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THE INLAND PRINTER

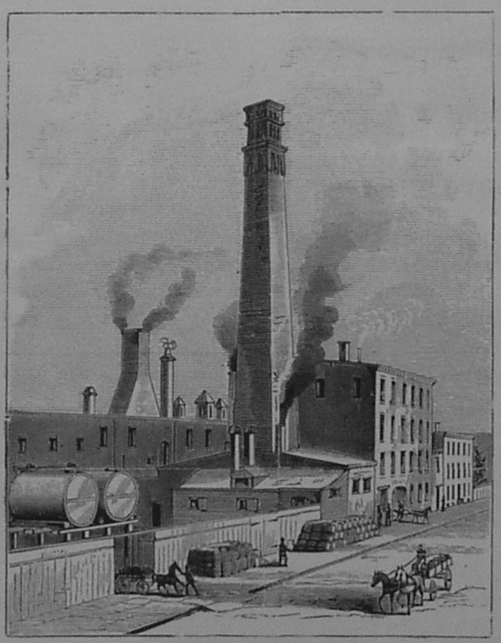
A TECHNICAL JOURNAL, DEVOTED TO THE ART OF PRINTING.

VOL. III.—NO. 1. CHICAGO, OCTOBER, 1885. TERMS: $1.50 per year in advance. Single copies, 15 cents.

CONCERNING PRINTING-INKS.

INK OF THE ANCIENTS — PRINTING-INK OF THE EARLIEST PRINTERS — THE INK OF CAXTON'S AND ALDUS' DAY — PRINTING INK OF THE PRESENT DAY — INK-MAKING AS CARRIED ON BY GEORGE MATHER'S SONS.

THE well worn apothegm that "necessity is the mother of invention," finds no more striking exemplification than among the peoples of antiquity, whose intellectual activity naturally sent them in quest of means whereby to preserve their thoughts in writing. The moment that a nation begins to think, its thoughts at once seek to express themselves in permanent, outward and visible forms; at first crude and symbolic, then in the more definite sign or picture-writing, and finally in the exact written language of letters, words and phrases. The ancient Egyptians, a very intellectually active people, although they do not seem to have been — as was that older nation, the Chinese — acquainted with the art of making paper from pulp, artificially prepared, deserve honorable mention for their ingenuity in the manufacture of the famous papyrus paper — a sheet formed by laying the thin pellicles of that plant, one upon another, subjecting the whole to pressure, and subsequently drying it in the sun. In addition to papyrus, vellum or prepared sheepskin served the purposes of the bookmakers of the day.



THE FACTORY.

We must now ask ourselves how and in what manner the ancients set down their thoughts in black and white, and this question brings us to the subject of ink, and it is a curious fact that our modern printing-ink is essentially identical with the writing-ink of the ancients; that is to say, it consisted of a carbon in suspension in a vehicle, and it doubtless had about the consistency of our modern printing-ink. As may be supposed, its vehicle being a gum or resin, the carbon-pigment took no such indestructible hold upon the paper as does the black of modern printing-ink when incorporated thoroughly and scientifically with the insoluble varnish, or boiled oil; but in the hands of the patient and dexterous scribe of antiquity it served an admirable purpose, filling the bill, to speak tritely, to the letter. We are indebted to Pliny and Dioscorides for formulas of the writing-ink used by Greek and Roman scribes during the first century. Pliny informs us that it was made of soot, charcoal and gum, and he alludes to an acid, occasionally an additional ingredient, to give the ink an encaustic property, and make it bite into the papyrus.

Dioscorides gives formulas with scientific accuracy, to-wit: One ounce of gum, with three ounces of soot, or half a pound of smoke-black, made from burned resin; half an ounce each of copperas and ox glue.

Doubtless a modern ink-maker would qualify this mixture as being little above the dignity of a shoe-blacking, and we must readily admit that it would have utterly failed if applied to the surfaces of modern type. The method of application was by means of a reed with a split point, the progenitor of our modern goose-quill, the scribe dipping the instrument into the mixture, which probably had, as already stated, about the consistency of the printing-ink of our day, and rather painting upon the vellum or papyrus than writing, as we understand the term *currente calamo*.

Cicero tells us that the fluid of the cuttle-fish was an

Written for THE INLAND PRINTER.

TYPEFOUNDING.

BY ALFRED PYE.

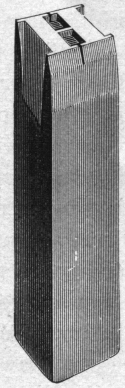
THE average printer's knowledge of typefounding is so limited that some description of the process by which type is produced will come as a boon to many who have longed to know something about the manufacture of the material which they daily handle, but have had no means of satisfying their desire in this direction. No idea of the number of hands through which the type has to pass, after it is cast and before it is ready for the printer, can be formed by anyone who has not seen the process or had it described; and the amount of work, both artistic and mechanical, that is necessary *to be* performed *before* a type can be cast is likely to create a feeling almost of wonder in the uninitiated as he is made acquainted with the manufacture of matrices and molds, the two implements which give form to the face and body of the type. A printer should, whenever it is possible to do so (and in large cities where typefoundries are located this should be an easy matter), make a knowledge of typefounding a part of his education. Most artisans and mechanics are intimately acquainted with the quality of the material used by them, and can tell how the tools they handle are constructed, and printers ought not to be behind them in this matter. For their benefit we will describe in as interesting a manner as possible how type is made, from the initial point to the finished type ready for use.

Considerable mystery surrounds the invention of typefounding, from the fact that no authentic record exists of the implements used for the purpose of casting type by Gutenberg, who is generally acknowledged to have been the inventor; but from vague references to "casting letters in brass" (no doubt meaning brass matrices), and the use of a mold in connection therewith, in such records as do exist, it is safe to infer that the principle of typefounding has remained the same during the more than four centuries that have elapsed since its invention. Without the mold and matrix, types cannot be made with that regularity and exactness of body and line of face that is so necessary to produce good printing. The face of the type is formed in the matrix, the body in the mold.

A matrix is an oblong, rectangular piece of copper, with the form of the letter it is intended to produce deeply impressed near one end, in such a manner that when fitted to the mold it will be directly in position for giving a correct face to the metal type that is formed in the mold. The making of matrices is an operation requiring considerable artistic skill and minute attention to details. The form of the letter has first to be cut in steel by an artist called a punchcutter, the steel letter thus cut being called a punch. Really good punchcutters, like good workmen in other businesses, are few and far between. Not only must they be skillful engravers, but must have a profound knowledge of the proportion one letter should bear to another; have correct ideas as to the form of letters, and should be, in fact, first-class artists in every sense of the term.

In the preparation of a set of matrices for a font of Roman letter two sets of punches are actually needed. The sunken portions of letters need to be first cut in relief and driven into the steel that is to be used for the punch. These primary punches are termed counter-punches, and are made to secure uniformity of impression in all the faces of a font of letter, which could scarcely be attained if the sunken portions were gouged out.

The illustration here given represents the counter-punch for a capital H. The white space in the center is cut into the counter, and when driven into the steel to be used for the punch leaves the fine line across the center of the letter in relief, while the dark portions form the hollow spaces in the upper and lower portions of the letter. The other illustration shows the finished punch after the punchcutter has formed the outside of the letter.



