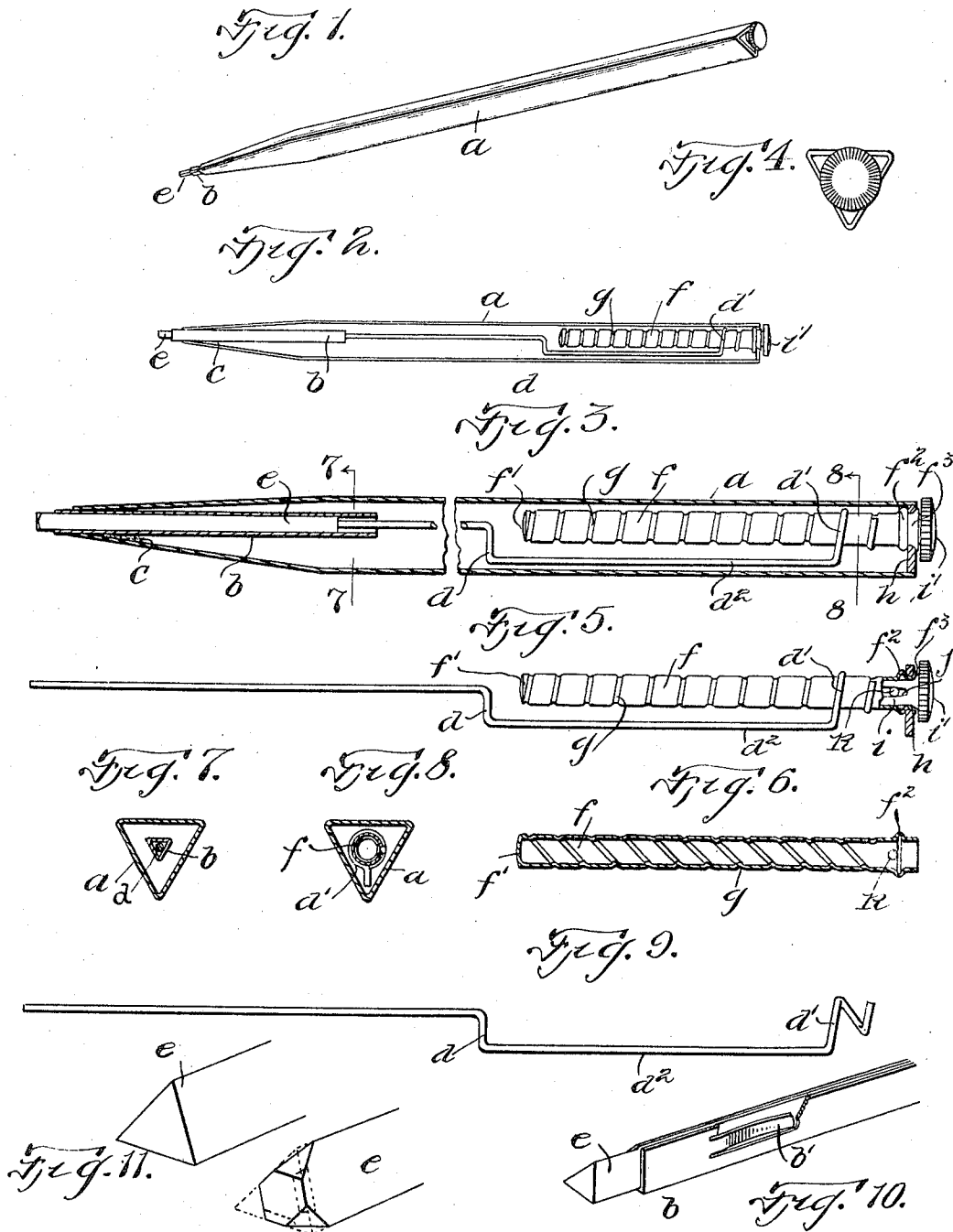


N. CRANE.
SELF SHARPENING PENCIL.
APPLICATION FILED SEPT. 13, 1911.

1,038,857.

Patented Sept. 17, 1912.



Witnesses:
F. R. Ronletone
C. A. Pizzetti

Fig. 13.

Inventor:
Newton Crane
by Wight Brown Dunbar & Tracy
Attorneys

UNITED STATES PATENT OFFICE.

NEWTON CRANE, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SELF-SHARPENING PENCIL COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

SELF-SHARPENING PENCIL.

1,038,857.

Specification of Letters Patent.

Patented Sept. 17, 1912.

Application filed September 13, 1911. Serial No. 649,143.

