

**Improved Grate Bar.**

Engineers have become thoroughly alive to the fact that the heating surface of boilers can never work up to its full efficiency without not only the proper amount of grate surface, but also such a construction of the grate that the fuel may be economically consumed. The combustion must not be partial, distilling off the fuel and sending it out of the mouth of the chimney in black volumes of smoke; it must be as complete as possible. Large heating surface avails nothing if the combustion of the fuel be imperfect, and the completeness of combustion depends primarily upon the grate, which must be of such a form that a full draft may be secured, yet be able to retain its form under the effects of heat, and support the fuel properly for the uniform distribution of air to the combustibles used.

A large number of patents have been issued for improvements in grate bars, and still inventions in this field increase and multiply. The demand for grate bars is so large that any bar which can fairly compete with those that have preceded it, is sure of sale, and the manufacture of such bars has grown into a large industry.

Our engravings show the form and construction of a grate bar, for which it is claimed that it effects a large saving in fuel, that it does not warp or twist, that it lasts much longer than the ordinary bar, and that it can be used in any furnace without the trouble and expense of making alterations.

The shape of the grate bar is such that a very large aggregate opening for the passage of air to the fuel is secured, resulting in more perfect combustion and greater rapidity in raising steam than is the case with many forms of grate bar in use.

Nut coal, slack, sawdust, shavings, and tan bark, can be successfully burned upon it, as is attested by those who have used it in the consumption of the combustibles named.

The bar is constructed with horizontally curved cross pieces, A, which act as braces, and in combination with the side plates, B, prevent warping or twisting, under great and unequal exposure to heat.

The grate, formed by the curved arch cross pieces, has a flat, even surface upon the top, so desirable in grate bars, and enables the weight of metal to be reduced, without increased liability of breakage from unequal expansion. The pieces also act as shears in cutting clinkers. It is claimed that actual use has shown that these bars will outlast two or three sets of ordinary bars. The bars, it is claimed, weigh less, per square foot surface measurement, than any other grate bar now in use, and the pieces are so constructed that they may be placed in any furnace without change in the bearing bars.

The exterior projections, C, on the side plates, B, form a series of apertures between the bars, when the latter are placed together in the grate, preventing the formation of blank spaces.

The under edges of the curved cross pieces are cast with a re-entrant curve, as shown in Fig. 2, which reduces their width, so that they do not readily clog up; and the ashes can readily be removed from the interspaces.

We have been shown testimonials in regard to this grate bar, which state that by its use a large saving in fuel has been secured, and also corroborating the claims made in regard to its durability.

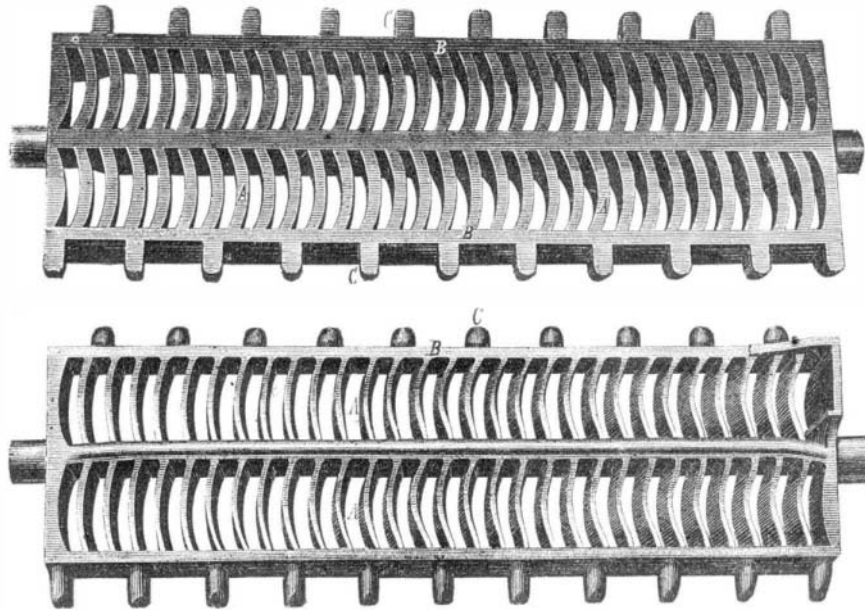
Patented, Nov. 16, 1869, by Clements A. Greenleaf. For further particulars, address Greenleaf Machine Company, 319 South Tennessee st., Indianapolis, Ind.

