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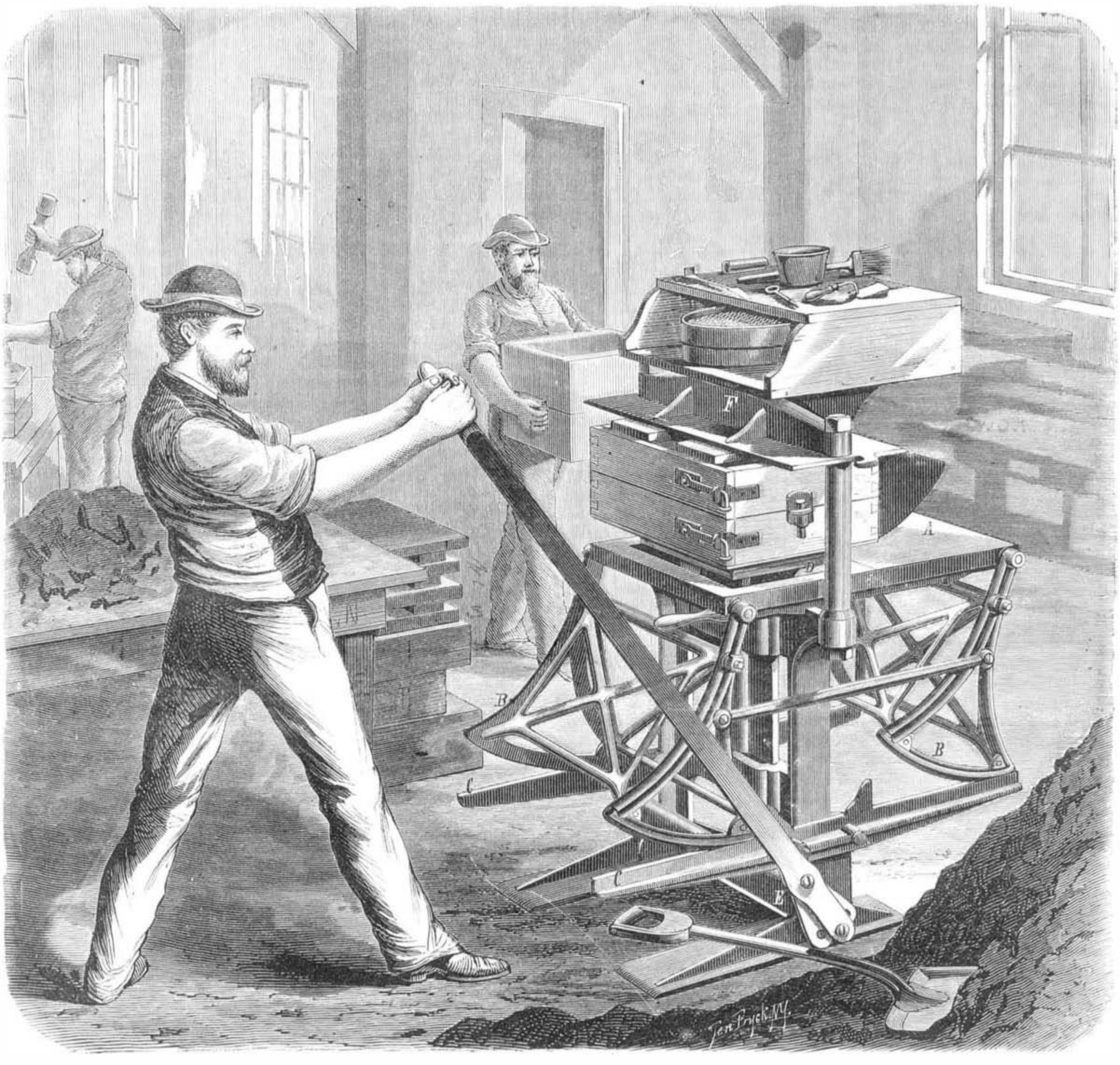

EAMES' AND BROADMEADOW'S MACHINE FOR MOLDING METAL CASTINGS.

