VOL. XXXIII. No. 5. JANUARY, 1902 PRICE, 20 CENTS

The AMERICAN PRINTER

A Journal *for* Progressive Master Printers

VOL. XXXII NEW YORK, JANUARY, 1902 No. 5

A Study of Modern Typefounding

BY DONALD WYLIE

TO the guild of which you and I are unimportant units, type is a thing largely providential and fortuituous. Either it is there when it is wanted, or it is not. In the one case we "pick for sorts"; in the other we accept it mainly as a happy intervention of industry in our work's behalf.

In these latter days it is with type as with many other things of daily use. The guild which had for its fathers Gutenberg, Schoeffer, Fust and Franklin, has come to regard it no more than other ordinary things which we take for granted, and as one of the factors that go to make up our business.

It was not always so, for in the days before mechanical thought developed to any definite plans those creations we now regard as the inevitable accessories of the printshop, the types were the beloved tool wherewith the printer wrought his wonders. Because it was no uncommon thing for the earlier printer to make his own types, there sprang up and dwelt through all the dawn of the art an intimacy and a regard between type and craftsmen of which far too small a trace remains. For the story of how type is made is as interesting, could it be rightly told, as any tale you or I know; and the twentieth century typefoundry is a place wherein more marvels of accuracy are wrought daily than in any of the great factories of which we hear so much and know so little.

No realizing sense of the ingenuity and the painstaking which goes to the making of type is possible to one, until he has given much time and more thought to an inspection of some great modern typefoundry—such an establishment, for example, as that operated by the American Typefounders Company in Philadelphia, on the site and with the plant where MacKellar, Smiths & Jordan earned a world-wide reputation for American typefounding. Spend at least a week in an inspection and a scrutinizing study of such a plant; and your respect for type will be where it should have been before.

Accuracy and quality are the twin gods of the American typefounder. The one he worships because of commercial, the other because of mechanical, necessity. Workmen gravely explain to one how their days are spent in regulating matters at the bench by the aid of gauges which record a deviation of the twentieth thousandth of an inch. After a little you find yourself listening to the superintendent-machinist, the genius who has created many of the progress-making machines of the automatic phase of typefounding, and you hear him describing a micrometer-gauge that is to detect a variation of 1/100,000 of an inch!

So far does the typefounder go toward the ideal of accuracy,—the "absolute zero" of error. To split an inch into one hundred thousand parts, and to manipulate metal at the melting-point so that its finished product shall not exceed or fall below a fixed standard by the least of those parts,—this is nearly the present attainment of typefounding.

Economical latter-day methods require the production of type to begin with the artist—the letter designer. In all the United States there are perhaps ten men whose understanding of the typefounder's needs is wide enough to qualify their drawings for service in the making of a symmetrical, salable and serviceable font of type; and so difficult and complex are the requirements in such designing that it is not probable there will ever be more than ten thoroughly capable designers of type letters.

Working upon white bristol board, with India ink, the artist draws his conception of the new face, preparing a separate design for each capital, each small capital, each lower-case letter, figure, punctuation mark, and specific mark such as the $-sign, the &-sign, and the like. His design sheet ready, the artist goes into conference with the master typefounder and his artistic pride begins to be jolted; for while his arrangement of letters may be beautiful to the artistic eye, it probably is not half fitted to meet the typefounder's understanding of the market's needs. So the latter considers the design in its every aspect. Detail by detail he studies the font the artist has designed, trying the pictorial effect of various common combinations of letters and of figures, balancing this slight fault against that substantial merit, to this line adding a little strength or clarity, taking away from that one a shade

of heaviness, rounding out curve and building up serif,—until, at last, the design seems to him what his idea of salability, wearing quality and catchiness would have it. Back then it goes to the artist for redrawing; and it may be amended again, or many times, before it gains the final approval of the man who knows. When the last touches are given and the design finally accepted, it becomes for a time the latest of the typefoundry's many well-kept secrets; and no hint of the new face transpires until the trade journals show it in their monthly array of specimen pages.

Up to the moment when the drawing obtained the final approval of the typefounder, the art has changed but little in centuries, for the first conception of every new face of type was wrought out something as it is to-day. But the approval of the drawing nowadays marks the beginning of the modern way of doing things; for now, the type-face-that-is-to-be is created by the intervention of the first instrument of precision in the foundry's work,—the pantagraph. From the drawing a photographer makes enlarged negatives, and from these negatives prints are made. The prints are brought to the typefounder's engraver, who uses tracing paper to outline the photograph of each character in the font upon a piece of zinc,—the templet. The templet is set beneath the stylus-point of an upright pantagraph; and the workman guides that point over every detail of the outline. As the stylus point moves, a needle point at the pantagraph's upper extremity is moving in unison with it, graving upon the face of a block of composition metal an exact replica of the drawing, but in just the size of the finished face,—be it six-point, twenty-four-point, or whatever. By the time the last movement of the stylus has been made, the block of alloy carries an array of hair-fine lines on its surface; and the engraver slices away all that part of the block's face which is not included within the outline, leaving the design in high relief. That is modern punch-cutting.

With the rise of this process of pattern making, there ensued the downfall of the punch-cutter of old. Punch-cutting as it was, in the days before it was a lost art, rested upon extraordinary delicacy of skill in the engraver who worked on steel. Of him there are very few left in the industrial world; and none of the few who are left is great. Last of the masters of the craft was Alexander Kay, who cut the famous Ronaldson Roman face in 1881 for the MacKellar, Smiths & Jordan foundry; and with him there passed the typical artisan of the kind. Men like Kay studied the proposed new design for days before they began their work by making a counter-punch from especially annealed steel. The counter-punch was an engraving of the hollow part of the type face,—the part which is white paper in the printed impression; and it was stamped into the end of a short bar of mild steel, the stamping being gauged as to its depth by the size of the type, shallow for the small sizes, deeper as the sizes increase. After the stamping is done and tested again and again by gauges, the punch-cutter cuts away, with a long, gradual bevel, the parts of the bar's face not depressed, paring the outer edges of the letter until its microscopic fineness is perfect.

From the punch-cutter the pattern goes to be retempered, in order that it may be struck into a flat bar of cold-rolled copper; and the stroke, producing a reversed, or sunken, replica of the letter on the punch, creates what is styled a "drive,"—an incomplete matrix. It is complete when the copper slab, highly burnished, has had filed from its upper face the burr left by the stroke of the punch and has been made absolutely true as to the depth of the letter it contains.

So the old process. In the new, the block of metal on which the pantagraph and the engraver have produced a letter in high relief is fitted into an oblong hole in a thin slab of copper; and a dozen or so such combinations of slabs and punches, laid side by side, are fastened with beeswax composition into an arrangement called a "flask." The flask, suspended by wires in an electrotyping battery tank, receives, upon each of the exposed faces, a slow deposit of copper held in solution and which is precipitated by electric decomposition of the fluid. This is the electrotyping process, and the deposit usually requires ten days on the smaller sizes, and as much as six weeks on the larger sizes.