**New Composing Machine.**

The New York *Tribune* gives an account of a new composing machine, designed to supersede the use of fonts of type in printing. It says: The great feature of the invention is a mechanical device by which ordinary type setting and type distributing are dispensed with, and one hundred types are made to perform the service of a full font set in the usual way. The letters of the alphabet, together with figures, punctuation marks, and combination words, are arranged in regular order in a type-head two inches square, and are operated upon by keys, manipulated as in a piano. When the keys are touched, the type-head moves to its position, and action is had upon whatever letter or figure is touched, the type moving downward a prescribed distance, and making a printed impression on transfer paper. The platen on which the paper is laid is moved backward and forward by a feed-wheel for each impression of the type, and the spaces between the lines are produced by lateral motion by means of a ratchet wheel. In this way one hundred impressions are made per minute, and proofs can be corrected very easily. The impressions are finally transferred to a zinc plate, and printed by an improved lithographic press at the rate of 2,500 impressions per hour. In place of transfer paper a mold of clay or wax may be used to receive indentations, from which a stereotype cast can be obtained of uniform thickness, and ready for the press. The machine is driven with a treadle like a sewing machine, and occupies about the same space. It can be manufactured for \$200, and the type-heads for \$3 each. Every style of type borders, ornamentation, and also music, can be produced, only requiring one type to represent each character. The type-heads are easily changed, and as

many as fifty styles can be employed by the compositor without rising from his seat. As originally patented, the types were arranged on the periphery of a disk or wheel, and the impressions, made upon prepared pulp or clay were justified with difficulty. By the improved machine, impressions are made upon paper, and justification and correction are accomplished without loss of time.

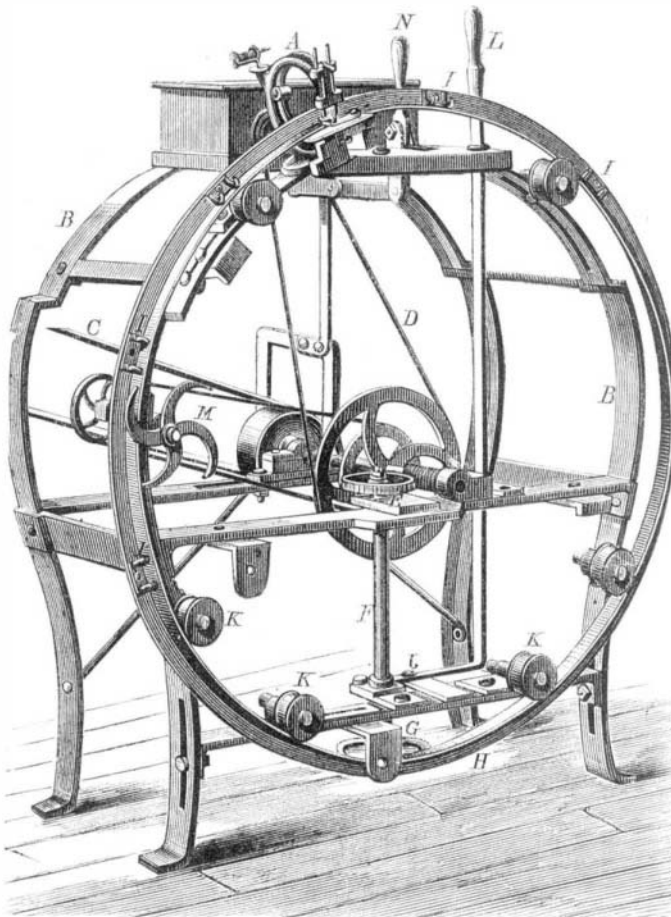
WE are glad to hear that the efforts to supply Nebraska with salt have been successful, and that saline water has been brought to the surface by an artesian well. A party of enter-

**GREENLEAF'S IMPROVED GRATE BAR.**

prising men in Lincoln city struck, at a depth of 600 feet, a stratum of sandstone, from which a torrent of salt water came upwards, and shot over eight feet into the air. When the well is tubed, a constant flow may be expected. The value of this discovery will be great, and a proper reward for Dr. Evans' untiring labors in the search. The strength of the saline water is estimated at 80 degrees.

**IMPROVED SEWING MACHINE.**

The invention which forms the subject of the present article is designed to provide a means for sewing goods together



in a continuous operation, as required in cotton mills, hosiery and bag manufactories, printing mills, and other similar works.

The stitching part of the machine may be of any approved kind of sewing machine now used, and is placed at A, as shown in the accompanying engraving, where it is sustained by the frame, B. The frame, B, also supports a central shaft with pulleys, as shown, which receives motion through the main driving belt, C.

