By making relief panels in opal glass and roughing the surface with the sand blast the effect of Parian marble is attained.

Coal Consumed in Cities of the United States.

The following report compiled from the mineral industries in the United States shows some interesting comparative figures and the importance of the fuel question. The loss in wasteful handling, and generally acknowledged imperfect combustion that represents millions of dollars, leave a profitable field, for invention, ingenuity and capital combined, to improve upon, if it is considered that only a fractional percentage of gain would figure up to enormous amounts. New York City received for consumption and shipment in the year of 1889, 10,253,706 tons anthracite and 4,353,436 tons of bituminous coal. Philadelphia, 4,751,175 tons anthracite and 2,620,562 tons bituminous. Boston, 1,660,001 tons anthracite and 984,409 tons bituminous coal. Buffalo, 2,480,035 tons anthracite and 1,126,765 tons bituminous coal. Chicago, 1,698,955 tons anthracite and 3,616,876 tons bituminous. The above figures include all coal used by railroad companies and delivered to steam vessels at the points named for their own fuel.

The actual quantities consumed in the various cities, excluding shipments, are as follows: New York City, 3,300,000 tons anthracite and 1,853,436 bituminous short tons; Chicago, 1,444,250 tons anthracite and 3,221,008 tons bituminous; Philadelphia, 3,188,094 tons anthracite and 919,187 tons bituminous; Brooklyn, 1,800,000 tons anthracite and 200,000 tons bituminous; St. Louis, 85,658 tons anthracite and 2,125,391 tons bituminous; Boston, 1,242,001 tons anthracite and 524,409 tons bituminous; Baltimore, 414,928 tons anthracite and 693,685 tons bituminous; San Francisco, 29,800 tons anthracite and 375,012 tons bituminous; Cincinnati, 30,904 tons anthracite and 1,030,948 tons bituminous; Cleveland, 117,157 tons anthracite and 924,602 tons bituminous; Buffalo, 333,653 tons anthracite and 1,032,791 tons bituminous; New Orleans, 12,107 tons anthracite and 435,299 tons bituminous; Pittsburg, 2,294 tons anthracite and 334,035 tons bituminous; Washington, 481,088 tons anthracite and 45,050 tons bituminous; Milwaukee, 402,774 tons anthracite and 262,089 tons bituminous; Scranton, 422,160 tons anthracite and 9,985 tons bituminous; Allegheny City, 1,591 tons anthracite and 100,674 tons bituminous; Reading, 331,944 tons anthracite and 59,902 tons bituminous; Syracuse, 179,891 tons anthracite and 84,327 tons bituminous; Rochester, 280,229 tons anthracite and 119,667 tons bituminous; Jersey City, 334,328 tons anthracite and 132,602 tons bituminous; Newark, 410,918 tons anthracite and 133,158 tons bituminous; St. Paul, 83,675 tons anthracite and 171,367 tons bituminous; Providence, 349,641 tons anthracite and 155,985 tons bituminous; Atlanta, 1,269 tons anthracite and 208,554 tons bituminous; Denver, 10,118 tons anthracite and 300,841 tons bituminous; Paterson, 202,290 tons anthracite and 24,259 tons bituminous; Nashville, 231,300 tons bituminous; Wilmington, 158,614 tons anthracite and 128,515 tons bituminous; Memphis, 45 tons anthracite and 172,669 tons bituminous; Dayton, 4,802 tons anthracite and 178,314 tons bituminous; Louisville, 1,981 tons anthracite and 380,326 tons bituminous; Kansas City, 59,353 tons anthracite and 306,607 tons bituminous; Omaha, 41,279 tons anthracite and 244,357 tons bituminous; Indianapolis, 11,390 tons anthracite and 277,278 tons bituminous; Trenton, 148,554 tons anthracite and 132,840 tons bituminous; Toledo, 93,583 tons anthracite and 153,968 tons bituminous; New Haven, 98,943 tons anthracite and 170,359 tons bituminous.