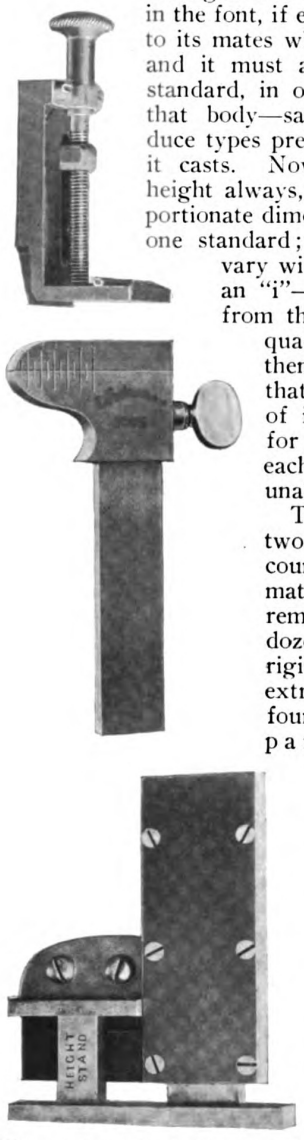
After nearly seven years of costly and extensive experiment in this foundry, the American Type Founders' Company has now perfected, and is using on a limited scale, a process whereby the battery deposits nickel instead of copper in the face of the matrix. Type cast from these nickel matrices present a degree of polish and perfection on their printing faces which is far ahead of the best heretofore; and though the secret of the nickel process is locked up in the heads of two or three men, its effect upon the art of typefounding is general, since it means better type than the most careful effort has been capable of producing by the older method.

At last the flask leaves the tank, its former hollows filled with copper that has been put atom by atom into every interstice; and the flask is resolved into its separate parts, each of which consists of the projecting punch the engraver made, joined to a slab of copper by the copper deposit. Now the slab is to become a matrix, and so it goes to the fitting-bench.

Toward the fitting-bench gravitate all the achievements of accuracy the typefounder can devise in the making of instruments of precision. It is the place where the reputation of the foundry is made or marred. Precision absolute,—precision more nearly absolute than any other industry conceives as daily practicable,—rules its every operation. Usually the master of it is a German,—that race which adores minute precision above all other things, and the one people that will take infinite pains to attain accuracy in seeming trifles. The matrix-fitter utilizes all his skill and all his delicate gauges to justify the drive,—to make it a perfect matrix. Each matrix in the font must have the same depth, to the minutest measurable fraction, from its upper surface to the bottom of its sunken face; each must be exactly square on each of its sides, with its sunken letters in precisely the same relative position to the face of the brass slab. Else the founded type cannot stand true in line, nor be placed in its due relation to its neighbor type. The smallest fault may destroy the sale of a font on which many dollars and many days have been spent; and, if the fault be repeated often, there is a typefoundry discredited. So it is, the matrix-fitter is the mainstay of the typefoundry,—he is treated with the deference one accords to the mainspring of a fine watch. For it is to him the founder must look for the presence in the place of the first of his gods, who is named Accuracy.

Next to this guarder of reputations, the important unit of the typefounder's art is the type-mold. Made from the finest grade of steel, its twelve parts each specially tempered and hardened with regard to the degree of heat or strain it must later withstand, the mold calls for exceptional care and skill in its making; and it represents, more truly perhaps than any other product of the modern mechanic, the primitive, true meaning

of the word "manufacture." It is fashioned by hand, with scrupulous, almost loving pains and effort, and it typifies the best that human skill can do with tools and metal to produce a mechanism rigorously exact. The mold must be not merely exact in one of its positions, but in all its adjustments; and, while each character in a font of type has its own matrix, unvarying and solitary, all those matrices must be handled by one mold, if need be. So the mold must be precisely arranged for adjusting each character in the font, if every type is to be cast true to its mates when they combine with it; and it must also be true to the mold standard, in order that every mold for that body—say eight-point—shall produce types precisely identical with those it casts. Now, types are uniform in height always, and in certain other proportionate dimensions they follow always one standard; but in width the letters vary widely—contrast a "w" with an "i"—and the spaces vary too from the hair-line to the heavier quadrats. The type-mold, then, must be so adjustable that it will carry any matrix of its rightful size the body for which it was made; and each must be locked in it in an unalterable relative position.



Micrometric and Standard gauges used by the matrix-fitters.

The type-mold is made in two sections, a right and a left counterpart, with which the matrix is assembled as a removable attachment. Its dozen parts are made with rigid fidelity to templets of extra hard steel, which are the foundry's standard pattern parts of that mold; and each part is separately fitted for its purpose by careful grinding and filing and polishing until the whole can be put together with no greater variation than the least fraction of an inch the workman is able to measure. When the two counterparts of the mold are finally united, their working faces, or inner sides, maintain a fixed distance, the mold's parts being immovable in any plane which can effect the body size of the type it will subsequently cast. Screws permit any amount of motion in the planes which determine the thickness or the width of the type-faces; and the two counterparts are arranged to slide each upon the other in broad surfaces of steel. At the upper edge of the mold is the opening or seat, for the matrix slab; and the lower edge is open, for the future inrush of melted type metal, while the space between one edge and the other regulates the height of the type, this being the same—.9185 of an inch—in the mold for four-point as for the biggest type cast. When the mold goes into active service it is locked until the tiny aperture at one side is directly opposite the central part of the matrix clamped in the other; and through that wee hole there is to be jetted a stream of molten alloy which very swiftly hardens into a type.

Of all the work the mold must do,—and its work governs the three dimensions of space for the finished type: height, width and thickness.—one of the chiefly vital is the making of the nicks. If the nick has been cut in the steel imperfectly, or misplaced by a hair's depth, the casting will show a burr, or be less smooth than it should; and the nick is the detail of the first importance to the compositor. Merely to file and grind with emery a single nick in a mold takes an hour of the time of a highly trained expert workman; and there are four nicks in some molds. Each of these must be so fitted into the body of the type-mold that there is not the least flaw or irregularity in any part of their raised surfaces,—raised, of course, because the nick is depressed in the casting. Whatever variation there may be permitted to any other part of the mold, none is permitted in the nicking; and the task of fitting the nick is therefore counted the crucial test of a mold-maker's quality.


Engravers working at the pantagraph

After the nick comes the aligning of the mold with the matrix, so that the upper and the lower edge of each type cast in it shall be, when put side by side, upon the same horizontal line. Perfection in alignment is gotten by a bit of steel made absolutely flat, which is affixed by a powerful steel screw to a position on the lower face of the mold. In conjunction with this device is a little strip of brass, barely 1/64th of an inch thick, by which the line of the letter can be raised or lowered in the casting process. The purpose of the latter attachment becomes plain when it is remembered that the molds of to-day often differ radically in their horizontal line from those of the same size and face cast a decade or two ago; and yet the modern type and its fellow of 1880 must be used together and show no difference in alignment.


(a)

(b)

An unfinished (a) and a finished (b) matrix.

Mathematical precision is the point the mold must attain; and a variation of the ten-thousandth of an inch from true accuracy condemns it. Fully a week's work, and often more, is required to complete a mold, and three months is about the average working life of the mold in its first state,—that is, after that period of steady use it must go back to the work-bench for rearranging and readjustment to its right degree of self-relation, the steel tending to expand here and chafe there until the delicate tool is faulty.