PUNCH.

The steel used for the punches and counters is of the finest quality obtainable; it is first annealed to render it easily workable, and afterward retempered so as to be able to overcome the resistance developed in driving, either the counter-punches into the steel for making the punches, or the punches into the matrices. Such letters as I, i, l, etc., do not need a counter-punch, as all the cutting is on the outside of the letter; but all other letters in the alphabet have to be counter-punched, or countered, which is the technical term. During the process of punchcutting delicate measuring instruments are constantly used to determine the exact depth of sinking, accurate lining, etc. These instruments are so constructed that they will measure the one-thousandth part of an inch, sometimes even less. The necessity for such close measurement will be apparent to anyone who will examine a single line of type, and observe the perfect proportion which one letter bears to another in the size of face and thickness of the lines which give it the right form or shape. The amount of time expended and expense involved in making a set of punches for a font of letter is something enormous, and the printer who carelessly tosses a "busted" type into the hellbox little thinks how much it would cost to produce another letter like it if the matrix in which it was formed were destroyed.

When the punches for a font of letter are all cut the operation of making the matrices begins. A separate slab of copper is required for each character in the font. The surface of the copper is highly burnished, so that when the punch is driven into it, the face of the letter will be a perfectly even surface, without flaw or blur of any kind. The copper slab is firmly fixed in an apparatus called a driving-block, the punch is placed in the right position, and by means of a smart blow is driven into the copper. Sometimes it will happen that the punch gets broken in the process of driving; even the detachment of a small portion of the face of the punch is sufficient to cause trouble, and the process of punchcutting for that character has to be gone over again.

The copper slab as thus prepared is termed a drive. Around the spot where the punch made its impression is a raised surface, or bur, caused by the displacement of the

copper in the process of driving. This has to be smoothed away, and the drive made of even surface. This portion of the work is intrusted to another person called a fitter, who has to test the drive in many ways before it becomes a matrix.

(To be continued.)

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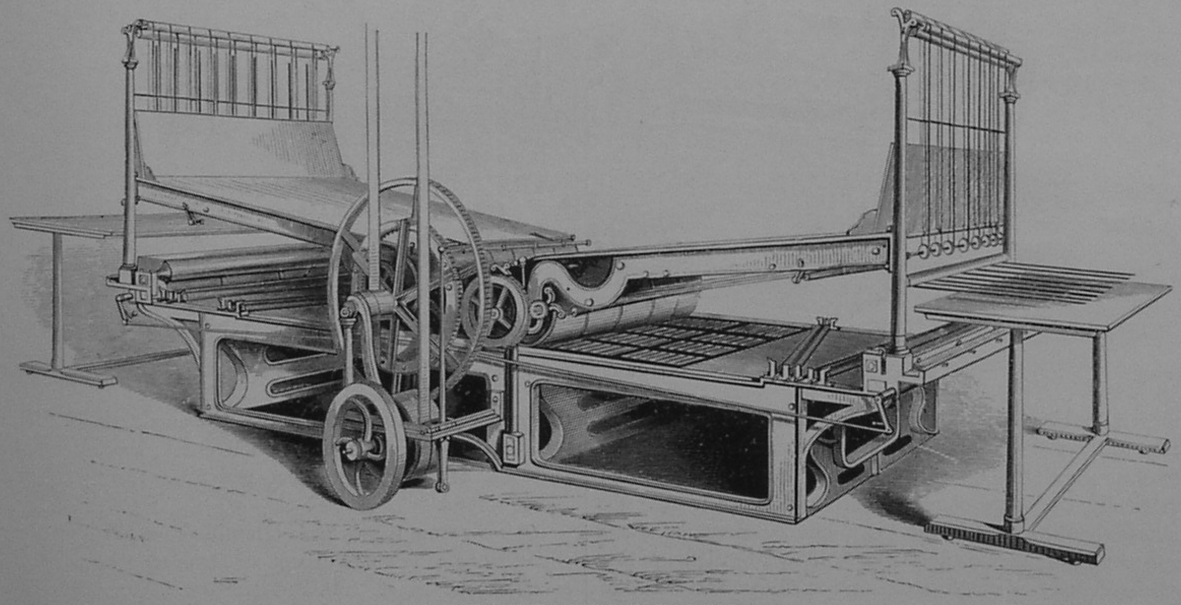
Written for THE INLAND PRINTER.

THE PRINTING-PRESS.

BY STEPHEN MC NAMARA.

THE two illustrations presented in the present number will close the reference to A. B. Taylor, who, for half a century, has occupied a front rank as an inventor and builder of cylinder presses. It has been necessary to depart from the regular order and delay notice of others during the period from 1846 up to 1860, that we may recall the efforts he made to furnish country printers a machine suitable to their wants. The Washington hand press had been looked to by them as the only means with which to print a paper; a cylinder press was out of the question on account of the cost and the necessity of a steam engine to drive it, and lack of the necessary skill to operate it. Efforts had been made to construct country cylinders suitable to the wants of this class by various parties, but none seemed to meet their requirements. The regular Napier press was cheapened by lighter castings and less finish, and a fly-wheel was added to turn by hand. Others were constructed of different model, using the crank motion to drive the bed, and the stop cylinder of a modified pattern was tried, but until the Taylor country cylinder was introduced, it is safe to assume, no machine had been devised to fully meet the pressing demand. When we take into consideration what those demands were, we are enabled to see and appreciate the genius of the man who fulfills them. The country printer is seldom a banker, and consequently is short of funds; the more he is forced to invest in a press, the less he has left for type, therefore the press must be cheap. As he is more of a politician than a mechanic, it must be simple, have few parts, and not liable to derangement. He may be an able writer, but a weak pressman, hence the machine must be capable of doing good work with little or no help from him. The press may be placed in the top story of a frame building, and the lower floors become vacant if it be noisy or cause undue vibration. And under all these conditions it must be durable and salable at all times, and capable of any class of work. To accomplish this, necessitates the



TAYLOR DOUBLE-CYLINDER BOOK PRESS.

Written for THE INLAND PRINTER.

TYPEFOUNDING.

NO. II.—BY ALFRED PYE.

ROMAN and Italic body type, small faces of job type, and most of the scripts are cut on steel, and matrices made with the punches. Most of the job type, and the larger faces of Roman letter are made by the electrotype process, which is less costly, and, in fact, more practicable. Some large faces are cut in steel, but it is not usual to do so, as it is a somewhat difficult matter to make a good drive with a large punch.

For the electrotype process the letters are engraved on metal which is a composition of the same ingredients as typemetal, but blended in different proportions. Typemetal is too brittle for engraving purposes, as in cutting fine lines it would break, so a somewhat softer composition is needed for cutting the originals upon. Equal care is necessary in cutting letters on metal as in punchcutting, seeing that both are destined to produce the same result; namely, the making of a matrix for reproducing the form of the original as often as needed.

