LEAD PENCIL, LEAD THEREFOR, AND PROCESS OF MAKING THE SAME

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The invention relates to lead pencils, and has as an object the provision of a lead pencil having the lead effectually interlocked with the adhesive in the grooves of the sheath to prevent separation of the sheath and lead.

It is a further object of the invention to provide a lead pencil having the lead interlocked with the adhesive and in addition having the fibers of the sheath reinforced immediately about the lead.

It is a further object of the invention to provide a lead pencil having a lead so formed that the adhesive will substantially entirely surround the lead when the pencil is assembled in the usual manner of manufacture.

It is a further object to provide a process of preparing leads for embodiment in lead pencils to secure the advantages of the invention.

It is a further object to provide a process of preparing the sheath to further secure the objects of the invention.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawing showing illustrative embodiments of the invention wherein—

Figure 1 is a side elevation of a pencil made in accordance with the invention partly broken away.

Figure 2 is an end view of parts of a pencil much enlarged, illustrating the prior art.

Figure 3 is an end view of the pencil of the invention much enlarged.

Figure 4 is a detail section on line 4—4, Figure 3, showing the lead partially in elevation.

Figure 5 is a side elevation of an old form of pencil showing the type of fracture of the lead and its effect upon the wood.

Figure 6 is a like view of a pencil of the invention.

The so-called "lead" of lead pencils is usually an extruded cylinder formed of a pigment, clay, and a waxy filler. In black pencils the pigment is graphite. In colored pencils a pigment of an appropriate color is substituted for graphite. In the present description and claims of the invention the popular term "lead" is used to include the marking element of "lead pencils" of any color.

In the manufacture of lead pencils it is the practice to prepare a blank of a width to provide a plurality of sheaths by forming parallel grooves to receive the leads, to place the leads in the grooves of one blank and apply glue to the surface, including the grooves, of the complementary blank, and to then superimpose the two blanks.

The grooving of the blanks is accomplished by means of cutters revolving at high speed which has an effect of burnishing the surfaces of the grooves, and the resultant smoothing and compression of the fibers close the pores of the wood in such a manner as to interfere with access of the adhesive into the pores.

The present invention provides an added step in the preparation of the blanks by way of a roughening or opening of the pores of the wood at the surfaces of the grooves. This may be accomplished in different ways. The surfaces of the grooves may be roughened by fine sand or emery paper, by brushing with steel brushes, preferably revolving counter to the direction of revolution of the grooving cutters, or the surfaces of the grooves may be sand blasted. At present the last named method is preferred.

When the grooves are so treated, the adhesive, as glue, is allowed to enter the pores of the wood and thus not only to provide a better attachment of the leads but also to reinforce the fibers of the wood immediately around the lead, the importance of which will be again referred to.

An important feature of the invention relates to the preparation of the leads. It is well recognized in the art that the waxy constituent of the lead results in very poor bond between the lead and the adhesive. In an attempt to improve the bond between the lead and adhesive it has been proposed to treat the lead by chemical means so as either to remove the wax from the surface or to deposit a substance, as calcium sulphate, upon the surface of the lead.

The pencil of the present invention comprises the usual grooved half sheath 10 and 11, the leads as shown at 12 and 13 being roughened by mechanical means to produce minute irregular indentations in the surface of the lead. Obviously these indentations and the intervening depressions may be formed in any desirable manner but preferably by fracture of the surface of the lead breaking out minute portions thereof.

