AMERICAN INDUSTRIES, No. 39.

THE MANUFACTURE OF PRINTER'S TYPE.

As there are nearly 8,000 newspapers in the United States, and probably twice as many printing offices for the production of every class of work from a merchant's card or letter head to a cyclopædia, it follows that the business of type-founding must be one of considerable magnitude. At first it was only a branch of the printer's trade, but it early developed into an essentially distinct business. Now a printer would no more think of making his own types than a tailor of weaving the cloth he cuts.

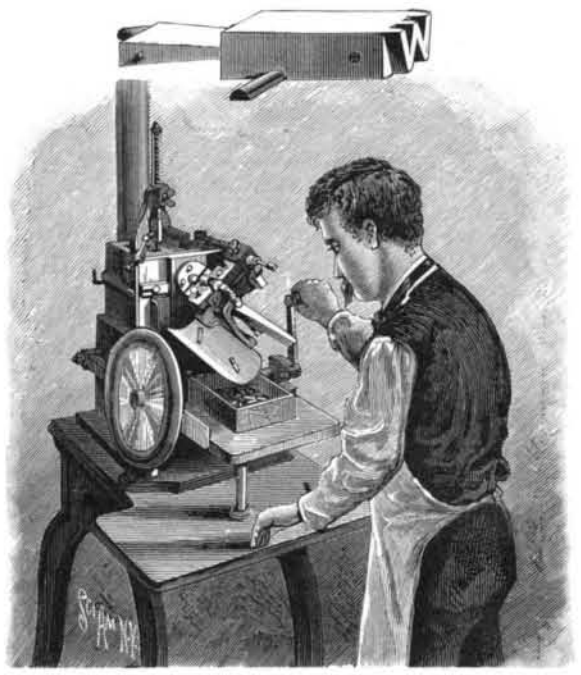
The forms of printing types and the manner of their use are so commonly understood that no account of them is needed here. The types with which all letter-press work is done must be uniformly "type high," which is a trifle over seven eighths of an inch. Of these types, a page such as this will contain about 25,000 separate pieces, counting the points, the spaces, etc., although, as "set up" by the compositor, the "spaces" between the words, the "leads" between the lines, the "quadrats" for filling out the blanks at the ends of paragraphs, etc., not being "type high," do not show in the print. Counting the capitals and small capitals, the italics, figures, punctuation and reference marks, etc., there are about 250 different pieces in every font of type, and all of these pieces must be kept in complete assortment for each different size of type, as well as for every different "face." There are, for instance, five different regular sizes of type smaller than that in which this article is printed, and in each of these sizes there are many different faces, even in the plain Roman styles, to say nothing of hundreds of kinds for ornamental work. These types have little nicks low down on the body of the metal, by which the compositor may readily see how to place them right side up, and a small groove is taken out of the bottom, so that each type, when composed in the page or column, will stand on its "feet," as they are called. It will be seen how exact must be the measurement and "fit" of each of these little pieces when it is remembered that, in the slight iron frame which holds them together in the pages of the largest newspapers, the pressure from the sides put upon the types, so that they will hold together in a body when lifted, is only just sufficient to overcome the weight of the metal. The types, thus set up in columns and pages, are ready for the press, except the work is of sufficient importance to have stereotype or electrotype plates made, in which case the types are used only to make the mould, and the printing is done from the plates. The SCIENTIFIC AMERICAN is printed from electrotype plates, which give a sharper and clearer impression, and will also allow of the printing of a much larger number of copies before showing wear on the fine lines of the engravings, than can be obtained from any stereotypes. The most of the large daily papers are now printed from stereotype plates. This improvement has been introduced within the past twenty years; the plates are necessarily made very quickly, and with many imperfections which would not be tolerable in fine work, but the making of plates greatly facilitates the printing of all large editions, for, the type being once composed, any desired number of plates can readily be produced. It is worthy of remark, however, that the general adoption of the practice of stereotyping their forms by the leading newspapers, and the copper-facing of the type, whereby the wear of the letter is greatly extended, seemed to have hardly any effect on the business of type founders; the demands for larger quantities and a greater variety of type have grown so steadily that even these great improvements did not appear to diminish the call upon the founders.

We have in the preceding three numbers sketched the manufacture of power printing presses, book paper, and printers' ink, and, for our illustrations in this paper of the manufacture of printer's type, so naturally associated with the above, and completing this class of industry, we show the leading operations in the large type foundry of Messrs. Farmer, Little & Co., of New York, a firm employing from 175 to 200 hands in the business, and making all descriptions of printer's plain and ornamental types, borders, rules, dashes, etc., besides making their own type-casting machines, steel punches, matrices, etc.