105 Years Old.

Mrs. Sarah Farley Van Nostrand, probably the oldest person in New Jersey, died at her home in East Millstone on December 15, aged 105 years 3 months and 10 days. Mrs. Van Nostrand retained full possession of her faculties to the very last, and her memory was remarkable.

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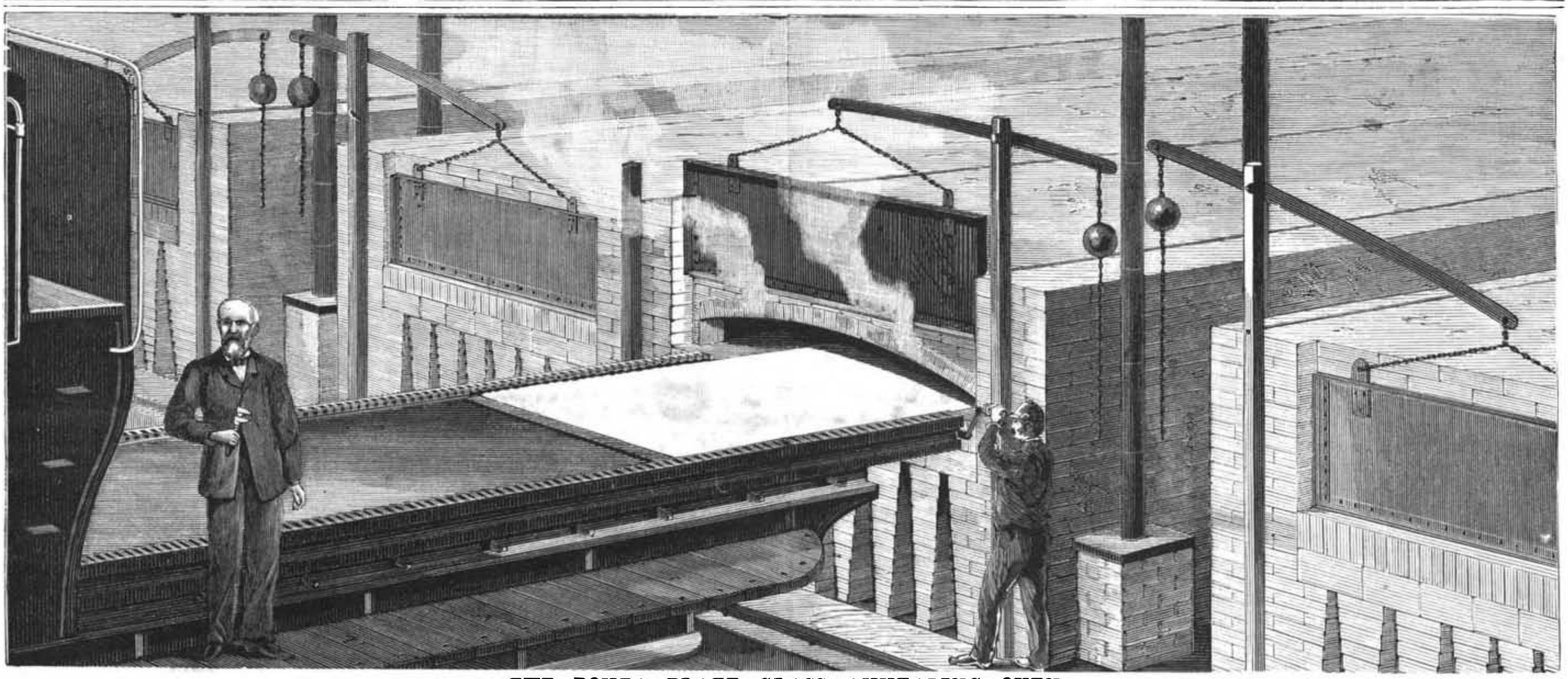

THE BONTA PLATE GLASS ANNEALING OVEN.

THE BONTA PLATE AND EMBOSSED GLASS ROLLING MACHINE—ROLLING THE GLASS.—[See page 423.]