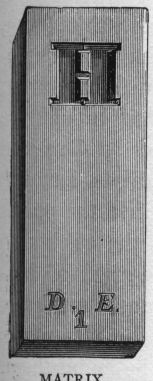
The face of the letters so engraved are highly polished, and every line needs to be sharp and clear, or the inaccuracies, if any exist, will appear in the matrix. When the cutter has finished all the characters in a font, he hands them to the electrotyper, who proceeds to convert them into matrices in the following manner:

A small brass plate, varying in thickness according to the size of the type to be made, with a hole punched near one end, is needed for each character, letter, figure or point, and sometimes ornaments, in the font. These plates are laid upon a flat surface, the letters placed in the holes, face down, and fastened in position with quads or spaces, care being taken to get them as square as possible to the head and sides of the plate. Wax is poured over the portions not intended to be exposed to the action of the battery, and a number of these plates are fastened together, side by side, and placed in a battery, being connected with it and a copper plate by means of wires forming a complete circuit. The battery causes the copper to be deposited around the face of the type in the opening in the brass plates, filling up the opening, and becoming virtually a part of the plate. The time necessary for the accomplishment of this process varies according to the size of the letter, some of the larger sizes needing to be immersed twice or three times as long as the smaller. When sufficient copper has been deposited to fill the opening in each plate, they are taken out of the battery, the letters withdrawn, leaving their image deeply imbedded in the copper, the back of the plate filed smooth, and another brass plate firmly riveted thereto, making the whole of sufficient thickness for use as a matrix, and are then handed to the fitter.

All the tools used by a fitter are very delicate and exact, being constructed to measure the slightest difference between one matrix and another, to the one-thousandth part of an inch, or even less. With a fine pointed gauge the depth of the face of the letter is measured, and made exactly parallel to the surface of the matrix. This gauge, when once set, is used for all the matrices in a font, thus

insuring regularity in height of the type from shoulder to face. Printers will see the necessity of such accurate measurement when they think of the trouble that would arise in making ready a form if the letters varied in height even the thickness of a tissue paper. The sides of the matrix are then made of equal distance from the face of the letter, so that the face may stand exactly in the center of the body. The matrices vary in width according to the width of the letter, but the space on either side of the face must be the same. For instance, supposing the space on either side of a capital I to be a long primer, the capital M must also have a long primer space on either side, the difference in the width of the matrix being as great as the difference in the width of the I and M. Should the matrix be too wide, the superfluous metal is taken off by the fitting-machine, which has a gauge corresponding line for line with the fitter's measuring gauge. If the space should be too little, the matrix has to be placed in the battery until sufficient copper has been deposited thereon to bring it up to the required size. The head of the matrix has now to be made square to the sides and surface, and the faces of each brought into line.

The punchcutter's and fitter's guides in determining the width and line of letters are the capital letters H and O for the caps, and the lower case m and o for the lower case letters. During the process of fitting, trial types are cast from each matrix for the purpose of measuring and determining their accuracy. These are cast in a hand mold, which will be described and illustrated in a future issue. It will thus be seen that considerable time is expended in fitting a complete set of matrices, on account of the extreme nicety of adjustment necessary for making a font of type proportionate and exact in line. The accompanying illustration shows a matrix in its finished condition. The letters and figures at the bottom are the typefounder's index to the set of which the matrix forms a part. Each set of matrices is kept in a separate drawer, and on account of their great value special care is taken to keep them in a safe place.



MATRIX.

The fitter having finished his part of the work, the matrices are passed to the typecaster, who casts a trial font therefrom. A specimen page is set and proofs taken which are closely examined for faulty letters. Should there be any (and it is seldom that all the letters are perfect on a first trial), the matrices of the faulty letters are corrected, and those letters recast. After changing them in the specimen page, other proofs are taken; and this process is repeated until the font is declared perfect.

The matrices being ready, a mold becomes necessary for forming the body of the type, the matrix creating the face only. A typemold is an ingenious piece of mechanism in two parts, each part being constructed of several pieces of steel screwed and fitted together with mathematical exactness. The steel used in its construction has to be very finely tempered to resist the action of the heat engendered during the operation of casting; and each of the two parts need to be of the same degree of fineness in this respect, or trouble might ensue from the tendency to expansion caused by heat, and the body of the type would become affected.

(*To be continued.*)

SKETCHES OF THE BOOKBINDING ART.

NO. II.—BY A. J. COX.

WITH reference to the elements of style in the three great book-producing nations of the present age, it is, perhaps, fair to say that France excels in taste and finish, England in elastic solidity and strength, and America in the invention and use of machinery vastly increasing the speed of construction.

An extraordinary feat in bookmaking, never surpassed, was the production of the Caxton Memorial Bible, 1877:

The Bible held up by Mr. Gladstone at the Caxton *déjeuner* as the "climax and consummation" of the art of printing was printed at Oxford, bound in London, and delivered at the South Kensington Exhibition buildings literally within twelve consecutive hours. The book was printed, not from stereotype plates, as has been erroneously stated by some of the morning papers, but from movable type set up a long time ago, and not used for years. The printers commenced to make their preparation soon after midnight, and the printing actually commenced at 2 A.M.; the sheets were artificially dried, forwarded to London, folded, rolled, collated, sewn, subjected to hydraulic pressure, gilded, bound, and taken to South Kensington before 2 P.M. The book consists of 1,052 pages, 16mo, minion type, and is bound in Turkey morocco, beveled boards, flexible back, gilt lettered on back and inside cover, with the arms of the Oxford University in gold on its obverse side, and is free from the set-off or blemish which its hasty production might well have excused. It contains an explanatory inscription and title: "In memoriam Gul. Caxton," with the occasion and the date of the edition printed at the bottom of each of its thirty-three sheets. The books are numbered 1 to 100, and copies are already allotted to the Queen, the Duke of Devonshire, the Marquis of Salisbury, the Earl of Beaconsfield, the Emperor of Brazil, Mrs. Gladstone, Earl Spencer, General and Mrs. Grant, Mr. James Lenox, of New York, Mrs. Pierrepont, wife of the American Minister, Earl Jersey, Prince Louis Lucien Bonaparte, the library of the Académie Francais, and several large public libraries at home and abroad, each book being inscribed with the name and original presentee. The idea of producing the Bible under the circumstances originated with Mr. Henry Stevens, a most eminent bibliographic authority on the subject of Bibles, who has catalogued and arranged the splendid collection now in the Caxton exhibition. Mr. Stevens applied to the University Press, Oxford, to enable him to give it effect. How efficiently they coöperated is now known to everybody. The event was quite the sensation of the day, while copies of the "Caxton Bible" are already scarce, if not unattainable.

A curious art in connection with bookbinding, consisting in the restoration of old books and manuscripts, is prosecuted in the French capital, and has been raised by a few experts to a marvelous degree of perfection. The skill of these artists is, indeed, so great that no book is beyond their transforming touch.