The large view at the bottom shows the main type-casting room, which occupies the entire top floor of the large six story building, 63 and 65 Beekman street, seen in the central picture. The machines for casting are most of them ranged around near the windows, to give the best of light, which is very important. The machines only take up about as much room each as a sewing machine. Each one of them has a little coal-burning furnace for melting the type metal, and about a quart of the molten metal is held in an open reservoir at the top. Though these machines are sometimes operated by power, the advantage of so doing is by no means clear, for there must be so many stoppages in doing careful work that but little can thus be gained. The operator turns a crank, which brings the mould up to a little spout projecting from the pot, from which the metal is forced into the mould, when the latter flies back and automatically drops its type, this operation being repeated with every turn of the crank. Care must be taken that neither the metal nor the mould get too hot, and the mouth of the spout must be frequently cleaned of refuse metal not taken in by the mould.

The type casting machine was first successfully operated in this country about 1840. By its use type are cast fully fifty per cent cheaper than they were by hand. The speed at which it may be run varies according to the kind of type, the plain newspaper types coming from the machine as fast as 100 or more a minute, while the ornamental types and all larger job types have to be cast a good deal slower In the latter case a perceptible interval has to be allowed for the hardening of the metal in the mould, which, with the smaller types, is instantaneous; and in all scripts, where a portion of the letter extends over the body, the work has to be done slowly to prevent these parts from being broken off.

In the view at the upper left hand corner may be seen the work of dressing and finishing the types after they come from the casting machine. Each one, as it drops from the mould, has a little jet or ingot of surplus metal attached to the foot; these are broken off singly by boys, when men rub the broad sides of the types on stones to remove any roughness on the edges; where the metal has to be dressed out around a face projecting over the body, workmen of a different branch are employed, called kerners. After this the types are arranged on long rules or dressing sticks, in lines three feet long, and, each line being firmly fixed in a kind of metal planer, a cutter is passed over the edges, to make them perfectly true. A light scraping is then taken off the body of the type next the face, and a groove is run through the bottom, where the little jet or ingot of surplus metal had been broken off, and making the "feet." This work is all done by the piece, the casters, dressers, and finishers being all paid so much a pound, according to the size and kind of type.



CASTING TYPE.

The right view at the top shows where the steel dies or punches are made, and where the types, as they come from the finishers, are divided up into the proper allotment of letters and sorts for each different font. Type founders take orders for fonts of all sizes, but in the making of plain body letter it is usual for them to arrange all that is necessary for a complete font in a "scheme" for about 300 or 600 pounds, and then, when any smaller amount is ordered, divide up the type proportionately. Before this work is done, however, the types are all carefully examined with magnifying glasses to see whether any imperfect or defective letters have been passed by.

The letter engraving, which is also shown in this view, consists entirely in cutting the dies on steel for the face of the letters. Soft bar steel is used, which is hardened after the cutting, and all the work is done by hand. These dies are used for making matrices, in copper, to place in the moulds for the different faces required. These matrices are struck out of a piece of copper weighing at least three times as much as they do when finished, and then worked down, so as to insure the greatest exactness.

In the illustration at the right in the middle, is shown the department where the type-casting machines are made, and where the matrices and moulds are severally adjusted. There are a good many pieces required in the mould for casting a type no larger than a pin, and these, while being constantly subjected to a pretty high temperature and wearing usage, must be kept as true and exact as the works of a fine watch.

In the same room also may be seen the work of making brass rules, which are always used between the columns of type in newspapers, and for the dashes between articles, etc. The sheet brass used for this purpose is furnished by the brass manufacturers cut in strips of proper width to allow of facing, and of the required thickness. The facing and finishing of these to make ordinary newspaper rules is done with planers, by hand, but for making wave rules and ornamental dashes, different kinds of steel cutters are used. Here also the "leads" and "slugs" are made. The former are thin strips of type metal, cut to the width of the column, and placed between the lines of type when it is desired to give the printed matter a clean and open appearance. This page is leaded, with perhaps two leads between the head lines, and a thin slug between the rule at the top of the page and the first line of type.

In the illustration at the left, in the middle, is shown the process of electroplating, with copper, the illustrations, newspaper headings, etc., made by the firm. The copper will give the finest lines, and is much more lasting than type metal. The thickness of this coating varies according to the work, or as may be desired, from $\frac{5}{100}$ to $\frac{12}{100}$ of an inch.