MACHINE FOR MOLDING METAL CASTINGS.

The ramming of molds is an operation which not only requires care, but judgment. Care in the venting, in placing the bottom board, in the quality of the sand, is alike essential, and to this is added the exercise of a judgment which is only attained by long and watchful experience, in ramming hard at one point or soft at another, according to the nature and style of the work to be produced, or in packing the sand with the absolute uniformity, at all points, which becomes necessary in many forms of casting. Ramming, therefore, is almost an art to which a man must educate himself, and certainly not one in which a few days' or a few weeks' practice will render a previously unskilled workman proficient.

It is unneeded here to enter into any discussion regarding the obvious utility of mechanical devices which fulfil the double purpose, of on one hand superseding the fallibility of hand labor by the certain accuracy of the machine, and on the other of saving the time which otherwise would be expended in acquiring the knowledge necessary to perform the work.

We have recently returned from a visit to New Britain, Conn.,—one of those thriving manufacturing towns of New England which have sprung from the dimensions of small villages almost within memory of the present generation—where, at the factory of its manufacturers, we devoted some hours to the examination of a machine which excited in our minds an interest which will doubtless be shared in by every metal worker.

The apparatus, of which we append an excellent engraving, is one for ramming molds, and in construction is extremely simple. There is a carriage composed of a table, A, which is supported on segmental wheels, B, the latter resting on ways, C, attached to the main standard. The segments, B, are suitably connected and travel upon the same arc, so that upon them the table can be moved toward or from the workman at will. In the table is an aperture through which works the rod supporting the platen, D. The upper end of the rod enters a socket in the bottom of the platen, while its lower extremity receives a projection on the vibrating cross piece, E. To the right hand end of this cross piece is secured the lever, shown in the hand of the operator, by bearing down on which, as will be evident from the connection of parts, the platen can be raised. By this means, whatever may be placed between the platen and fixed head plate, F, can be compressed as desired. An adjusting screw is arranged in the platen connecting rod, by which the length of the same and consequent throw of the lever before pressure begins can be regulated, and there is also a simple latch by which the table is locked in proper position. The operation of molding consists in first swinging the table outwards by pushing up the lever and so locking it. Then the match and pattern is laid upon the platen, and above the former, the lower half of the snap flask. Sand is first sifted upon the pattern and subsequently shoveled in until the receptacle is evenly filled. The back board is then laid on top, the latch lifted, the table swung in, and the lever pulled down. The back board is thus brought up against the head plate, forcing down the loose sand beneath it. The table is again carried outward; on the pressure being relaxed, the match is removed, the flask reversed, and the cope adjusted, sand is placed in as before, another board laid above, and the whole brought again under compression. This is the position of the machine as shown in the engraving. Again the table is swung forward, and on removing the upper board two shallow cavities, made by projections therein, are found in the sand. A hollow metal punch is forced down into these, forming the pouring holes, which, with the subsequent preparing of the mold, are finished in the usual way. The use of sprues by this means is done away with.

This sums up the construction of the machine and its working, and it now remains to point out what it will do. Standing in the molding room, watch in hand, we noted the time taken by a first class molder to complete ten molds by the old process of ramming, and then to finish the same number by the aid of the apparatus. The snap flasks were 11 by 13 inches in size, and the castings 4½ inch iron rim locks. By hand, the ten molds were completed and deposited on the floor in 39 minutes; by the machine, the same work was done in 18 minutes. The hand made molds also were fully one third heavier than those made by the apparatus.