The belt, D, conveys motion from the central shaft to the stitching part of the apparatus, A. Upon the central shaft is cut a screw thread which actuates the worm gear, E, and through it the vertical shaft, F. Upon the lower end of the vertical shaft, F, there is keyed a toothed wheel, G, which meshes into teeth (not shown in the engraving) on the back of the flanged feed-ring, H. This ring is suspended on flanged friction wheels, K, which sustain it vertically and laterally, but leave it free to rotate in the proper direction when actuated by the wheel, G.

At intervals around the flange of the feed ring, H, are placed hooks, I, upon which the edges of the cloth to be sewn are stretched, and are fed to the sewing attachment as the ring revolves in the manner described.

A sliding plate, J, which sustains the lower bearing of the vertical shaft, F, is moved back or forward by the hand lever, L, which throws the toothed wheel in or out of gear with the feed ring, as desired by the operator.

The friction rollers and all the moving parts below the central shaft are covered by a flat plate or shield, not shown in the engraving, as when in place it conceals the working parts. To prevent the cloth from being carried under this shield, four bent arms, M, are attached to a short pulley shaft driven by a belt from the central shaft. These arms press the cloth off from the hooks on the feed ring, and thus released, it falls down upon the floor which supports the machine.

The hand lever, N, runs the stitching part of the machine into or out of gear, as may be desired.

We are informed by the inventor that this machine has stitched one thousand pieces of cloth, 28 inches wide, per day, with one hand, and it has stitched, in one day, forty-five pieces (of same width) more, with one operator, than was done by two operators with the Willcox & Gibbs sewing machine without the attachment.

Patented through the Scientific American Patent Agency, Nov. 1, 1870. For further information address W. A. Rayer or W. S. Lincoln, patentees, care Willcox & Gibbs, sewing machine manufacturers, 147 Tremont st., Boston, Mass.

**A 30-Inch Gage Railroad in Ohio.**

The Toledo *Commercial* having stated that the Piqua, St. Mary's and Celina Railroad Company had been incorporated on a capital basis of \$400,000, to build between Piqua and Celina, through Miami, Shelby, Auglaize and Mercer counties, Ohio, about forty-four miles, a Piqua correspondent gives us the details of the scheme.

The country along the line is very populous and productive, and the question of an outlet by railway has long been agitated. But the Miami and Erie canal passes through it already; and though inadequate to the wants of the country, there is scarcely warrant for the construction of an expensive road. Last winter, the plan of a narrow-gage road, to cost, fully equipped, less than half a million of dollars, in place of one of the ordinary gage, costing a million and a half, was discussed. The design is identical with that of the Welsh railways, which have been so often described in engineering journals of late. A road of this kind, for transporting coal—the only one in this country as yet—is already in operation between Akron and Massillon, Ohio. A system of narrow-gage railways is also projected from Toronto, Canada, as feeders to the wide-gage roads now centering there. We learn that parties interested in the proposed Buffalo and Springfield road are now examining the Canada system, with a view to the adoption of the narrow gage. The Kansas and Denver Pacific Companies also contemplate reaching the mining regions near Denver, and probably at no distant day penetrating the Great Mountain Parks, and perhaps passing over the entire range, by narrow-gage roads, costing only one seventh as much as the present gage, where the latter is practicable. In all these cases the data, showing the entire practicability of these roads, and giving the cost of construction and operation, are such as to reduce the prospects of any such enterprise to a certainty.

To return to the Ohio road. The right of way is to be fifteen feet in place of forty feet; twenty pounds instead of fifty-six pounds iron will be required; the locomotives, weighing six tons instead of thirty, will draw from ten to twenty loaded freight cars, each having a capacity of two and a half tons; under freight and passenger cars alike (the latter seating twenty persons) four-wheel trucks will be placed; the ties will, of course, be nearer than on the wide gage; while finally, on account of the lightness of car equipment, in comparison with capacity, and of the central position of the trucks, both higher gradients and sharper curves will be practicable, greatly reducing cost of excavation, and other important items of construction.

In the present instance, the route presents no engineering difficulties—Piqua, thence following the canal to Berlin; thence to Minster, Bremen, and St. Mary's, where it will leave the canal, and make Celina its northern terminus.

The enterprise, which is to be begun in January, is in the hands of able and energetic citizens—among the incorporators being Hon. J. F. McKinney, member of Congress elect; William Scott, one of the oldest citizens, and President of the Piqua National Bank; J. G. Young, Cashier of the same; Henry Flesch, a wealthy merchant of the city; Chas. C. Clute an experienced railroad builder, of New York city.—*Chicago Railway Review.*

**Additions to Clubs.**

For the information of subscribers the publishers of the *SCIENTIFIC AMERICAN* give notice that they will receive additional names at any time, to clubs already formed, at club rates.