They take out the most inveterate stains and marks; they reinstate the surface where holes have been gnawed by rats, or eaten by worms; they replace missing lines and leaves in such a way that no one can discover the interpolations; they remake margins, giving them exactly the color and appearance of the original; so well is all this done, that frequently the most discriminating judges can not tell the restored copy from the perfect original work. Ornamental frontispieces, editor's marks,

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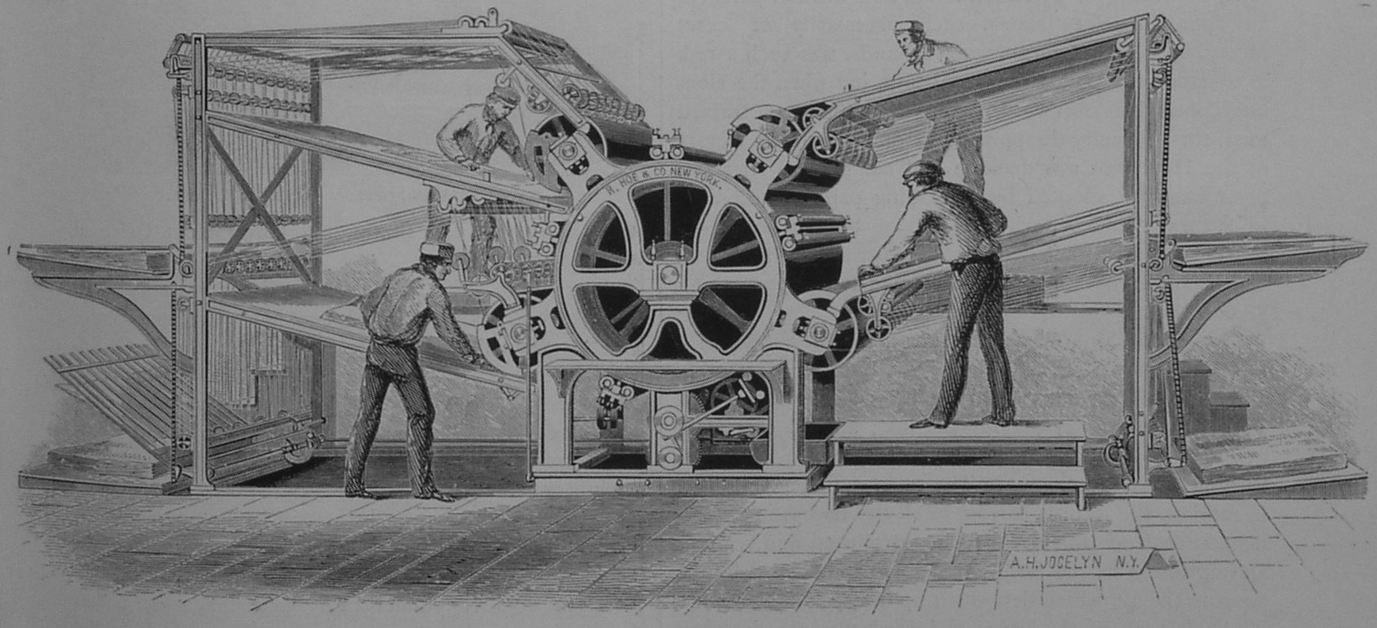
THE PRINTING-PRESS.

BY STEPHEN MCNAMARA.

CONTEMPORANEOUS with Applegath's wonderful vertical press in England in 1846-8, appeared the still greater marvel of Hoe in America. Between the gigantic intellects of these remarkably able men the world witnessed a contest for superiority, the like of which has seldom if ever been equaled. One characterized, as we have previously shown, by marvelous ingenuity and a resort to the most intricate, difficult and dangerous means to avoid an obstacle which for years intimidated the ablest mechanics; the other with the boldness of desperation, backed by strict adherence to true mechanical principles, in the face of doubt and fears openly expressed by all, accomplished the hazardous feat of firmly holding type on a curved surface, in open defiance of centrifugal force and gravitation. No wonder his temerity won the admiration and plaudits of the world; and the resultant effects soon proved how well he deserved them, for, coming hand in hand, at a time when the influence of the telegraph and the railroad were being first felt, its influence upon journalism cannot be overestimated.

When R. M. Hoe conceived this bold idea and put it into execution, he opened the way to possibilities for the spread of intelligence which had previously been hedged about. No longer was the newspaper to be regarded as a purely local institution, cramped by methods of production and limited to small circulation. "News by Telegraph" henceforth meant late news, for the Lightning Press permitted the columns to be kept open until the last moment, and when once started it moved with resistless tread, while its extreme simplicity obviated all danger of accident or delay.



HOE TYPE-REVOLVING PRESS, 1847.

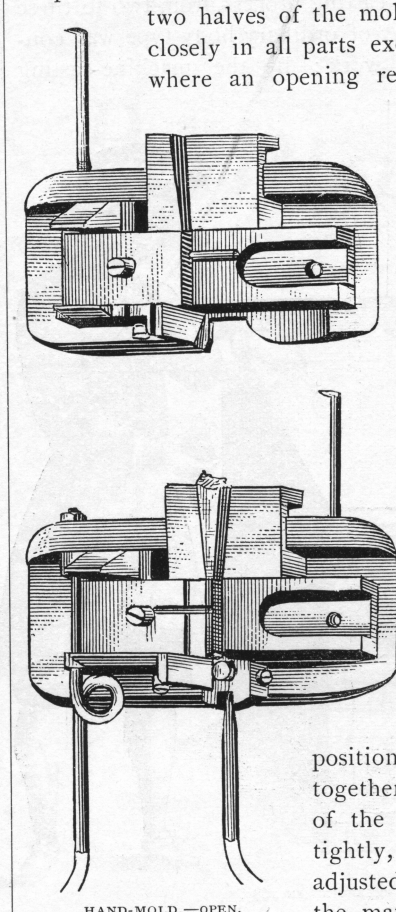
Thus, when the first four-cylinder press was placed in the office of the *Public Ledger*, of Philadelphia, in 1847, a

Written for THE INLAND PRINTER.

TYPEFOUNDING.

NO. III.—BY ALFRED PYE.

UNTIL within the last fifty years, all type had to be cast in hand molds, which was a tedious process, and one which would not begin to meet the requirements of printers in these days. The hand mold was constructed of several pieces of steel, scientifically screwed together, in two halves, which were inclosed in a wood box or shield, to protect the hand of the workman from injury. The two halves of the mold lock together, fitting closely in all parts except just in the center, where an opening remains of sufficient extent to form the body of the type, into which the molten metal is poured. Each half is a counterpart of the other, except that attached to one half (the lower half shown in the engraving), is a spring for holding the matrix in position, and in the other half is a ridge for forming the nick in the type.



HAND-MOLD.—OPEN.

The operation of casting was as follows: Taking the mold in his left hand, the caster with his right adjusted the two halves, and placed the matrix in position. Drawing the halves together, the clamps or cheeks of the mold held the matrix tightly, and the spring was then adjusted to press the surface of the matrix close to the mold, the point of the spring fitting into a hole at the back immediately beneath the face of the type. Standing beside a furnace or oven, upon which was a kettle of molten metal, the caster took a spoonful of the metal and quickly poured it into the opening in the mold, at the same time giving the mold an upward jerk or throw. This throw was necessary to cause the metal to penetrate the finer lines of the matrix and give a good face to the type; for the metal cooled so rapidly that it otherwise would set before reaching its destination, and an imperfect type would result. The matrix was then removed, the mold opened, and the type pulled out with one of the hooks shown in the engraving. Each half of the mold had a hook attached, as, according to the method of casting, the type would remain sometimes in one half and sometimes in the other. In the lower half of the engraving a type is shown in the position it would occupy on the opening of the mold. A very large jet filled the mouth-piece of the mold (much larger than is produced in machine-casting), being attached to the

letter, and the labor of breaking off these jets was very great.