There are five kinds of metal used by type founders generally, according to the particular work in hand. These all consist of different proportions of lead, copper, tin, and antimony. Though many other combinations have been recommended, and used to some extent, these are the only metals generally and successfully employed. The quadrats, which correspond with the white spaces in the printed page, and on which the least wear comes, are made of the cheapest metal, the smallest types, on the other hand, require the hardest, toughest, and dearest metals, while the medium-faced types, such as would be used in ordinary books, have a grade of their own, as have also the ornamental job types and the script. Messrs. Farmer, Little & Co. have always paid particular attention to this department of their business, and can point with satisfaction to the long continued use their fonts have withstood.

The want of accuracy in the justification of type would be a fault for which all other good qualities combined could not atone. To secure this, however, only the best of machine work must be employed in the fitting of the moulds and the finishing of the matrices, as well as in the dressing and finishing of the type; and in this branch of the business the complete appliances and experienced workmen, the firm have, afford the best of evidence that, by properly appreciating its importance, they have won the right to claim special excellence in this direction.

The number of "new faces" which any type foundry will get out in a given time depends largely on the state of general business. The firm of Farmer, Little & Co. have always been fully up with the times in this kind of enterprise, and some of their styles of type, both plain and ornamental, as well as their very elaborate combination borders, are to be found in almost every considerable printing office in the land. It is as difficult for a really good printer to see a nice new face of type without buying a font of it as it is for a fashionable lady to do without the latest style of bonnet. But in the variety this house can present of types they have originated in their long business career, they have an advantage which only an old foundry can offer.

The house was established in 1810, and since that time they have been constantly accumulating dies and matrices, which always constitute the most valuable portion of the stock of a type foundry. Of the present members of the house, it can be said that they are all active workers and practical men in their trade, the senior of the firm having been about fifty years continuously connected with the business.

Signaling Instruction.

The spring signaling instruction has commenced at Fort Preble, an hour's drill each day For this army system of signaling is claimed superior simplicity over all others, its advocates claim preference for it over the Morse alphabet, and certainly its messages are more easily transmitted by ordinary appliances. No sailor ignorant of a code should be allowed to go to sea in any capacity of command. Magnetic telegraphs and Edison telephones are well enough in their place, but a ship on a lee shore needs its officers and the coast guard to be well instructed in Myer's Code. It should be taught in all our schools. We give the alphabet below for the benefit of the curious. The second columns are the equivalents for which the corresponding letters may serve as contractions. With four of any two kinds of things, fixed signaling can be done. Calling one's right side one, and his left side two, he can transmit any message by waving a handkerchief according to the following table.

Letters.	Word Equivalent.	Signal Number.	Letters.	Word Equivalent.	Signal Number.
A	after	22	P	put	1212
B	before	2112	Q	quiet	1211
C	can	121	R	are	211
D	did	222	S	station	212
E	of the	12	T	the	2
F	for the	2221	U	you	112
G	ground	2211	V	very	1222
H	have	122	W	wood	1121
I	if the	1	X	next	2122
J	———	1122	Y	why	111
K	o'clock	2121	Z	———	2222
L	———	221	&	———	1111
M	———	1221	ing	———	2212
N	not	11	tion	———	1112
O	of	21			

If we have four apples and four oranges, and we designate the apples ones, and the oranges twos, with them then we can spell out anything Thus to spell the word *system* we would from our right to left (so that they may come in regular order for the reader) first place an orange, then an apple, then an orange (= 212 = S); after withdrawing the S place an apple, an apple, and an apple (= 111 = Y); next repeat the S (an orange, an apple, an orange), next place an orange (= 2 = T), next an apple and orange (= 12 = E), and last an apple, an orange, an orange, an apple (= 1221 = M).

With a small flag a sweep to the left, two to the right, and one to the left would spell *be*. A great many contractions can be made and are introduced in the code.