In the process of making lead pencils now in common use leads as 14, Figure 2, are laid in one of the grooved blanks as 15 by machinery and the only glue utilized is applied to the surface of the remaining blank, as 16, and indicated in this figure at 17. The blanks are then superposed but the glue obviously can not find its way between the lead 14 and the blank 15. It is impracticable by a machine operation to glue both of the sheaths for the reason that the lead laying machine would
become smeared and inoperative in a short time. In accordance with the present invention the production of the pencils known to the trade as "Ruffinish" is carried out by the first step of roughening the lead. This step in the process of making a pencil causes a radical improvement of the effects of each of the remaining steps for the reason that when the leads have been machine laid in the half sheaths the surface between the lead and the sheath is not sealed, there being now a plurality of tortuous channels between the fibers caused by communicating indentations and as a result when the step of placing the glue coated blank upon the blank and lead, the glue will flow completely around the lead and interlock with the lead in a manner totally impossible with any structure of the prior art known to applicant. The bond thus produced between the lead, and glue to the wood is such as to prevent the shattering fracture of the wood illustrated in Figure 5, but the lead will break either near or at the wood or if pressure is applied to a sufficiently short lead the wood will break relatively cleanly with adherence completely about the broken off portion of the lead.

The roughening step of the process may also be carried out in different ways. The lead may be acted upon by means of knives, which in their action cut across the surface of the lead, or the particles of wood are removed angularly relative to the leads, or both such movements are provided. When sand blasted, the particles of sand will impinge upon the leads at various angles and the resulting minute pits will extend into the surfaces of the leads at various angles so as to provide an effective interlock between the adhesive and the lead.

A further unexpected result flows from this treatment. In the present practice of manufacture, the grooves are sought to be cut upon a slightly larger radius than that of the cylindrical surface of the lead. This for the reason that glue or other adhesive is applied to only one of the blanks and the slightly V-shaped recess between the lead and the sheath in which the lead is placed is expected to cause the adhesive to flow as nearly as possible entirely around the lead in the unglued blank. In practice however the grooving cutters soon become slightly worn at their corners so that the groove in a large number of cases is really made semi-cylindrical closely fitting the lead, and the adhesive therefore engages the lead on only one-half of its circumference.

When the leads are prepared by the process of the present invention the glue is enabled to flow from pit to pit entirely around the lead, thereby providing a complete bond between the adhesive and the lead.

When a lead made in accordance with prior practice is sharpened, particularly upon a long taper, the sheath at the surface of the lead is reduced to a feather edge and in the absence of an effectual bond between the lead and the sheath, and particularly in the absence of any reinforcing of the fibers in the feather edge, the said fibers yield under pressure and the lead is broken off up into the sheath with crushing or splintering of said fibers, thus necessitating a cutting away of a considerable length of the sheath before a new workable point is formed upon the lead.

When pencils are made in accordance with the present invention with the said fibers strengthened by being indurated by the adhesive, the fibers are enabled to resist said pressure and the leverage for breaking the point is only from the end of the said fibers to the end of the sharpened lead, and little trouble is found with the breaking of the lead up inside of the sheath. Comparative tests of pencils made in accordance with the present invention and those of the best prior practice show an advantage of substantially one hundred per cent in favor of the present invention.

Minor changes may be made in the physical 30 embodiments of the invention or in the steps of the process within the scope of the appended claims without departing from the spirit thereof.

I claim:

1. In the process of manufacturing leads for pencils, the step which comprises producing minute, irregular indentations in the surface of the lead by mechanical action.

2. In the process of manufacturing leads for pencils, the step which comprises breaking out closely adjacent particles throughout the surface of the lead by mechanical means to produce a roughened surface thereon.

3. In the process of manufacturing leads for pencils, the step which comprises sand blasting the surface of the lead to form minute adhesive-receiving indentations therein.

4. A pencil led formed with a pinted surface of fracture with the pints extending below an original surface of the lead.

5. A pencil lead formed at its longitudinal surface with closely adjacent irregular eminences and depressions; a plurality of said depressions interconnecting.

6. A lead pencil comprising, in combination: a sheath; a lead formed at its surface with closely adjacent irregular eminences and depressions; and hardened adhesive surrounding the lead, projecting into said depressions and into pores of said sheath to provide a mechanical interlock between the elements of the pencil.

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