Counting all the factories of the American Type-

THE FITTING ROOM

Facing the windows is the fitting bench, where the highest skill takes extraordinary pains to secure absolute accuracy in the matrix. Workmen are here also preparing the flasks, which later go to the battery, seen on the right of the picture. The small machines in the center cast test types from the matrices.

founders Company, there are fully five thousand molds stored in its vaults; the Philadelphia foundry alone has nearly two thousand; and each of them cost thirty dollars, at least, to make, and is worth practically twice that sum. All these molds are pedigreed. The foundry keeps a record which shows exactly when each one was made, how long the making took, and what repairs it has had; and, moreover, ninety-five per cent. of the molds must be ready at any moment for immediate service, accurately adjusted and mechanically exact.

Before David Bruce the younger perfected, in 1845, his first type-casting machine, the world's types were cast by hand. Each half of the mold was encased in wood to protect the workman against the heat of the metal. Fitting the halves together the caster took the mold in his left hand and poured melted alloy into the mouthpiece of the device. That the metal might fill every niche of the hollow part of the mold, he then gave the whole a quick and strong jerk upward, to force the molten stuff against the face of the matrix. Hooks fastened to the mold forced it open, and the type was released. By this process, which is everywhere obsolete except in the fitting department of some foundries, the skilled caster produced four thousand perfect types a day. With the modern mold, in a hand-casting machine, fifty thousand is an ordinary daily product.

Mold and matrix ready, the type enters now upon its semi-final step by going to the casting-room. The great Philadelphia foundry which illustrates this story divides that department into three distinctive sections: the one where the Bruce hand-casting machine, in its improved form, is used to cast larger job faces; the steam-casting machines, which produce any face of type up to thirty-six-point; and the automatic machines, casting large and small sizes, but used only for large fonts.

All things counted, the hand-casting machine, which is the improved mechanism of Bruce, is possibly the most useful of the three. With it the founder produces job type faces, fills orders for small or special font schemes, produces small amounts of sorts and special characters ordered to fill out a font, and does all the "odd jobs" it would not pay to put upon the quick-working steam casting-machines or the lightning-like automatics.

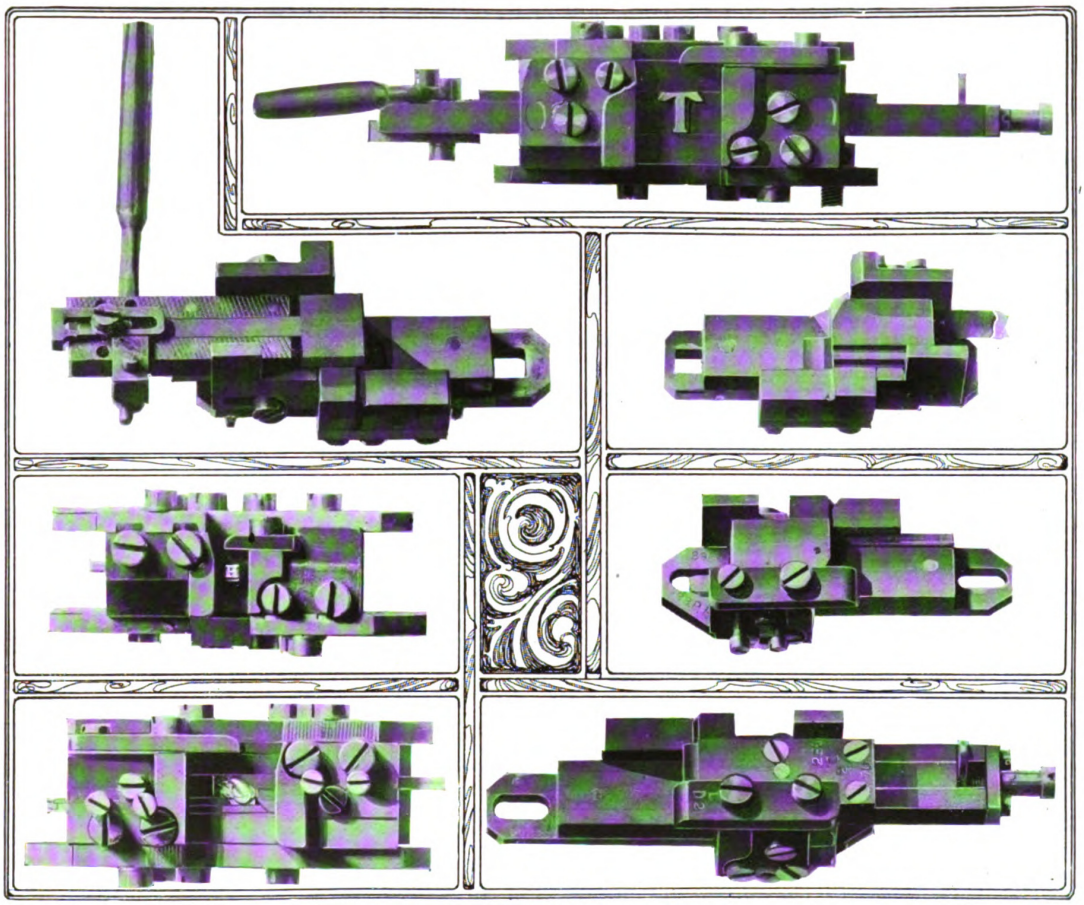
There is not much room for further improvement in the hand-casting device; in one respect there is none at all,—the speed and facility with which one matrix, or a mold, may be removed from it and another substituted, or the size of type cast changed immediately from eighteen-point to ninety-six-point if need be. From the fire-proof, damp-proof, everything-proof storage vaults (which treasure chamber, used solely for the storing of matrices and molds, is in the nethermost basement of this big foundry) the hand-caster operator procures such matrices as are indicated on the written scheme he obtained from his foreman, together with a mold for each size he is to cast. The metal-pot of his machine has been loaded with little pigs of type-metal, and the gas lighted to reduce that metal to its molten consistency, which is a temperature high enough to light paper laid upon the surface of the pot's contents. It must not be too hot, or too fluid, for that means delay in the cooling, and as the workman is paid by the piece, he is not likely to wait upon the machine more than he can help, nor would the foundry have him so wait.

It cannot be too cool, or the flow from the pot will be too sluggish. Setting the mold with its accompanying matrix in place, the operator turns a wheel at the right of the machine, and there is forced up through the melting pot a plunger which drives the metal through a nipple against which the mold's mouthpiece is resting. The jet pushes into the hollow mold and fills it; the workman's experienced touch holds the wheel, and the wheel the jet, just long enough to suffice to fill the mold,—a motion styled the "dwell," which seems very simple until one tries it. As the wheel completes its turn, the metal withdraws from the nipple, a lever raises the upper half of the mold and the type drops from the matrix and slides down a runway to a shallow box.

MOLD MAKING

These workmen spend days in fitting together many small bits of hardened steel, measuring the adjustment to the ten-thousandth part of an inch, and thereby providing that the type shall be accurate to the farthest degree possible.