To all whom it may concern:

Be it known that I, NEWTON CRANE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Self-Sharpening Pencils, of which the following is a specification.

The present invention relates to lead pencils and those of like nature, and has for its main object to provide a lead for such a pencil of a character such that it will be self-sharpening.

A subsidiary purpose is to provide an improved means for propelling the lead of the pencil as the same becomes worn away, of such a character as to simplify and reduce the cost of the construction of the pencil.

The preferred manner in which I secure the objects above indicated is described in detail in the following specification and is illustrated in the accompanying drawings, in which,

Figure 1 represents a perspective view of the pencil. Fig. 2 is a side elevation of the same, showing the actual size thereof. Fig. 3 is a longitudinal section showing the entire pencil on an enlarged scale. Fig. 4 is a right-hand end view of Fig. 3. Fig. 5 is an elevation of the propelling mechanism. Fig. 6 is a longitudinal section of the compound propeller screw and magazine for leads. Figs. 7 and 8 are sectional views on lines 7-7 and 8-8 respectively of Fig. 3. Fig. 9 is a side view of the lead propeller. Fig. 10 is a perspective view of the lead guide and friction retainer for the lead. Fig. 11 is a perspective view greatly enlarged of a lead used in the pencil. Fig. 12 is a similar view showing the manner in which facets are formed in the corners of the lead by wear. Fig. 13 represents an end view of a modified form of lead.

The same reference characters indicate the same parts in all the figures.

Referring to the drawings *a* represents the case of the pencil which is conveniently a metallic shell, although it may be of any other material. This case has approximately the same proportions and dimensions as the ordinary lead pencils of commerce, but differs therefrom in that it is given wholly or in part a prismatic form. At one end the walls of the case converge to correspond with the pointed end of the ordinary lead

pencil, and to avoid abrupt transverse projections adjacent to the marking point.

b represents a guide for the lead, which is preferably a tube of approximately the same shape and area in cross section as the lead, and is located in the longitudinal axis of the case, one end being contained in the small end of the case, to which it is united in any way suitable for giving sufficient strength, as by solder at *c*.

d represents a pusher of which one end enters the guide tube *b* and bears against the inner end of the lead *e*, which latter normally protrudes from the end of the tube and also the small end of the case.

f represents a combined propeller for the pusher *d* and magazine for leads, and it is preferably formed as a tube extending into the case from the large end thereof and having a helical groove *g* corresponding to a screw thread which is engaged by the helically bent end *d'* of the pusher. The propeller *f* is swiveled in the case, being rotatably mounted in a plate *h* which fits in the open large end of the case and is retained therein by means of solder or in any other desired way. There is an almost endless variety of ways in which such plate may be secured and that described is merely illustrative of one of these many ways. A plug or cap *i* having a head *i'* passes through the open end of the propeller tube *f* and serves both as a cover for such tube and as the mechanical element on which force for rotating the tube may be applied. The stem of the cover is notched at *j* so as to form jaws or prongs which embrace a projection *k* on the interior of the propeller tube to provide a non-rotating engagement therewith. The head *i'* is accessible to the fingers of the user of the pencil, who can thus grasp and turn the head with the thumb and finger of one hand while holding the pencil case in the other, and thereby turn the propeller so as to advance the pusher and free the lead.

The foregoing is a general description of the main parts of the pencil. I will now proceed to describe the form, construction and principles of the several parts more minutely and in detail.

The most important feature of the invention resides in the character of the lead by virtue of which it is enabled always to present a sharp point ready for use, no matter

how much it may have been worn by use. To this end the lead is given a prismatic form, preferably that of a triangular prism, with sharp corners. It is also comparatively small in cross sectional area. As will be readily understood, when the lead is cut or broken with its end perpendicular to its length, the corners of the prism provide three sharp points, each capable of making a fine-line. In using the pencil it will be so held that one of the points bears upon the paper. As this point wears away it forms a facet of which the boundaries as wear progresses gradually approach the other two corners or angles of the prism. When the surface produced by such wear is too wide to give a fine line, the pencil may be turned to present a fresh point to the paper. Each of the corners in wearing away reduces the amount of material adjacent to the other two corners and thus sharpens the points at these corners. Thus the wearing away of each corner forms a side which approaches the other corners and reduces the cross sectional area of the lead at the end. Whenever two or more of the corners are worn away so far that the facets produced by wear intersect, such intersection produces a new sharp point.