The illustration on page 144, copied from a work entitled "Mechanick Exercises, or the Doctrine of Handy Works applied to the Art of Printing," published in London, England, by Joseph Moxon, 1683, shows the typecaster in the act of carrying the metal from the kettle to the mold.

Mr. David Bruce, Jr., in 1838, patented a typecasting machine which wrought a revolution in the art of type-founding. By the hand-casting process, from two to three thousand letters per day of ordinary body type was considered a good day's work; by the machine-casting

TYPECASTING IN 1683.

process the quantity produced is greatly increased, the method of casting greatly simplified and the labor rendered less arduous. In place of the many motions necessary in hand casting, the simple turning of a crank produces a letter in a marvelously short space of time. The mold has undergone little, if any, change, beyond being adapted to its new position on the machine. The wooden shield is discarded, being of no further use. The following illustrations show the mold as at present used. In Fig. 1 the lower half of the mold is shown, which is attached to the mold block of the machine, and becomes a fixture. This half contains the ridges which form the nicks in the type. It is shown upside down for the purpose of more clearly disclosing all its parts.

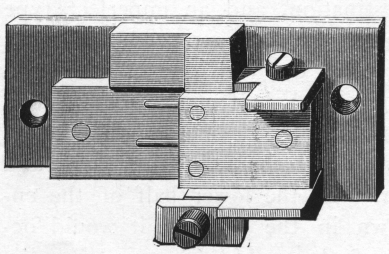


FIG. 1. LOWER HALF OF THE MOLD.

Fig. 2 shows the upper half of the mold, which is movable, being lifted for the purpose of removing the type every time a letter is cast. This half is adjustable in a lateral direction, to accommodate the mold to the varying width of the matrices. Fig. 3 shows the mold complete, with the matrix removed, disclosing the face of the type in the mold. The matrix fits in between the cheeks on either side of the face of the letter, being held close to the mold by a spring as in the hand mold. A separate mold is made for each type body. It would be impossible to attain satisfactory results in uniformity of body if adjustable molds could be constructed with the view of using them for more than one body. The adjustment could not be effected with the accuracy which is such an essential feature in type bodies. The number of molds needed in a foundry is therefore considerable, when all the varying bodies of type, from brilliant up to six or eight-line pica, are taken into consideration. It is not necessary to have a mold for everyface of type that is made, as the matrices for any number of faces on the same sized body can be used on one mold.

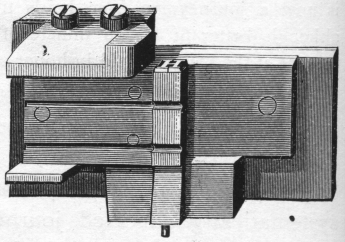


FIG. 2. UPPER HALF OF THE MOLD.

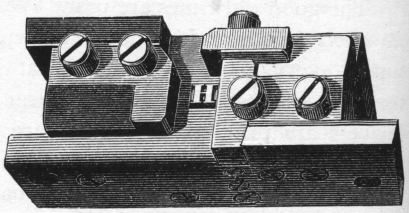


FIG. 3. TYPE MOLD COMPLETE.

(*To be continued.*)

AN EAST INDIA PAPER MILL.

A correspondent in Bombay, Babaji Cassinathjee, writes to the editor of the *Paper Trade Journal*, New York, under date of Oct. 14, as follows:

In your number of the 12th ultimo, which came to my hands yesterday, on page 460, in an editorial paragraph referring to the paper mills of India, it is stated that "the managers and foremen are Europeans." This, I beg leave to say, is not correct, as far as the paper mills in Bombay are concerned. I am the manager of the Girgaum Mills, and am a native (Hindoo), and have a native foreman and native engineer to assist me in the working of the mill. The mill has been worked by me for the last fifteen years, having European foremen under me at different times, but for the last seven years it has been worked to the satisfaction of the owner without a single European. Please oblige me by publishing this in your next issue.

THE number of pounds of type used in the newspapers of the United States is put at 6,689,878. The newspapers in the five states of New York, Pennsylvania, Ohio, Illinois and Iowa set half the number of ems set in the United States. A pound of type sets 83 ems. An average of 1,200 ems is left in the cases. The average per newspaper is 74,147 ems for dailies; average for weeklies, 57,197. The total amount of type set for one issue of the daily newspapers of the country would make 2,785 duodecimo volumes, and all the papers in a year would represent as much type work as would make 10,000 volumes, equal to "Appleton's Cyclopedia." A slip of the work would extend from the Atlantic to the Pacific. Eight thousand persons are employed.

THE INLAND PRINTER

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Written for THE INLAND PRINTER.

A REVIEW OF THE DAYS OF OLD.

BY REV. JACOB MILLER, RECTOR OF ST. JAMES, P. E. CHURCH, PITTSTON, PA.

IN the year 1839, at an early age, I was engaged as "roller-boy" in the printing-office of James Sharp, northwest corner of Sixth and Callowhill streets, Philadelphia, my native city. It was a modest apartment, with a meager supply of printers' material, including a Wells press, which to me was an object of deep interest, as I had never seen a printing press of any pattern. I soon became quite proficient in the performance of my duties *behind* the press, and turned the cylinder with becoming ardor, and rolled over the form to the evident satisfaction of my employer. But he, being a practical man, of the utilizing sort, soon proposed that I should learn to pull, so that my time might be fully occupied, in his absence, with the double task of "rolling" and pulling. To this *sharp* proposal I readily assented. But it was a slow and tedious process; I soon wearied of it, and after a few experiments, the number of *impressions* made while he was absent became perceptibly diminished. I had the misfortune to break through the parchment tympan by striking against the platen of the press, which accident was at once attributed to sheer carelessness. I had nothing to do, of course, with making ready the forms. But I was astonished to see paper, and even cards, deluged with water as a preparatory ordeal. I will relate another incident which occurred at this early stage of my novitiate. On a certain occasion, being sent upon an errand, while working at the press, I took the precaution to prop up my rollers with pieces of furniture, omitting however to lower the curtain of the window immediately in their rear. To my horror, when I returned, the rollers were running away from their stocks, the hot summer sun having melted the unprotected surface. After a brief probation, I wearied of my situation, and left by apparently mutual consent. For a year or two I was employed as errand-boy by Griffith & Simon, bookbinders. Then, at the suggestion of a friend, I tendered my services to John Young, printer, No. 3 Black Horse alley, and was duly accepted as a learner of both branches of the printing art, and soon began to operate at press and case. This was a famous office; its locality was known far and wide. For plain and fancy printing of every description it had no superior in Pennsylvania. Merchants from all parts of this and adjoining states came to old Black Horse alley to have their store-bills printed in Young's peculiar style. His imprint was seen everywhere. For months in the spring and fall we were kept busy day and night. We were familiar with inks of every color. Vermilion and printers' varnish were in almost constant use. A very pretty little press, called the Orcutt, was used for cards and small circulars. It was a general favorite. Here I would state that one of my first tasks was to manipulate a very soft roller *before* the press, which fairly hugged the stone that was overspread with red ink, thus raising great blisters upon my hands suggestive of the buckskin balls that were used by our ancestral printers. Printing in gold, silver and bronze was a specialty in this office. Howell Evans, an adept in novel and attractive designs, was the foreman. He has since established an office in Philadelphia which ranks among the best. I remained in Young's office for several years, and then worked for Major Town until I became of age. Subsequently I was employed in the office of the Norristown *Register*, and worked off the weekly edition by hand, with the aid of an athletic youth who plied a long and heavy roller composed entirely of well-boiled glue and molasses. Meanwhile John Young, having retired from business and settled upon a farm, was succeeded by John Duross, who kept up the prestige of the old office for a long while, and realized a handsome fortune, as the reward of his persevering and ceaseless industry. I worked for him a number of years; and then, after a brief term of service with L. Johnson & Co., quit the printing business to enter upon a calling in which I have continued to the present time. But Oh! what changes have taken place since first I essayed to become a printer. The office of James Sharp has long since become extinct, and he has passed to that realm in which types and presses have no place. John Young, too, has been "gathered to his fathers." He soon quit farming, and died in Philadelphia at a good old age. And the old four-story building, so long used as an office and dwelling, has been demolished, and the site is now occupied by a fine store-house. *All* my fellow-apprentices, with a long list of associate pressmen and compositors, are

