

original character is laid, can be swiveled to any angle, thereby changing the style of the letter to wide, narrow, back slope or italic, both the italic and back slope being produced through the combination of angles. This machine has a range of production from 0 to 96 point.

**A REVERSAL OF FORM**

When the original design submitted is large, the machine reproduction is backward, and reproduces it in small form by removing the microscope attachment and in its place attaching a small pencil arm which traces the outline of the letter by

nifying power required to produce the same error.

**THE WAX IMPRESSION**

The next step in the development of the letter toward the pattern stage is the outline in wax, which is made on a panto-

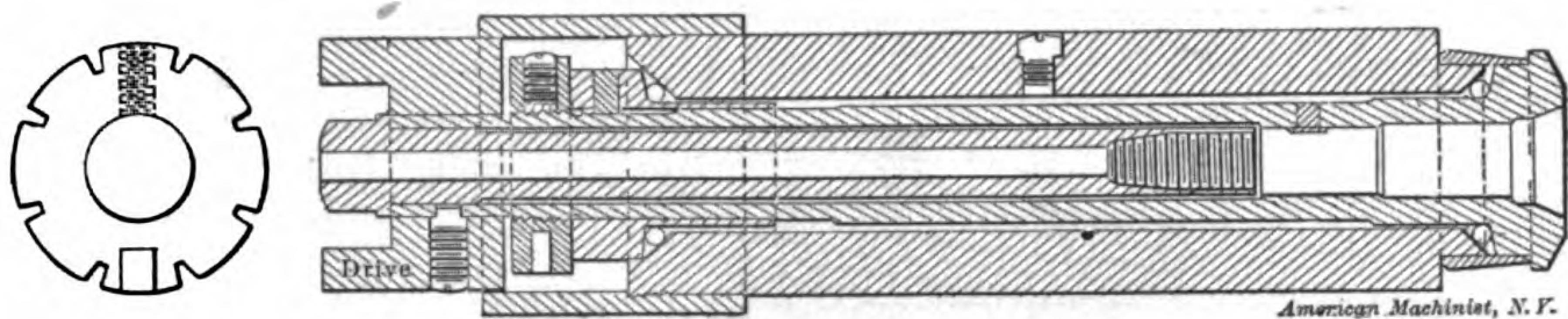


FIG. 4. CONSTRUCTION OF QUILL

able the operator to follow the movements of the needle through the varying outlines. This enlarged drawing is larger than the pattern size, so it is not only reproduced, but also reduced in this second step.

**THE PATTERN**

From this machine, after the ragged edges of the wax have been removed, it is electrotyped, a process which deposits in the outline sufficient metal to leave a raised character when the wax has been removed. This is "backed up" with metal, trimmed and finished similar to an ordinary electrotype plate of a page of type. This pattern is now ready for use as a model in the engraving machine.