A reference to the foreman's books also furnished us with other interesting points. A fair day's work in ramming the molds in the old way for lock castings averaged 163 pounds of metal, against 250 pounds from same patterns by the machine. Common butt hinges showed 397 pounds by machine against 260 by hand. The average saving in labor, on all kinds of work, is fully 33⅓ per cent. Perhaps more striking evidence will be found in the fact that an entirely unskilled workman, on the second day of his attempting the task, completed 110 molds of about the size above noted, and another man on the fourth day made 140 molds. In the casting of small work in brass, such as keys, etc., we were told that 1,752 pieces are made in a day through the machine, against 1,008 pieces through hand labor, the reason given being the possibility of putting a larger number of pieces in a flask, of making more molds, and of getting out much better work.

We may add that the specimens of castings exhibited to us, as coming directly from molds thus prepared, appeared fully as sharp and clear as those from the best hand-rammed molds. Nor does the intricacy of the pattern seem to cause any difficulty, as we were shown molds for very irregular blind hinges, and completed castings for bank locks, the latter weighing some 30 pounds each, and of considerable intricacy of form. We also remarked that, through the evenness of the ramming, the waste through imperfect casting of large numbers of keys, hooks, and similar small goods was very small, almost every object coming from the sand true in shape.

Our readers can draw their own conclusions from these simple facts, so that we forbear further comment. We examined the score or more machines which the manufacturers, Messrs. P. & F. Corbin, of New Britain, Conn., had in use in their factory, noting in every instance the ease and rapidity with which they were handled by the workmen. The amount of pressure to be applied to the lever seems to be the only point requiring practice to judge; but that this knowledge is readily acquired, is proved by the work of the unskilled hands above detailed.

The patent granted to Albert Eames and John P. Broadmeadow, of Bridgeport, Conn., under which the device is manufactured, was extended November 25, 1873, and many essential improvements are covered by another patent dated August 4, 1874. Further particulars may be obtained by addressing the manufacturers as above, who are the sole licensees for the sale of the machines.

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NEW YORK, SATURDAY, OCTOBER 17, 1874.

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(Illustrated articles are marked with an asterisk.)

OUR FEVER NESTS AND THEIR REMEDY.

Though blessed by nature with a situation unrivaled for sanitary advantages, New York has a death rate such as few cities in Christendom can equal. The appalling mortality of the past summer, especially among children, has given rise to a great amount of sorrow and indignation on the part of the daily press, and not a little severe criticism of the action of the medical and police authorities, the common theory being that the enforcement of proper sanitary regulations would have prevented the larger part of the needless loss of life. That much might have been done to improve the health of the city by more rigid sanitary measures, there is no doubt; but it is useless to expect a Board of Health, however efficient, to achieve impossibilities. The great source of disease and death in the city is the tenement house system, whereby families are massed by the hundred in huge barracks, destitute of light, ventilation, the means of keeping clean—of every appliance, in short, for healthful living; and until wholesome dwellings can be substituted for these dens of disease, New York must endure the shame of being one of the most unhealthy cities in the world. No other city, in its densest portions, crowds half as many inhabitants to the acre as can be seen in some of our lower and eastern wards, and nowhere are the dwellings so poorly fitted for a numerous occupancy. And not only are these huge hives, with narrow halls and lightless sleeping rooms, crowded from the roof to the pavement with poverty-stricken families, but underground, in damp, unwholesome basements, multitudes find miserable shelter. Says the Children's Physician to one of the largest dispensaries: "An experienced dispensary physician can detect a patient who comes from a basement simply by the sense of smell"! Is it any wonder that the deaths of children in such a house number five or six a week? Or that a week of excessive heat may swell the weekly death list of children under five years of age by four or five hundred? About two thousand of these candidates for early death are born in our tenement houses every month.

With high culture, scientific management, and abundant means, it may be possible for many families to dwell together in health and safety under one roof; but where ignorance, poverty, and filthy habits prevail, the massing of families is little short of pestilential. Only by the dispersion of the tenement house population can the now over crowded wards of the city be made tolerable, and the death rate reduced to reasonable limits; and we see no way by which such a desirable result can be effected humanely, save by providing means for carrying the poorer working people to and from country homes more rapidly and cheaply than is possible with surface roads.