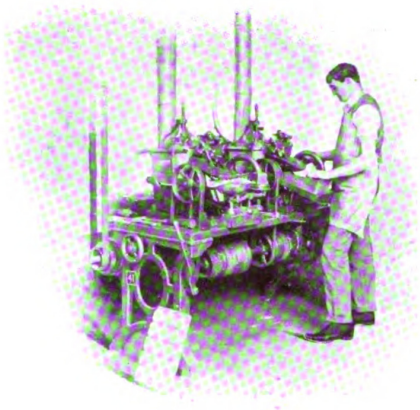
At the place where the mold's mouthpiece ended and the hollow began there is attached to the type a conical fragment of metal called the jet, which is broken off by boys, leaving the foot of the type almost flush save for a slight projection at the break. After the breaker-boy, the type goes to the rubbers, workmen who rub each side of the letter against a circular stone, removing the burr from its edges and reducing it to a uniform smoothness on all its side surfaces. From the rubbers the letters are received by a setter, who ranges the types, nicks all one way, on a wooden bar, slightly grooved and about a yard long; and these sticks, each bearing but one kind of characters, are delivered to the dresser. He clamps the stickful in a steel rod, turns the face of the letters downward, and with a tiny plane gauged to strike the exact mathematical center of the bottom end of the type, grooves out at a stroke a shallow depression which makes the "feet" of the types. The feet grooved, the dresser may have to



TYPE-MOLDS

The mold showing the letter H is used for casting ordinary type. Molds used in casting cored type are seen in the two largest cuts and that at the lower right of the group. The second and third pictures on the right, reading down, and that in the lower left, are script type-molds.

smooth the sides, the whole long row of letters being still clamped in their steel frame; and when that is done, the last of the working processes is near. This consists of an inspection termed "picking," which concerns itself with the face of the letters only. The picker, with a watchmaker's magnifying glass fastened to his eye, puts the wooden stick with its three feet of type in a strong light, and scrutinizes each letter for the least imperfection. Some minute atom of dust



STEAM CASTING-MACHINE
Used in casting job type in quantity.

may have gotten into the matrix, or a bubble of air preceded the hot metal as it drove through the nipple and up the mold; then there is a flaw on the face of the highly polished face of the letter; and that letter the picker pulls out of its resting place and casts aside to be returned to the operator, who is only paid for perfect letters,—letters accepted by the inspector. The picker's approval gained, the type goes to another room to be arranged in packages according to the font scheme or to the specific order on which it was made; the boys array the letters on a sheet of heavy manila paper, in a square form, and tie them up in the packages familiar to every printer.

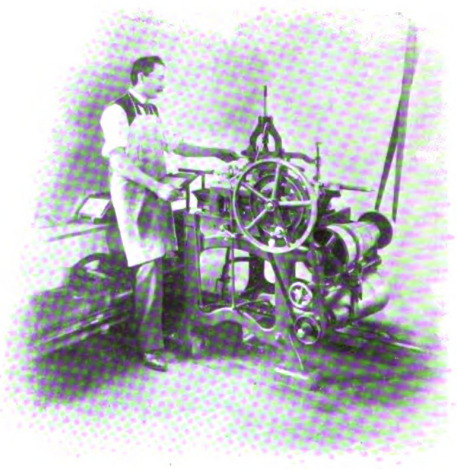
Besides the processes described, many characters in the popular job types, and nearly all in scripts and italic faces, require another process to complete them. This auxiliary operation is known as "kerning," by which part of the type's metal must be cut away to allow other letters used with it to come close enough to maintain the regulation distance. The curve of the lower case "f" for example, which projects beyond the edge of the body, is usually a kerned letter. Kerning is a most intricate and careful operation, demanding marked skill and great pains from the workman. One by one he holds the type to be kerned in a guide, slotted to admit the letter and set at the proper angle, while a swiftly turning saw-edge wheel cuts away from the shoulder of the letter, close under the overhang of the type, enough metal to allow the character to set properly with others.

Passing from the realm of the hand caster into that where the steam casting-machine dominates, the step confronts one with the development of the automatic and the superseding of the slow and costly processes of hand labor. In its mechanical aspects, the steam casting-machine does not represent any great advance over the hand caster, for it is simply an expansion or amplification of that device. It operates more rapidly, but uses the same principle in its work, and producing smaller sizes of job and body type, it delivers these in quantity in a condition one degree ahead of the hand machine, breaking off the jet before the type falls from the mold.

A type-finishing machine has recently been perfected in this foundry that eliminates all of the old hand processes and puts it almost completely on an automatic basis. It rubs, grooves, dresses and sets the product of steam and hand casters and is a most ingenious and simple piece of mechanism.

Automatic production controls the making of body and job type in quantity. The automatic type-casting machine now in use was invented by Mr. Henry Barth, manager of the Cincinnati Foundry, and patented in 1888. In this mechanism the half of the mold which carries the matrix is fixed immovably by a clamp in an upright position; the other half slides back and forth upon wide friction bearings, setting free the type that has just been cast and presenting again the mold mouthpiece to the nipple before the hot metal is injected for the next type. In order to prevent undue expansion of the mold, to get more accuracy in the type and to chill them quickly, a stream of cold water is carried in pipes through the fixed parts of the mold, and a current of air plays steadily (as it does in all casting-machines, automatic or not) on the matrix to keep it cool.

The automatic machine casts the type, breaks off the jet, plows out the groove in the foot, removes the feather edges from the angles of each side, and delivers the types in serried rows upon sticks two feet long, ready for the inspector. The product surpasses in wearing quality the best from the steam or hand casting processes, because the metal used in the automatics is of greater hardness than is possible with the alloy used



AUTOMATIC SPACE AND QUAD MACHINE
This device is nearly identical in method with the automatic type-casting machine of the Philadelphia model.

in the other machines. Mr. G. Frederick Jordan, manager of the Philadelphia foundry and one of the most eminent living masters of the art, a typefounder of life-long experience, asserts that body type made by these machines is more accurate and uniform in every particular than can be made by any other method, and that it also wears better, lasts longer and aligns more precisely than the type made in the older fashion.

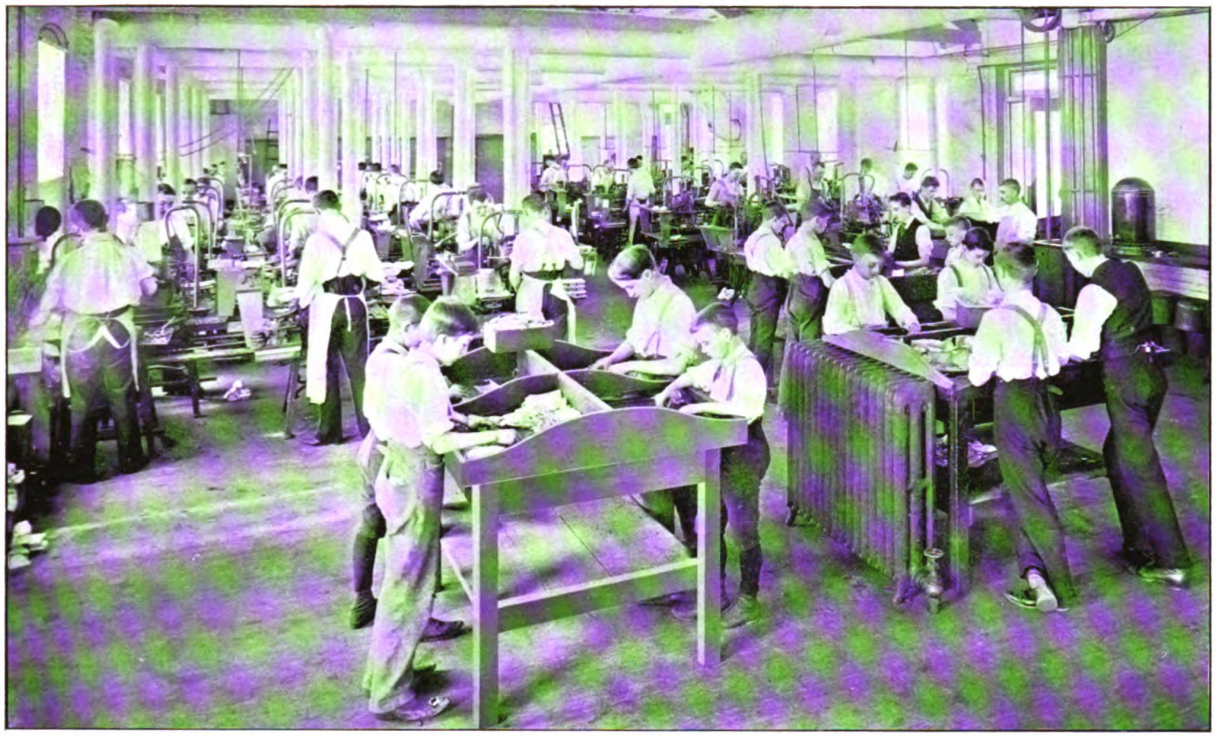
In the first manual of typography extant, and it was the most complete and competent of all early works on the theme,—Joseph Moxon's "Mechanick Exercises," of which but three copies are known to exist in America and but five in the world,—the process of hand-casting type, as it was then practised and as it remained almost unchanged until half a century ago, is thus described:

". . . placing the under half of the Mold in his left hand, with the Hook . . . forward, he clutches the ends of the Wood between the lower part of the Ball of his Thumb and his three hind-fingers. Then he lays the upper half of the Mold upon the under half, so as the Male-Gages may fall upon the Female Gages, and at the same time the Foot of the Matrice place itself upon the Steel. And clasping his left-hand Thumb strong over the upper half of the Mold, he nimbly catches hold of the Bow or Spring with his right-hand Finger at the top of it, and his Thumb under it and places the point of it against the middle of the Notch in the backside of the Matrice, pressing it as well forwards towards the Mold, as downwards by the Sholder of the Notch close upon the Stool, while at the same time with his hinder-Fingers as aforesaid, he draws the under half of the Mold towards the Ball of his Thumb, and thrusts by the Ball of his Thumb, the upper part towards his Fingers, that both of the Registers of the Mold may press against both sides of the Matrice, and his Thumb and Fingers press both Halves of the Mold close together.

"Then he takes the Handle of the Ladle in his right Hand, and with the Bell of it gives a stroak two or three outwards upon the surface of the Melted Mettal to scum or clear it from the Film or Dust that may swim upon it. Then he takes up the Ladle full of Mettal, and having his Mold as aforesaid in his left Hand, he a little twists the left side of the Body from the Furnace, and brings the Geat of his Ladle (full of Mettal) to the Mouth of the Mold, and twists the upper part of his right hand towards him to turn the Mettal into it, while at the same moment of Time he Jilts the Mold in his left hand forwards to receive the Mettal with a strong Shake (as it is call'd) not only into the Bodies of the Mold, but while the Mettal is yet hot, running swift and strongly into the very Face of the Matrice to receive its perfect Form there, as well as in the Shanck.

"Then he takes the upper half of the Mold off the under half . . . and finding the letter and Break lie in the under half of the Mold (as most commonly by reason of its weight it does) he throws or tosses the Letter Break and all upon a sheet of Waste Paper laid for that purpose on the Bench . . . "

Standing by one of the automatic type-casters, while it clicks out perfect type fast as a Maxim gun throws bullets, one recalled this quaint description and (after trying vainly to count up the number of thumbs the olden caster must have had to have, and the number of brain cells he needed to remember to do all those things at once of which Moxon tells) one fell back upon the trite reflection about the distance we have moved since the good old days of yore!



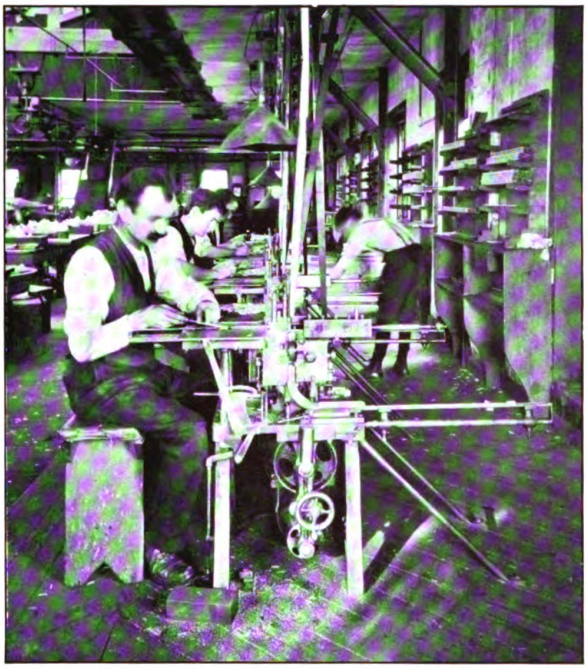
THE HAND AND STEAM CASTING-ROOM

The Bruce Model Hand Machines are to the left, the steam casters on the right. In the foreground boys are breaking off the jets, after which the type goes to the finishing room adjoining.

If the foregoing dissertation has been sufficiently perceptive and studious, the reader of it has had made plain to him the pains the typefounder takes to do fair service to his worshiping of the chief of his industrial gods, which is named Accuracy. He takes quite as many pains in the worship of the other of them, whose name is Quality.

Quality in type means the ability it has to resist wear. Not durability alone is concerned with this; but the kind of durability by which a type can hold its pristine

clarity of outline in face and its capacity for clean-cut printing, despite the utmost stress of ordinary service in the printshop's every-day workings. Now, the printer is not conspicuously careful of type, as a general proposition. He does not devote much thought to his humble servitor, to the fashioning whereof went so much skill and devoted watchfulness He is more than



AUTOMATIC FINISHING MACHINES

This mechanism, invented by the master machinists of the Mackellar, Smiths & Jordan foundry, does work in eight hours which hand-labor can only do in twenty-one hours. Its processes include the grooving of the type's feet, dressing the sides and delivering ready for inspection.

likely to batter it, and to permit that it goes back to its box, after use, half-washed and wholly covered with minute particles of printing ink. He lets it go dusty, often. Also slovenly compositors hurl it ruthlessly to its place in distribution, and its serifs lose sharpness prematurely. Mostly, for that matter, the printer does not know of the existence of the god Accuracy in type-making; for he does not give a nice appreciation to the difference between type that wears well and type that wears less well. For all this disregard, the quality must be there; and it must be a quality which will help the type withstand abuse as well as usage, and yet last as long as may be and do good service.

Whatever of quality the typefounder gets into his type is put there by the metal he uses. So the shrine of Quality is in the melting-room, down cellar by the furnaces, where all day long the workmen fuse lead, antimony, tin and copper, watch and stir and study, and at last pour long ladlesful of molten alloy into molds that form little pigs for the machines upstairs.