Drunken and otherwise Unreliable Printers. — Supply greater than demand. Prices weak, and getting weaker, as more good printers come in. Employers always on the lookout for better men to take their places.

Good, Fair, to Medium Printers.—Steady demand at fair prices. No lack of employment, and many opportunities for advancement.

A No. 1 Printers.—Scarce. In great demand at high prices. Not enough to supply the demand. Market never overstocked.

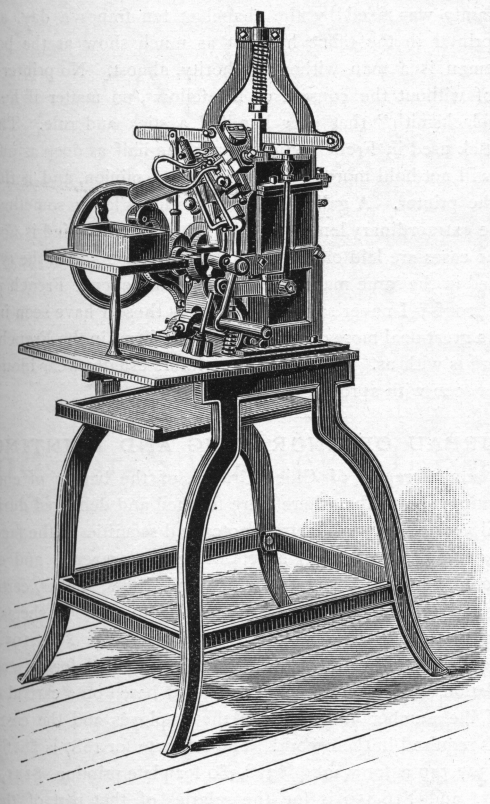
The grade to which he decides to belong will determine the question whether the trade is too crowded for the inquiring novice to find an entrance profitable.

Written for THE INLAND PRINTER.

TYPEFOUNDING.

IV.— BY ALFRED PYE.

THE type-casting machine is a very compact apparatus, occupying but little space. At the back is a small furnace, above which is a reservoir or metal pot for containing the molten metal. In the metal pot is a well containing a pump, and a tube leads from the well to the front of the metal pot where is a nipple, through which the metal is injected into the mold. The mold is fitted to the



TYPE-CASTING MACHINE.

mold block in front of the machine, the lower half being screwed to the block, becoming a fixture. The upper half is attached to an arm which opens the mold for the purpose of releasing each type as it is cast. The matrix is held firmly in place by a spring in front of the machine. At each revolution of the crank the mouth of the mold is brought close up to the nipple ; a cam attached to the shaft turned by the crank presses down a lever which withdraws from the nipple a pin that blocks the passage, called the "joker," thus permitting the metal to flow through, while another cam at the same moment presses down a bar which operates the pump, forcing the fluid metal into the mold. Sufficient metal to fill the mold only is allowed to pass through the nipple, the joker immediately closing it as the mold is removed. As the mold block returns to its original position, the upper half of the mold is raised and the type released, when it falls into the box on the stand in front of the machine. A type is cast at every revolution of the crank, and small sized letters can be made as rapidly as the caster can turn the crank. On large type the caster has to work slowly, holding the machine for a few seconds after filling the mold, in order that the metal may set, for if the type was released from the mold immediately, the metal in the center not being set would burst the type. When practicable a current of cool air is directed by means of a tube on to the mold for the double purpose of keeping it from being overheated and aiding the type to set rapidly.

Job type is cast by means of the hand machine, as, the fonts being small, the matrices need to be changed frequently. When a sufficient quantity of the letter *a*, for instance, has been cast, the matrix is removed and the matrix for the letter *b* takes its place, and so on throughout the font. The upper half of the mold has to be adjusted to the width of each matrix, and the caster is responsible for any inaccuracies that may result from possible negligence. Body type is cast on machines operated by steam power, the matrices not needing to be changed so frequently, and two steam machines can be attended to by one man.

Each foundry makes its own type-molds, for the reason, as printers know, to the great vexation of their souls, that the type bodies of no two foundries in the United States being exactly alike, molds useful in one foundry would be useless in another. The repairing of molds forms a considerable item of expense in a type foundry, for, like all other pieces of mechanism, they will wear out with constant use, or get out of order, and therefore need some careful attention. The expansion caused by heat is one of the troubles that type molds are subject to, and this fault would be fatal to correctness of body if not detected and adjusted.

On account of the great expense that would be involved in changing the size of the type bodies to make them uniform with those of any other foundry (necessitating a complete new set of molds), typefounders are unwilling to agree to that much-desired result which printers are now agitating for, namely, uniformity in size of type bodies throughout the foundries of the United States. That such a result must come, sooner or later, is an admitted point in the argument; but it will depend largely upon the willingness of the majority of typefounders to incur the necessary outlay. Some are working to this end by changing a few of their molds at intervals, thus spreading the expense over a long period of time. No doubt a uniform system would be a boon to both typefounders and printers, because printers would then place some orders with the nearest foundry, which now have to be sent to

particular foundries (sometimes hundreds of miles away), because the body must match.

The metal used for type varies in hardness according to the purpose for which it is needed. Most printers know that type metal is a combination of lead, tin and antimony. The average proportions of the respective metals are as follows: lead, 60 per cent; antimony, 33 per cent, and tin 7 per cent, with a small quantity of copper added. For body type and small job type hard metal is used, containing a greater proportion of antimony, as there is more wear on these types than on any other. Larger sizes of job type are cast with a little softer metal, and spaces and quads with softer yet, wear on these being very slight.