By making the lead sufficiently small in cross sectional area it is impossible for the lead to wear far enough to make an objectionably broad line before it brings down the adjacent parts of the lead to a sufficiently fine point. Thus during the attrition at any one part of the lead in the ordinary use thereof, adjacent parts are being brought into a sufficiently pointed condition to be satisfactorily used.

The lead is prevented from turning in the pencil and so held in its relation to the paper by the tube *b*, which is likewise prismatic and is of approximately the same shape and size as the lead. Conveniently this tube is made of a strip of sheet metal of the proper width, bent up along parallel lines until the opposite edges meet. It is so made as to retain the lead frictionally against dropping out, and to secure this end may conveniently be provided with a tongue *b'* formed integrally in one of the sides of the tube and bent inward so as to bear on the lead. The same effect may also be secured by twisting the tube slightly about its longitudinal axis. Another feature of the pencil is that the case *a* is likewise prismatic, having the same number of sides as the lead, which sides are so disposed with relation to the sides of the lead that when the pencil is held in the user's hand in the natural position for writing, one of the sides bears on the user's finger and holds the pencil in such a position that one of the angles of the lead is presented to the paper.

The propelling and magazine tube *f* is

conveniently made of a section of metallic tubing of which the inner end is spun over at *f'* to provide a bottom capable of retaining the leads. In the sides of the tube is rolled the helical groove *g* which forms the thread, and near the outer or open end is rolled an external bead *f²* which forms a shoulder against which the plate *h* seats. The latter, of course, has a perforation in its center which receives the mouth of the tube *f*, and the rim of this mouth is flanged over at *f³* outside of the plate to retain the latter. Thus a sufficiently firm coupling is afforded between the tube and plate by a means which costs very little, and at the same time the tube is swiveled. The projection *k* previously mentioned may be formed as an integral part of the tube offset inwardly. A feature which is likewise of great practical importance in that it enables a very simple and inexpensive construction to be utilized in the pencil relates to the form of the pusher *d*. Such pusher is offset at *d²* between the helically bent end and the pushing end. Such offset enables the helical part to surround the propeller tube, and at the same time causes the pushing part to lie in axial alinement with such tube and to enter the guide tube *b*, which likewise is central in the case. Furthermore the offset *d²* lies within one of the dihedral angles of the case and prevents the pusher from turning with the propeller. Thus the shape of the pencil is made to serve the additional end of holding the pusher from rotation and compelling the rotation of the propeller tube to give a direct endwise motion to the pusher, and avoiding the necessity of employing more or less elaborate devices such as have been found essential in propelling pencils hitherto for a like purpose.

I wish to make it understood that, although I have referred to my invention as relating to lead pencils, and have described the marking element of such a pencil as a "lead," I do not thereby intend to limit myself to the use of black lead or graphite, which is ordinarily understood by the term "lead" as here used. On the contrary I have used the term generically as meaning any solid substance capable of being used in or as a pencil or crayon for producing a mark by attrition, and in the following claims such term wherever it is used is to be understood as meaning any substance or material of this character.

The term "prismatic" which I have used in describing the shape of the pencil lead is not to be understood as limiting me to the use the leads formed exactly as geometrical prisms, that is having plane sides. It is within the contemplation of my invention to form the lead with concave sides, as indicated in Fig. 13, so that each of the di-

5 hedral angles or corners of the lead form
 ribs sharper than the dihedral angles of a
 true prism. It will be very readily seen
 that this formation diminishes the possible
 area of a facet produced by wear, thus keep-
 ing the lead sharp for a longer period and
 increasing its self-sharpening quality.

10 The number of sides of the prismatic lead
 and the number of corners or ribs formed
 between the plane or concave sides of such
 ribs is limited by the necessity of allowing
 only one such corner or rib to bear on the
 paper at the same time, and of causing other
 corners to be sharpened while one corner is
15 wearing away. Thus the lead will not gen-
 erally be given more than four sides, while
 a three-sided lead is best.

I claim:—

1. A pencil consisting of a substantially

prismatic lead, each of the angles of which 20
is sharper than a right angle, and a case
having flattened finger-engaging portions
substantially parallel to the several sides of
the lead.

2. A pencil consisting of a casing and a 25
lead, each having substantially the form of
an equilateral triangular prism, arranged
with corresponding sides respectively sub-
stantially parallel, whereby grasping of the
casing in any position suitable for use causes 30
one of the angles of the lead to be directed
toward the marking surface.

In testimony whereof I have affixed my
signature, in presence of two witnesses.

NEWTON CRANE.

Witnesses:

ARTHUR H. BROWN,
P. W. PEZZETTI.