The American Typefounders Company follows its own special formula for the making of the alloy, balancing the component metals in such proportion as it believes most serviceable; and the formula is the inviolable secret of the place. In the high qaulity type produced there is included, with the lead, antimony and tin, a proportion of copper, which accounts for some of the repute this foundry's output has won for durability in service. Lead, always the chief constituent of the alloy, but useless by itself because type made from pure lead proves too soft for use, is the ideal metal known for its purpose, as it possesses great ductility and density; while antimony, which melts at a temperature of 806° Fahr., nearly two hundred degrees above the fusing-point of lead, is valuable for the hardness it gives the alloy; and tin, melting at 442° Fahr., supplies the toughness the copper increases, and serves as a solder to bind the other metals cohesively together.

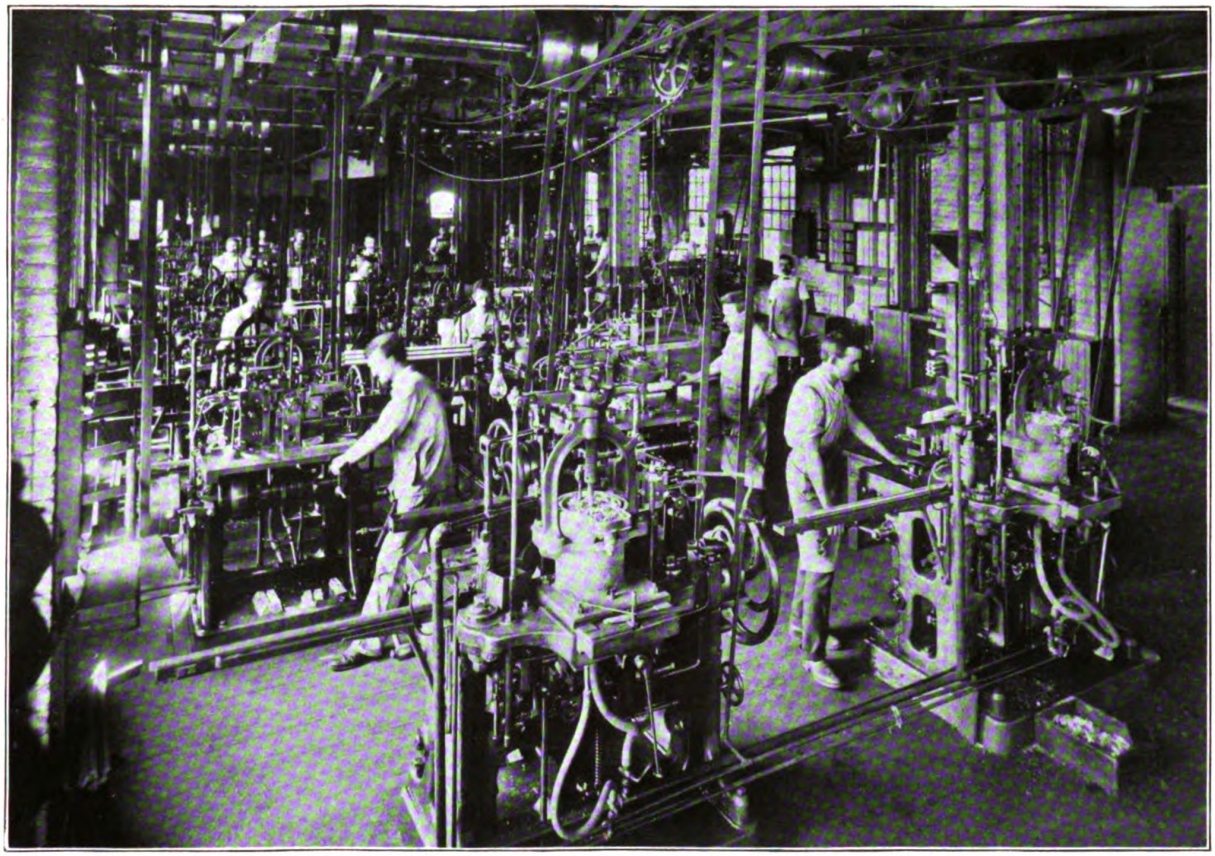
During the seventeenth century, and well into the eighteenth, iron was a part of the type-alloy, taking the place, in some degree, tin now fills. Writing about 1650, Moxon says that the typefounders ". . . mingle an equal weight of antimony beaten in an Iron-Morter into small pieces and stub-Nails together . . . they put for every three pounds of iron about five and twenty pounds of lead . . ." Besides this disappearance of iron from the founder's furnace room since Moxon's day, another custom mentioned by that writer has passed also; for, says he, when the type-metal was finally made and left to cool, ". . . according to Custom is Half a Pint of Sack mingled with Sallad Oyl, provided for such Workmen to Drink; intended for an Antidote against the Poysonous Fumes of the Antimony, and to restore the Spirits that so Violent a Fire and Hard Labor may have exhausted." Sherry wine and sweet oil! Verily were there giants in those days.

More than a few printers wonder why the typefounder will never buy zinc, though he will take from them, in exchange for new type, other waste metals of the printshop,—old copper half-tones, electrotypes, stereotypes, and the like. It is not unusual to find printers who imagine type contains some alloy of this metal. Zinc is the pet aversion of the typefounder; for the presence in his melting-pot of so small a fraction of it as one per cent. renders the whole pouring so refractory that the metal will not let itself be handled. Therefore old line cuts or zinc etchings have no market value for the typefoundry. Indeed, it is on record, as cited by Theodore L. De Vinne's masterly work on "Plain Printing Types," that "one European founder advertises that he will not only refuse types

THE DRESSERS

Rubbing the type in circles against circular stone until the feather edge is gone and the type made perfectly square on each side, these workmen are making the last stand of hand-labor in the typefoundry's finishing department.

brought to him as old metal that contains any admixture of zinc, but will prosecute the seller for damages." From this same book of De Vinne's the printer can get a mighty serviceable store of knowledge about type and



THE AUTOMATIC TYPE-CASTING MACHINES
Each of these remarkable mechanisms, the Philadelphia model of the invention of Henry Barth, can produce seventy pounds of brevier body type in a working day, the type finished complete ready for shipment.

its uses; and one part of it is so cognate to the purpose of this story that it may well be made a part of it, thus:

The most remarkable peculiarity of type-metal is that it shrinks so little after being cast, a property not found to so great a degree in any other useful alloy. Harder metals, which must be melted at more intense heat, must necessarily shrink in a corresponding ratio, and this shrinkage is injurious to accuracy. Nor do the harder metals so truly fill the molds or make perfect casts.

The density of type-metal is a real advantage. Although melted at a comparatively low heat, it fills the mold and matrix with remarkable solidity, and reproduces the finer lines of the matrix with great exactness.

Another great merit in type-metal is its ability to resist oxidization. It takes much usage to dim its brightness; it does not rust like iron or steel, nor show corrosion like copper and brass. . . . These useful properties are gained only at the expense of durability. The hardest types soon wear out. When morning newspapers of large circulation were printed direct from the type, it was often found necessary to renew the fonts after a few months of service. To jobbing type the damage by wear is even greater; the beauty of script and hairline types is sometimes destroyed by one month of service.

Ever since types were invented, founders have studied to make them harder and more durable. Great improvement has been effected, but a point seems to have been reached beyond which additional hardness is no longer an advantage. Every good founder could make his type harder, but only at vastly increased expense. The harder alloy would require greater heat to melt it; the metals used would be more expensive; the molds and machines would wear out rapidly; the speed would be slower, and the type not so accurate.