The type as it leaves the mold is in a far from finished condition. There is attached to the foot of each letter a piece of metal called a jet, formed by the metal remaining in the mouth of the mold when the letter is cast. This has to be detached, and for this purpose the type, as it leaves the machine, is passed to a boy called a breaker, whose work it is to break off these jets.

Around the shoulder of the type where the matrix and the mold meet is a bur, or roughness, which also has to be removed. This is done by rubbers, usually girls. The operation of rubbing may be thus briefly described: Seated at a table, upon which is laid a file specially made for this purpose, the rubber takes each type separately, and rubs first one side, then the other, upon the file, removing all superfluous metal that may adhere to the sides of the letter. Each letter, as rubbed, is dropped into a tray or drawer, in readiness to be passed to the setter. This is the best and most perfect method of rubbing type, and is practiced in most foundries. There is another mode of rubbing type, called "bunching," where the type is rubbed on a sandstone, several letters being rubbed at one time. This is a quicker way of getting the work done, and is less expensive, but the work is not always so good as when rubbed on the file.

After rubbing, the type is taken in hand by the setter, who sets it up in single lines, about three feet long, on wooden sticks ready for the dresser. The rapidity with which the girls pick up the letters would excite envy in the breast of many a poor comp. who is toiling on a "lean take," and can only scoop up from four to five thousand ems per day. Of course, the setter in a type-foundry has no bad copy to perplex her, and no spacing out to attend to, but the quantity some of them can pick up in an hour is something wonderful.

(*To be continued.*)

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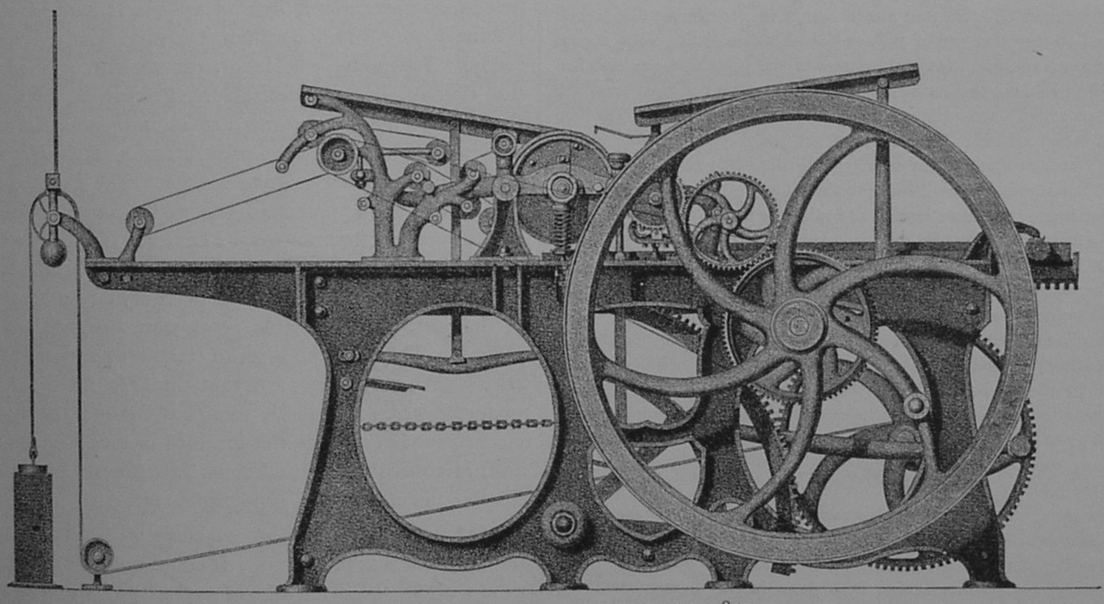
Written for THE INLAND PRINTER

THE PRINTING-PRESS.

BY STEPHEN MCNAMARA.

IN many important industrial centers between the seaboard and the Mississippi, printers whose slender resources prevented them from becoming the possessors of machine presses have sadly felt the need of something less expensive than the productions of Hoe, Taylor and Adams. Throughout the advertising age, from 1850 to the present, such printers were eager to patronize those whose efforts were directed toward building machinery to answer their growing wants, nor did they care whether it was built according to prevalent ideas so long as it came within their means.

Among the first to attempt this hazardous feat was L. T. Guernsey, a resident of Rutland, Vermont, to whom a patent was issued in 1852 for a cylinder press, differing in many respects from any then in use. The cut herewith presented is taken from a lithograph courteously furnished



GUERNSEY OSCILLATING CYLINDER PRESS, 1852.

by the inventor, and is the only memento left of his efforts in behalf of his brother printers in the past. Mr. Guernsey, who is still engaged in the printing business in Beloit, Wisconsin, states:

I was the first person, so far as I know, who attempted to construct a cheap machine that would serve the then wants (1846) of first-class country printers a better purpose than the hand press. I began on the traversing cylinder plan, i. e., cylinder rolling over stationary bed. I built a crude wooden thing, and became satisfied that it was useless. I had supposed I was original in it, but found afterward I was not, that many years before an English press built on this principle had been used in a Baltimore printing-house. Some time after this a man

enterprising business men, realizing that printers' zinc had the ring of pure metal, have availed themselves of its advantages and sought by every means to attract attention. The three "R's," that had so long been known to stand for Readin', 'Ritin', and 'Rithmetic, would indicate "Radway's Ready Relief" equally as well if worked on hand-bills, posters and circulars. The cabalistic sign "S. T. 1860 X," and "Spaulding's Prepared Glue" required tons of ink to advertise the excellence they represented.

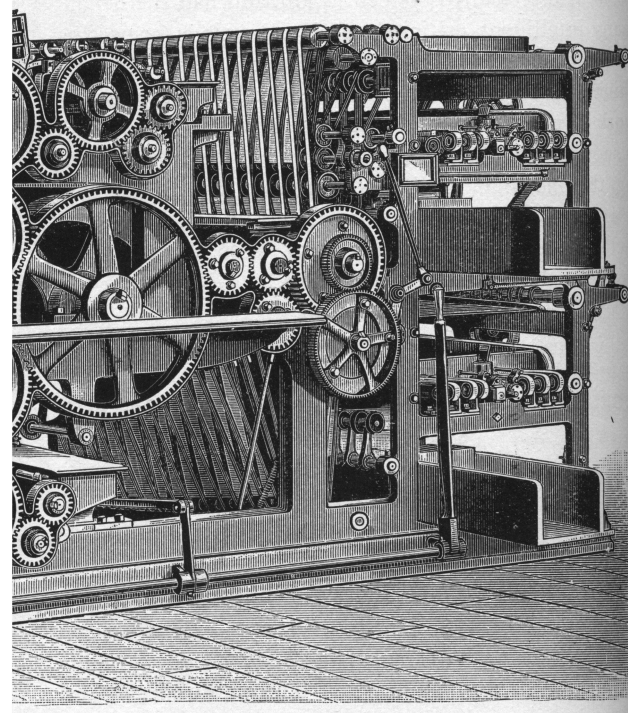
In hopes of securing portions of the increasing work,

Written for THE INLAND PRINTER.