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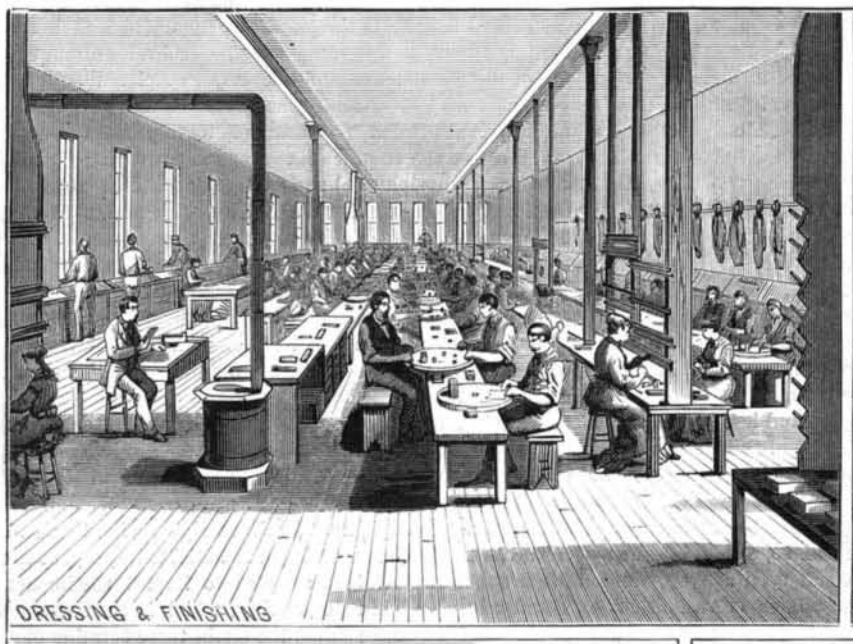