The durability of types is materially affected by size and cut of face. With kind usage a font of pica may receive a million impressions before it will be condemned; with the same treatment a font of pearl may be worn out with less than a hundred thousand impressions. Yet the pearl is always of a harder metal. The difference in durability is caused by the difference in face. In the size of pica, the counters are broad and deep; the hairline and body marks will wear down and flatten out to a great degree before the face will show muddiness or illegibility: in the smaller size of pearl, the counters are necessarily shallow; the hairlines and body marks are thinner and closer together. It requires more impression to print the pearl properly; this impression, meeting with less resistance, soon wears down the thinner lines.

The amount of wear that types may receive cannot be stated in figures. . . . Brevier and minion have sometimes received two millions of readable impressions upon newspaper work, but the thick presswork from types worn by more than one million of impressions would be accepted only by a newspaper publisher. Many book publishers would reject small types that had received but three hundred thousand impressions. For the finest letter work, the limit would be put very low. Typography with characters entirely faultless can be had only from new type. For typefounders' specimens and for sumptuous books new types are always provided. They are never reset, but are condemned to the melting kettle after their first use.

KERNING
This most delicate process is soon to be superseded by an automatic machine which will do the work quicker and with greater precision.

The repeated handling of types is as injurious as the impression of the machine. One million of acceptable impressions may be obtained from small types skilfully made ready if these impressions are taken from one form; but if the types

are repeatedly distributed and reset for many different forms they will not furnish one-fifth of that number. The wear of types in the composing-room is much greater than is commonly supposed. They are bruised and battered in distribution and in composition, in making up, and especially by planing down and correction. The molding process of stereotyping is remarkably injurious. Proving with a brush, or molding by the papier-maché method, is more destructive, in most cases, than any kind of printing machine. Nor can a more destructive agent be found than the stiff scrubbing brush which is used, often by unskilled hands, to clean the forms from the ink after they have left the press. . . . The durability of types is also affected by their uncleanliness

"PICKING"

These inspectors, each with a jeweler's glass strapped to his eye, scrutinize the type for flaws. What passes them is as nearly certain to be perfect as anything can be; so keen is their vision.

and the want of care they may receive. If they are not thoroughly cleansed immediately after taking proof or on leaving press, if dust and paper fibres are allowed to settle in the counters and harden with the drying ink, and if the sediments of the lye and turpentine used for cleansing is allowed to collect—a thick, tenacious deposit will soon be formed, which cannot be removed without nearly destroying the type. The counters of a font of type so neglectfully treated will soon become filled up, and this may happen before the stems or the serifs have been appreciably thickened by the impression of the press. . . . Hardness of metal is usually considered of great importance in types. The quality of the metal is roughly, but not always accurately, tested by breaking a type. If this bends very much before breaking, showing a ragged fracture, or if it, when whittled, curls up in unbroken rings, the metal is soft. If it breaks off short, after much resistance, showing a close, crystalline fracture the metal is hard; but if it, when whittled, crumbles at a slight touch, the metal may be hard, but is deficient in tenacity. Great hardness, without tenacity, is as serious a fault as too much softness. Types that easily break when dropped on the floor, or that have their serifs and hairline gapped by planing down or by rubbing with a brush, betray an excess of antimony and a deficiency of tin or copper.

Beyond any other factor in the type-making industry, the automatic machine has reduced the cost of manufacture, and consequently the price of type in the markets of the world. The price of type, during the past decade, has steadily been lowered, and its quality and precision as consistently raised; but the present average of prices, like the extant standard of quality, represents something close to the mean on which the trade must dwell for a while to come. In the great foundry here described and pictured, the current price-list of type and sorts is based upon the most careful and close figuring, and its average speaks of economies only possible to extensive organization in the sales department—where no small degree of the auxiliary cost once was—and the reduction to their lowest point of other incidental costs. There are many reasons why this should be so,—why the price of type as it is to-day will remain at to-day's level. The modern typefounder, his establishment putting forth an average of ten new faces each twelvemonth, loads his interest account with heavier charges each year for the matrices and the molds each new face demands. Then, too, a great foundry must steadfastly better its equipment in each department, and particularly must it show progress in its machine shop. There it builds every mechanism it uses, from hand-caster and automatic machine to the tiny height-gauges; and so the latest improvement in machine tools and the most scrupulous efforts to improve the improvements become simple necessities if it would keep pace with real progress. In the Mackellar foundry now, they are equipping the lathes and planers and most of the other large tools with costly micrometers and similar measuring implements, for use in the turning of wheels and the cutting of pinions to the ten-thousandth of an inch; and that spirit is common to the whole of the place, as it must be to all genuinely progressive foundries of the kind.

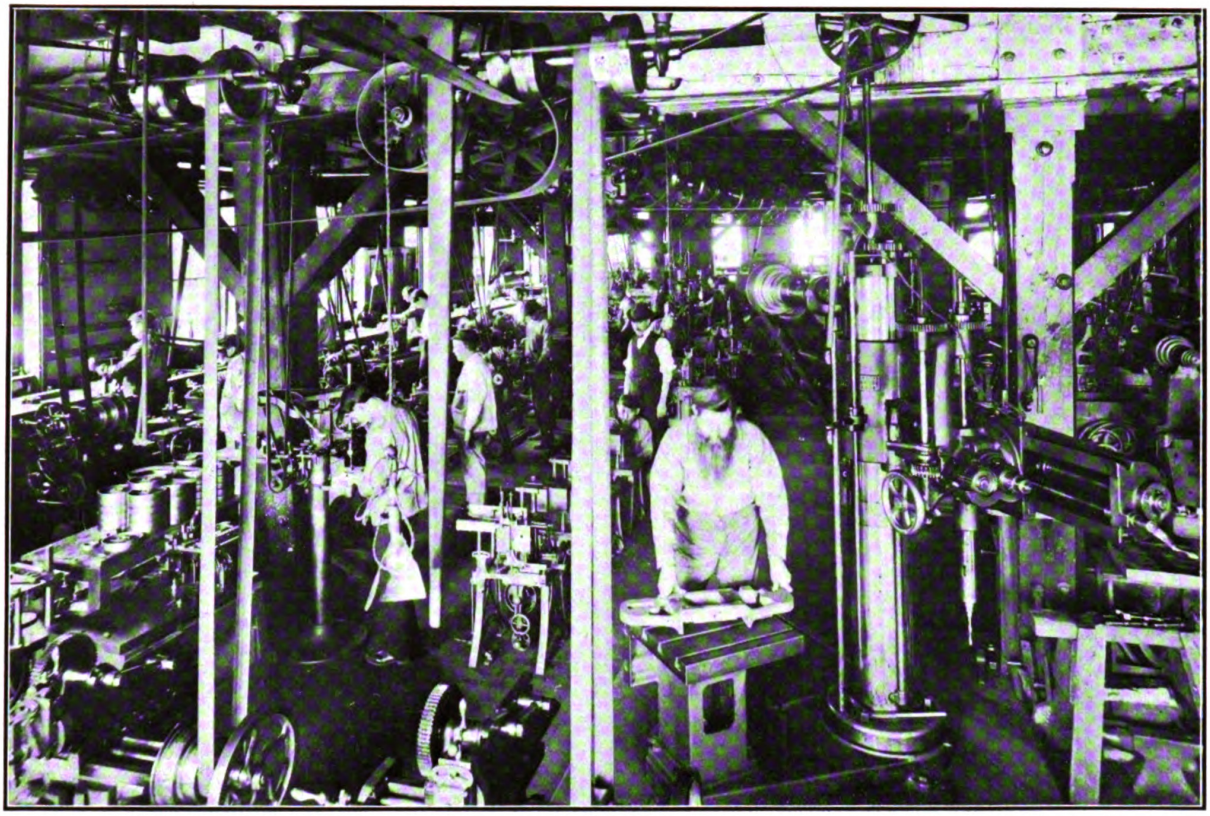
Again, the class of labor the typefounder must needs employ in most of his work is easily the highest paid labor in any of the crafts allied with typography.