TYPEFOUNDING.

V.—BY ALFRED PYE.

FROM the setter the type goes to the dresser, who places each stickful of type in a dressing rod, screws it up tightly, turns the type on its face and clamps it tightly in a bench. Then with a plane he cuts a groove in the bottom of the type, giving it feet to stand upon. Unclamping the rod from the bench, he then smooths off the back and front of the letter, and with a powerful magnifying glass carefully examines the face and throws out all bad letters. Sometimes this portion of the work is done by another workman called a picker. The long stickfuls of type are then broken up into shorter lines, made up into pages, and sent to the dividing-room to be made up into fonts. Kerned letters such as *f*, *j*, *ff*, and italic letters have to be finished on the kerning machine. This is an apparatus constructed with swiftly revolving knives beneath a



flat surface, with an opening for the kern of the letter to be placed in. By means of a treadle the knives are brought close up to each letter, and cut away as much metal as is desired.

In the dividing-room job type is laid out on long tables with galley tops, the letters being arranged in lines proportionate to the size of the fonts intended to be made up. These lines are gathered up into complete fonts on galleys, tied and wrapped up, labeled and passed to the warehouse for sale. Body type is divided into fonts without being laid out on tables. The pages as they come from the foundry are placed on galleys and the proportionate quantities of each letter, figure, space and quad are separated from the bulk and made up into fonts (usually) of 25 lbs., 50 lbs., or 100 lbs., properly wrapped up and labeled, ready for sale. Special orders, of course, have to be made up according to instructions.

In making up fonts of type, carefully prepared schemes are used, which vary somewhat in different foundries.

The following figures will give a general idea of the proportion the letters should bear to one another, without going into detail: *Lower case.—e*, 6 lbs.; *a, n, o*, 4¼ lbs. each; *h, r, s, t*, 3½ lbs. each; *m, d*, 3 lbs. each; *i*, 2½ lbs.; *u*, 2 lbs., and the other letters varying from 2 lbs. down to 2 oz. each. *Points*, etc., vary from 1¼ lbs. of *commas* down to 1 oz. each for *reference marks*. *Figures* average 5 oz. each, with 1 oz. each for the fractions. *Caps* average 6 oz. each, a greater proportion being allowed for A and E, while J, K, Q, U, etc., are in the minority. The *Small Caps* average about one-third the weight of the Caps, varying from 3 oz. down to ½ oz. *Braces, Dashes* and *Leaders* are put in small quantities, as they are seldom drawn upon for use, except on special work. About 18 lbs. of *Spaces* and *Quads* are needed in a 100-lb.-font, ranging from 5½ lbs. of "3-em" spaces down to 3 oz of "hair" spaces.

Any printer who cares to think for a few moments about the matter will see that it needs some nice calculation to so proportion a font of type that it will work out evenly in setting. There may be in some cases errors made in the dividing-room, which will give a greater or less quantity of some letter than ought to be, or sometimes omit a letter altogether, but such instances are not frequent, and printers can easily determine, by careful examination of a font of type upon opening the packages and before laying the type in case, whether he has a complete font, rightly proportioned, for *then* is the proper time to have mistakes rectified.

In job fonts the letters are proportioned by number to the letter "a," and the size of the font is designated as 12 A, 24 a, etc., a similar scheme being followed, as described above, in relation to Roman type.

A few words with regard to ordering sorts may not be out of place. Most printers, having purchased a font of body type, lay it in case, and straightway forget the number of the face, and sometimes, when they buy from two or three foundries, will forget from which foundry it was bought. Some sorts are needed, and one or two letters, it does not much matter which, are sent as a sample of the type to the foundry, with an order for a pound or two of certain letters. We have seen a colon sent as a sample, and on another occasion, a comma and a period. Such samples as this are not much of a guide to the typefounder in determining to which font they belong. A lower case "m" or a cap "H" of the letter needed should be sent as a sample. Another guide in ordering sorts, for quantities, is, that in an ordinary news or book case the large square boxes, for letters *a, c, d, m*, etc., hold about two pounds of type; the half-size boxes, for letters *b, f, g*, etc., hold about fourteen ounces, while the quarter-size boxes hold about six ounces each.

Leads, slugs, metal furniture and brass rule are necessary adjuncts to a printing-office, the manufacture of which forms part of the operations of a typefoundry. Leads and slugs are cast sometimes in hand molds, sometimes in machine molds, the number cast at one time varying from one to a dozen. On one end, where the metal enters the mold, is a clump, similar to the jet on type. This is cut away, and the leads are shaved singly, on both sides, by a hand planer, making them of even thickness throughout their entire length. Various kinds of power machines have been tried for the purpose of superseding the hand process, but none have yet been found to answer so satisfactorily.

Leads are cast in thicknesses of 12, 10, 8, 6, 4, and sometimes 3-to-pica. Above 3-to-pica thick they are called slugs, and are made in thicknesses of nonpareil, pica, great primer and double pica. These are shaved by a power machine, the slugs being forced between two sharp-edged knives, set apart exactly the distance the slug should be shaved down to.

Metal furniture is cast in hand molds in lengths of about fourteen inches, being cored to lessen its weight. It is shaved in the same manner as slugs, and is afterward sawed up into lengths of from four to fifty picas. The ends are smoothly planed off, making the lengths of accurate measurement. Metal furniture varies in width from two to ten picas. Another kind of metal furniture is made which is not cored, but cast similar to a section of railroad iron, and is called "railroad furniture." This is of greater strength than the ordinary furniture, there being no danger of its giving way at any point.

Brass rule is received from the brass manufacturers in strips of varying thickness from 12-to-pica up to great primer, and a little more than type high. The face is cut with a planer, the strip of rule being clamped tightly in a bench while it is being cut. Wave and fancy rules are made with special tools cut for the purpose of producing the various patterns. The rule is dressed and gauged to the height of the type made in the foundry, and is sold to the printer in strips of twenty-four inches length, or cut to measure as needed.

From the foregoing remarks printers can easily see that though a type may seem an insignificant piece of metal, which might be produced in a moment, the amount of skill and number of hands necessary to produce it and give it the necessary qualifications for serving its purpose are very great; and though it may sometimes be thought the price of type is high—higher, in fact, than it ought to be—when the various expenses incident to its production are taken into consideration, it will be readily understood that the profits on typefounding are not quite so enormous as many persons imagine.

Written for THE INLAND PRINTER.

NOTES ON WOOD ENGRAVING.

NO. XVII.—BY S. W. FALLIS.

IN a large folio, with text in German and French, printed at Gotha between 1808 and 1816, from old wood cuts collected by Baron Von Derschau, the first part being printed in 1808, the second in 1810, and the third in 1816, the editor, Zacharias Becker, assigns to several of these cuts an earlier date than 1500. Jackson expresses his opinion that two or three may possibly have been done prior to that period, but thinks that bad drawing and rude engraving has been mistaken by Becker as evidence of antiquity. There are also two or three of these cuts that Jackson suspects of being modern forgeries. The authority of the Baron was of a questionable character as to the dates