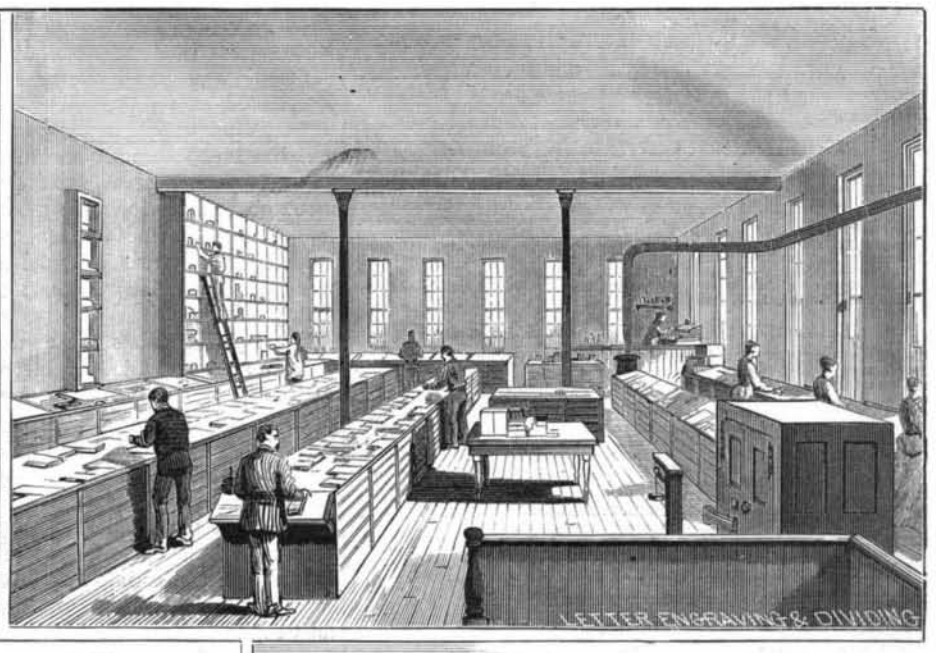

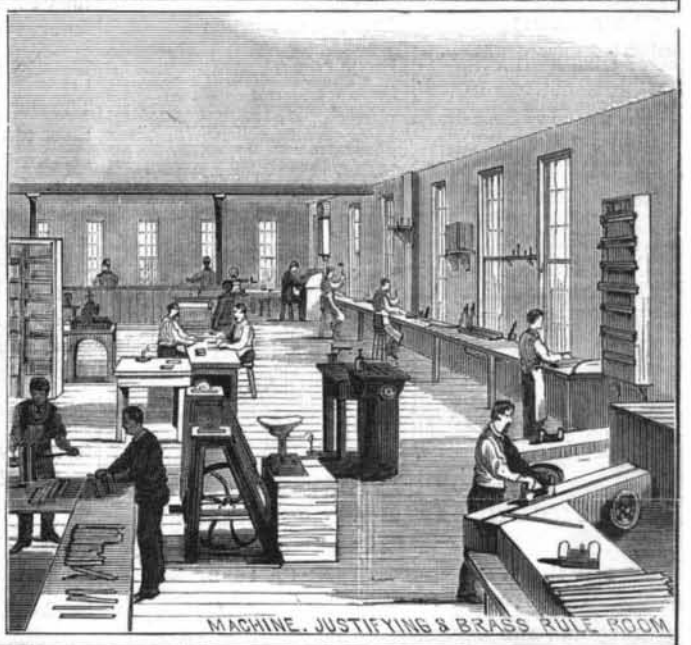

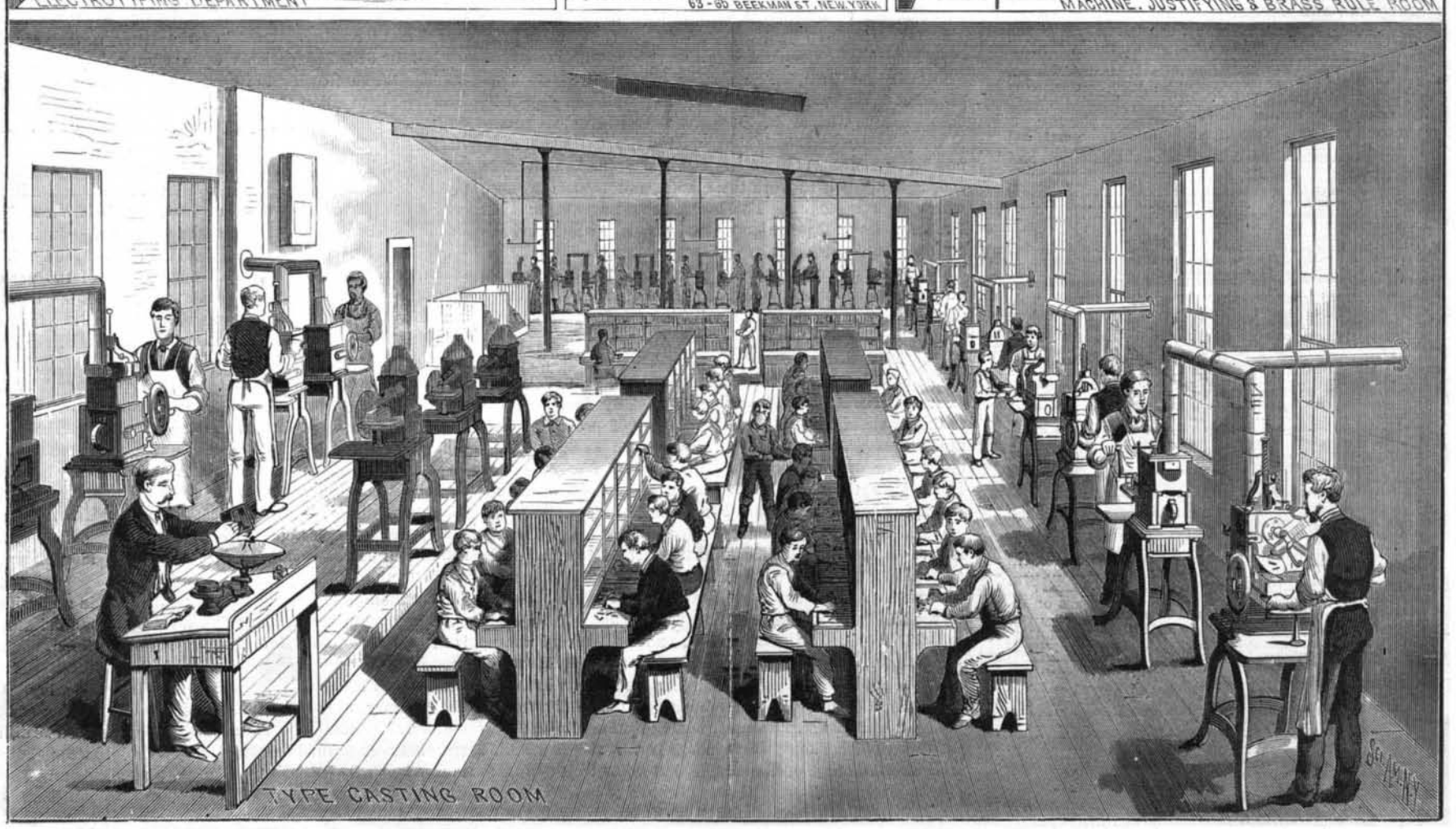

THE MANUFACTURE OF PRINTER'S TYPE.—FARMER, LITTLE & CO.'S FOUNDRY NEW YORK CITY.—[See page 244.]