So it runs through each division of the typefounder's payroll,—best wages, best men, and that best better than the commoner crafts rate normal, since all the processes of typefounding require special training and long apprenticeship, and therefore commensurate pay. Besides these heavy and non-decreasing drafts upon the typefounder's ratio of profit, troops of other reasons will appear to any man who gives thought to the subject, troubling enough to think it out why the existing price-average of the type market is near the possible minimum; and each of the reasons will suggest, moreover, the notably downward trend such prices have made since the introduction of modern methods in the business phases of the art and the organization of its affairs upon twentieth century commerce's lines of least resistance.

If this story has done nothing else, it is the hope of THE AMERICAN PRINTER that it has at least created in the reader a definite respect for the craft of typefounding, and put something of the real perspective that art should possess into the printer's field of vision. It has meant to show what infinite and tireless pains inspires the genius of the modern typefoundry; with what vigilant care it seeks to improve and extend the prestige of American-made type. All these things can be read into the story, perhaps. Much of the typefoundry's product,—brass rule, for example, and ornaments and spaces and quads, and types in odd and nearly unknown foreign tongues, and music type, and a multitude of

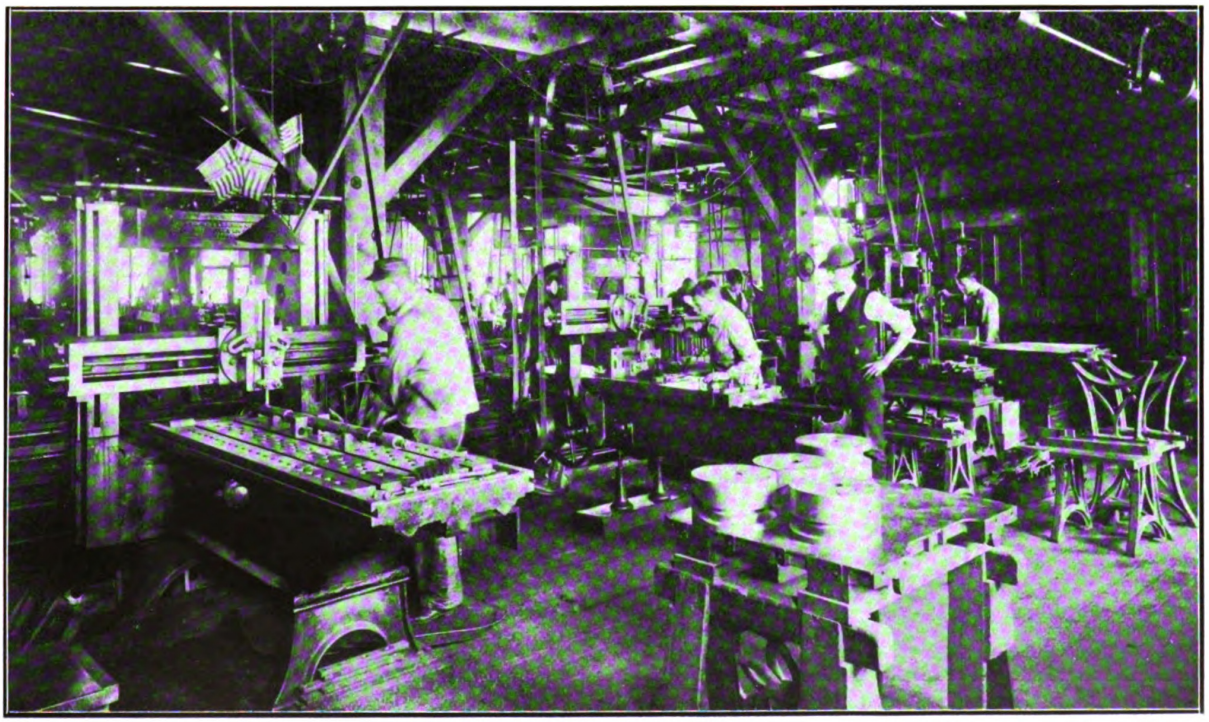
THE MATRIX AND MOLD VAULT

Here is the treasury of the foundry, where is stored more than two thousand series of matrices, representing every size of type from four to ninety-six point in each series. Some of the matrices were made in 1850. The molds also kept in this fire-proof and damp-proof vault represent many thousands of money, and a keeper is in it at all hours to serve out matrices and molds to the casters.



IN THE MACHINE SHOP

Here workmen of picked skill and lifelong training (most of them brought up as apprentices in the peculiar requirements of the typefounder's machine shop), manufacture all the parts of the automatic, steam and hand casting machines, with the exception of the castings used therein Nearly all the great lathes and planers are fitted with micrometers; and the machinists work to the ten-thousandth part of an inch on nearly every piece of work they do.



curious and interesting details rightly belonging to the story—are known more by their daily service than by what any writer can say anent them. Well, for these faults and omissions the reader must be graciously lenient, since there is not room to tell the half of it in the pages of a magazine.

Until some writer appears who can put the whole story of the art of typefounding into a book, and make that book certain to be read by every one that uses type or the kindred products, the story can never be adequately told, for it contains far too many diverse clauses and intricate details to make it understandable in less than a considerable volume. Neither is it an essential necessity that the story be so told; for the printing world is pretty well content to accord prestige to American-made type without exact knowledge of the details of its making; and that those details are admirably and amazingly perfect, although very largely mysterious to the general mind, gives sufficient reason why the real story of typefounding is in the merit accuracy and quality have put and kept in the type itself.

PAGING

Arranging type in square form ready for the wrapping.

Finally, it is worth the thoughtful consideration of folk interested in American commercial progress, or concerned with or in the dominating influence the United States is wielding and spreading in every market whither its industrial products have gone,—it is worth the thought of these folk that in no other business has the advance of this influence been so recently swift as in the printing-supply trade; and that, moreover, the typefounder has been the forerunner of such progress almost always. Our press-builders have so far distanced the world that comparison is no longer made between American-made presses and others; but typefounding is a newer art here with us, and that it, too, should be showing our superior mercantile power is remarkably straight proof of the push and thoroughness of the nation. Our type excels, as our presses do; and the printing world looks to America, and to the American typefounder, not for quality and accuracy alone, but for that ingenious inventiveness and searching understanding of what is best that operate to elevate and dignify the printer's art. Steadfastly the excellence of American type betters, in every foundry of note; and each bettering spells American supremacy.

PACKING UP

The last step of the mechanical department. The type is now ready for shipment to the consumers.

THE GREAT WAREROOM

Here are stored more than a thousand tons of type of all sizes and shapes and kinds, together with brass rules and sorts and the multiple other minor products of the foundry. From here the foundry distributes its output to the territory it covers—the world.