**THE ENGRAVING MACHINE—ITS CONSTRUCTION AND PRINCIPLE**

In Fig. 3 is shown the next step in the

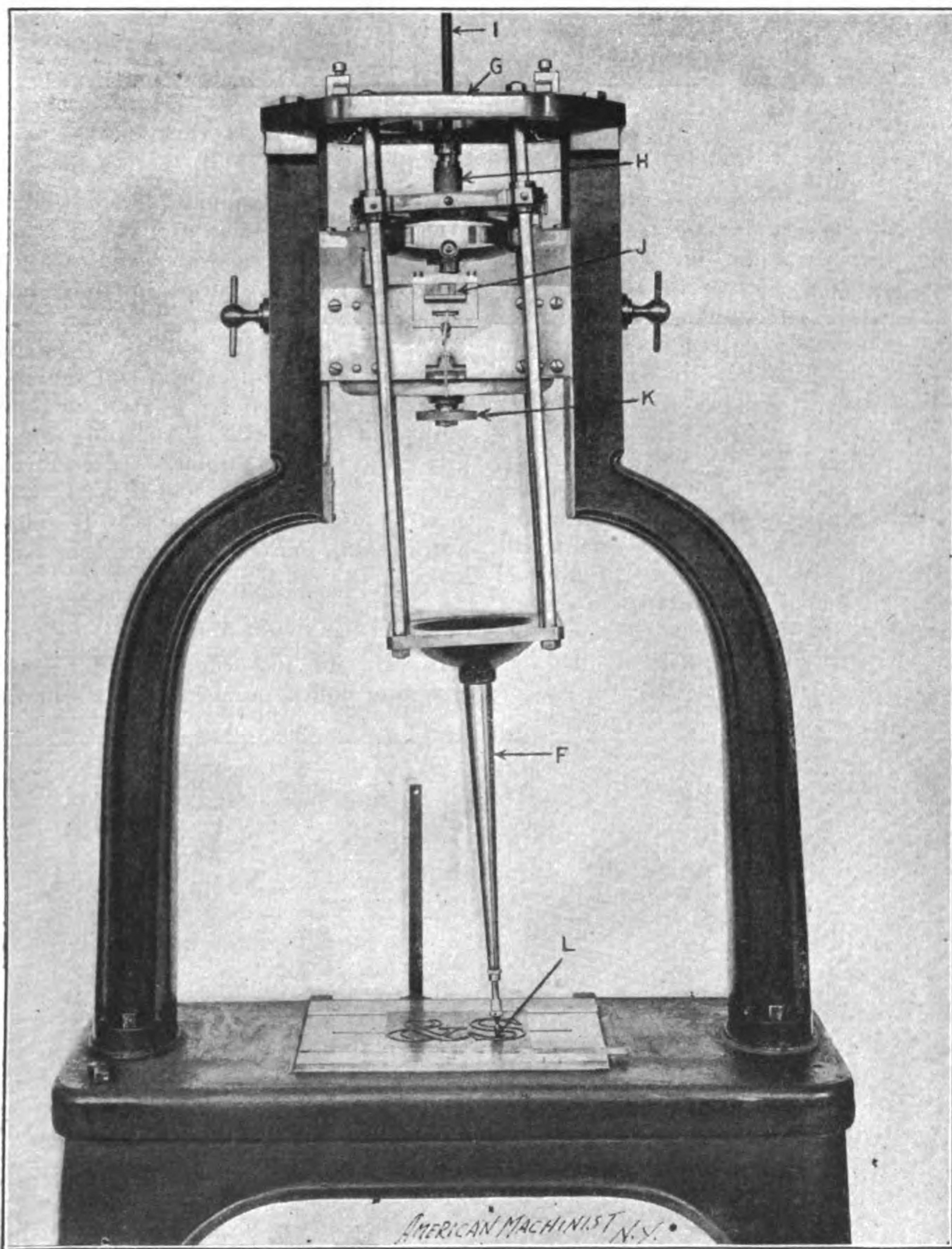


FIG. 3. MATRIX ENGRAVING MACHINE

F, pendulum; G, yoke; H, quill; I, flexible shaft drive; J, matrix; K, micrometer adjustment; L, follower.

moving the long arm pencil over the large outline. This small letter is then filled in solid, that is, leaded, and carefully inspected. This solid letter lends itself more readily to criticism. The focal length of the delineator can be changed to meet the requirements of changes in size of letter, the smaller the letter the higher the mag-

graph machine specially designed to hold a plate that has been coated with wax. This plate is held in a horizontal position at the top of the machine, as shown in Fig. 2.

Immediately under the tracing needle, which works on the face of the wax plate in an inverted position, is a mirror to en-

