



Punch-cutting in the Linotype plant involves machinery and operations of extraordinary precision. The punch-cutter has for a guide the large brass letter pattern affixed to the

punch-cutting machine table. As he follows its outlines, the machine transfers the motion of his tracing point to the punch-cutting tool above the table.

MAKING THE LINOTYPE MATRIX

PHYSICALLY, a Linotype matrix is just a piece of brass—but fifty-six individual operations are necessary before that piece of brass becomes a matrix.

After the design of the individual letter is approved (and the very designing of a letter is a task requiring the skill of an artist and accuracy of an engineer) a special pantographic device is used to trace the drawing upon a plate of brass.

The background is then routed away leaving the large brass letter in sharp relief. After

several finishing processes, this becomes the master pattern from which punches are made.

The master pattern is then placed on a punch-cutting machine, designed to produce a punch at a reduction which minimizes error to within one-fifteenth part of one-thousandth of an inch.

As the operator follows the brass pattern, the microscopic cutting tool above nibbles into the steel of the punch, until the letter design is revealed in full relief. A series of minute operations follows before the punch

is pronounced accurate: microscopic inspections and reinspections, the hardening of the steel in an electric furnace, the oil bath, etc., which transforms the soft steel into a punch so hard that it can crush its way into solid brass, leaving the impression of a sharp-cut letter. The process is simple enough to watch, but it has required years of experimentation by metallurgists and engineers to perfect.

Next comes the stage of quantity matrix production—although we have neglected to mention the tremendous amount of clerical data involved in compiling record cards and charts to reach this stage. Each month, more than 160,000,000 individual mechanical operations are engineered, checked and recorded at the factory in Brooklyn, New York.

When the punch is ready for stamping the characters on brass matrix blanks, it reaches a machine which has been adjusted with the precision of fine watchmaking.

The letter character must be punched to an exact depth to control height-to-paper in the cast slug; it must be punched square and true; the matrix must be located accurately to insure perfect "fitting" of type; it must also be correctly related to a constant, horizontal base line—since some characters are deliberately punched above or below that line for optical reasons.



The brass letter, or letter pattern, actual size. The surrounding metal has all been routed away, leaving the letter high and sharp in relief. These brass letters are the master patterns for Linotype faces.

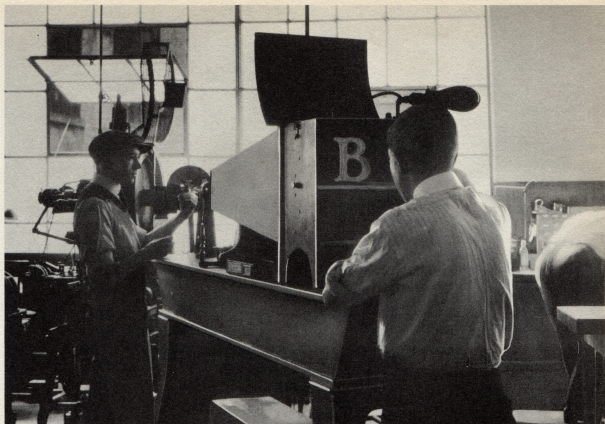
The punched matrices then go through a series of finishing processes and inspections at various stages to again insure perfection of cast. Every face of the piece of brass is ma-



When a letter design has been approved, it goes to a specially designed machine of great accuracy to be reproduced as the large brass letter which is to serve as master pattern for making the punch. The picture shows the operation.



The finished punch. When a punch has passed the system of microscopic inspections and other tests and examinations, it is hardened in an electric furnace, finished by grinding and lapping, and again reinspected and retested.



After continual tests and inspections during manufacture, the matrix goes to the projectoscope, which throws a hugely enlarged image on a screen for measurement tests so accurate,

that an infinitesimal variation is clearly visible, because of its increased size. The enlargement is so great that a thin line in a type face is shown up fifty times as thick.

chined in several ways. Its projecting ears control character alignment on the slug. Varied recesses, notches and holes all have specific functions—and must be extremely accurate.

All of the matrices are passed through instruments which optically project their letter

characters against a constant base on a ground glass. Other devices are used to measure the depth of drive.

Thus are the printing qualities of the Linotype slug safeguarded throughout the various stages of matrix production.



The final inspection of matrices: When the matrix has passed this last examination, it is ready to do its duty in the world