To some extent it may be necessary to do for this class of the community what Mr. Stewart is doing for the more fortunate in his Garden City (a description of which was given in the SCIENTIFIC AMERICAN about a month ago), and that is to build country cottages for them.

The success that has attended the operations of the Artisans', Laborers', and General Dwellings Company, in providing cheap suburban homes for the working men of the larger English cities, is proof that such enterprizes may be profitable as well as philanthropic.

In connection with the recent inauguration of one of their villages, the London *Times* gives a detailed account of the history of this company and of the work it is doing. The new village, called Shaftesbury Park, will illustrate its mode of proceeding. The site embraces forty acres. The foundation stone was laid in August, 1872; and it is expected that, by the opening of the coming winter, 749 of the intended 1,200 dwellings will be ready for occupation. The houses are engaged long in advance of their completion, while over 1,200 applications, for houses still to be built, are on the books. The dwellings are of four distinct classes: Class 1 contains eight rooms—a front parlor with bay windows, a backroom for meals, a kitchen with dresser and kitchener, a small larder, a scullery fitted with copper and sink, a closet, ash pit, and coal cellar; while on the floor above are three bed rooms and a bath room. Class 2 are seven roomed houses, without the bath room. Class 3 have six rooms, and class 4 have five rooms, of which two are bed rooms. Gas and water are laid to every house. Ventilators are supplied to each room: and the drainage (except surface water) is carried back from the closet and sink in the rear, so that no drain passes under any house. The foundations are of concrete, and the roofs are of slate. The paths have been laid with asphalt, and shade trees have been set out. There is also a temporary lecture hall, now used as a school room. School houses will soon be built, and baths and wash houses are projected. A site is left for a coöperative store, and two acres and a half have set apart for park and playground.

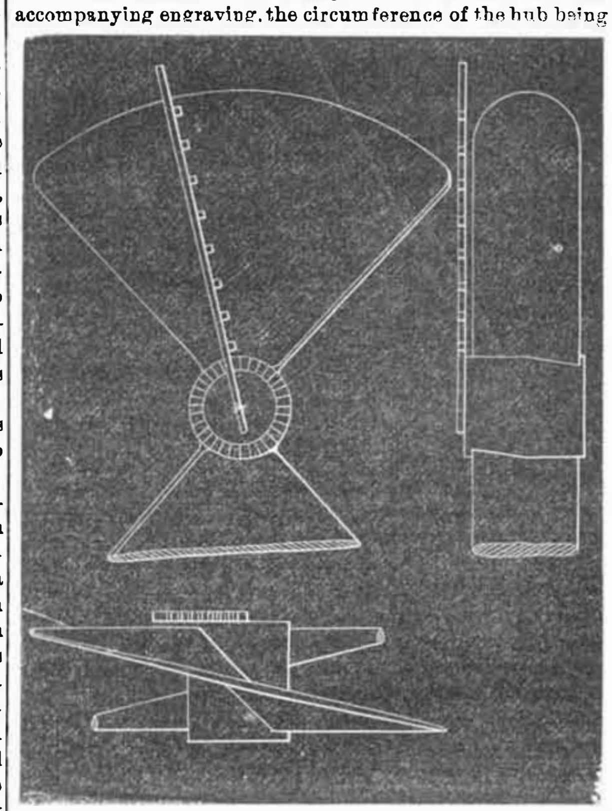
The houses have been built, to a great extent, on the coöperative system, the work being let out, under foremen in each branch, to the bricklayers, carpenters, painters, plasterers, slaters, and plumbers employed, and it is reported, as a matter of special satisfaction, that, under the piecework plan which has been adopted throughout, union and non-union workmen have worked harmoniously together, and there has been no cause for the intervention of the appointed arbitrators. Many of the workmen are shareholders in the company, and not a few of them live in the houses they have helped to build. The result of this arrangement has been unusual care in the finishing of their work. The houses built by the company, the directors say, are better than those usually erected, yet they can be sold at equally low prices, in consequence of the materials saved by the workmen, who are shareholders. It is further claimed that these interested workmen earned, by piecework, forty per cent more than their ordinary wages.