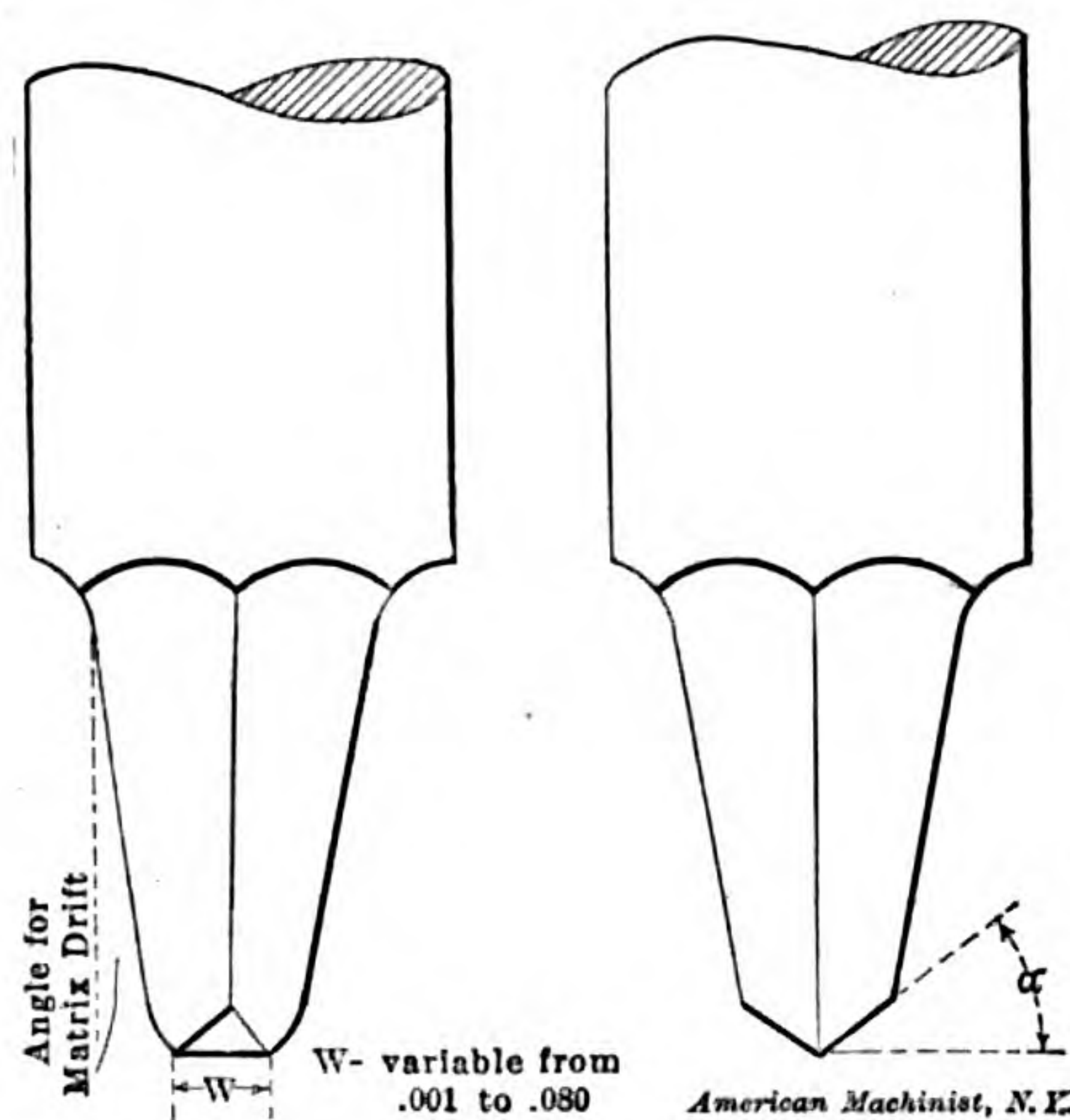


FIG. 5. ENGRAVING TOOL SHOWING FACETS

evolution of the type, the matrix-engraving machine, which consists of two housings between which swings a long pendulum or arm, which is delicately suspended in a compound yoke by means of gimbal screws which gives it a toggle-joint effect. The whole accuracy of the matrix lies in the accuracy of this machine. The quill holder, or the head which holds the tool in the matrix machine, and the work in the punch-making machine, which is built on the same principle, is fitted between hardened, ground and lapped guides or ways, and is perhaps the most highly developed of the many parts that go to make up the machine design. The steel is specially selected and machined and then laid away for three or four months for seasoning or adjustment of the various strains inherent in all steels. It is then carefully fitted in its guides. The central hole in which the quill or tool holder is