The growth of the company in popular favor is shown by the annual amount of stock taken. At the close of the first year, 1867, the share capital in hand was only $2,500; at the close of the next year it was $9,000. In 1869 it rose to $15,000. In 1870 it was $30,000. In 1871 it increased to $92,500. In 1872 it rose to $260,000, and at the end of 1873 it was $560,980. The last annual dividend was six per cent, and previously they had divided seven and a half per cent.

Were our means for cheap and speedy transit equal to those of London, villages like this might be multiplied indefinitely along the Highlands, in Westchester, and on Long Island. The advantage, not only to those who would thus be enabled to take their families into wholesome air, but to thousands who would of necessity remain within the city limits, would be incalculable.

MEASUREMENT OF A SCREW PROPELLER.

A correspondent asks for a rule for measuring the pitch of a screw propeller. The process, though simple, requires considerable explanation to make it understood, and as the subject will doubtless be interesting to many of our readers, we devote some little space to its consideration. The surface of a screw propeller is the same as would be generated by a line revolving around a cylinder, through the axis of which it passes, and at the same time advancing along the axis. In this way the under or back surfaces of the blades may be supposed to be formed, and then the proper thickness is put on, so as to make the front or entering surfaces. All measurements of a blade should of course be made on the back surface. It will be evident, from the explanation of the manner in which the surface of a blade is formed, that by varying the shape of the generating line, or the rate of its motion along the axis, very different forms of blades can be produced. The pitch of a screw is the distance the generating line moves in the direction of the axis, while it is making one revolution around the cylinder. It is evident from this that the pitch of the screw may be constant throughout, or it may vary from forward to after part of the blade, or from hub to periphery, according to the rate of motion of the generating line in an axial direction, and its angle of inclination to the axis. Hence in measuring a screw propeller, it will be necessary to determine the pitch at a number of points, for the purpose of ascertaining whether it is variable or constant. Every point in the generating line describes a curve which is called a helix. If measurements are taken along one of these helices, they will show whether the pitch varies from forward to after part of the blade, and measurements on corresponding points of different helices will indicate whether or not the pitch is constant from hub to periphery. As a general thing, the hub of a screw propeller is faced off at the ends, and the blades do not overhang a plane passing through this face. If necessary, however, a faced surface can be fitted to the hub, and made thick enough for its plane to clear the blades. Provide a straight edge a little longer than the radius of the propeller, and secure cleats for it, every foot of its length for large wheels, and from nine to six inches apart for small wheels. These cleats are intended to serve as guides for a rule, so that measurements can be made with accuracy at right angles to the straight edge. Secure to the end of the hub a piece of paper on which the center of the hub is marked, and the circumference is divided into any number of equal parts. Then place the straight edge on the end of the hub, bringing a mark near its end to the center of the hub, and making its direction coincide with a division of the circumference. Measure the perpendicular distance from the straight edge to the surface of the blade, at each of the cleats; then move the straight edge to coincide with the next division of the circumference, and again take measurements. The arrangement is represented in the accompanying engraving, the circumference of the hub being



divided into thirty-two equal parts. Suppose that, in the position represented, the measurements from the straight edge to the blade, taken at each cleat, are each six inches. Then move the straight edge to the next position, and suppose that the measurements are each fourteen inches. This shows that the generatrix, in one thirty-second of a revolution, has advanced eight inches in an axial direction, consequently the pitch is thirty-two times as much, or twenty-one feet and four inches. If measurements taken at successive divisions of the circumference give a successive increase of eight inches for each division, it shows that the propeller is a true screw, with a pitch of twenty-one feet and four inches. Of course, if the pitch varies, it will be shown by the variation in the difference of the measurements taken at successive divisions of the circumference. It will be observed that the measurements made at one cleat in different positions of the straight edge give determination for the pitch at different