Feb. 16, 1954 H. L. LARSEN 2,669,222

PENCIL

Filed Dec. 27, 1949

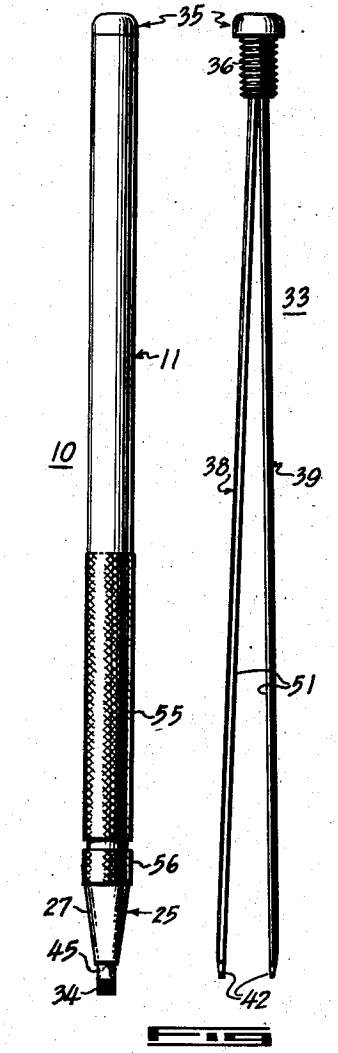


FIG. 1

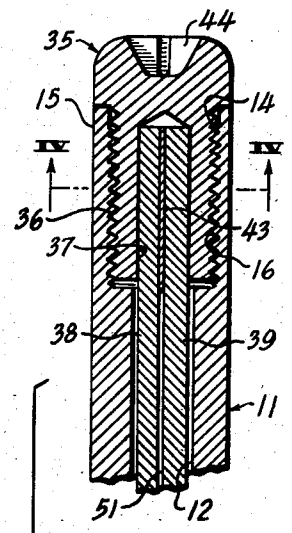


FIG. 2

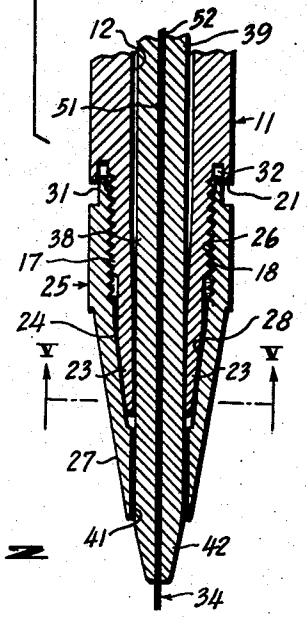


FIG. 3

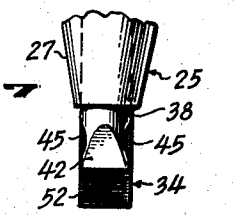


FIG. 4

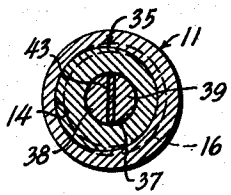


FIG. 5

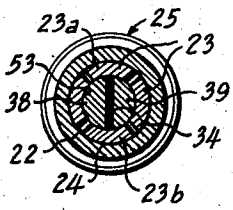


FIG. 6

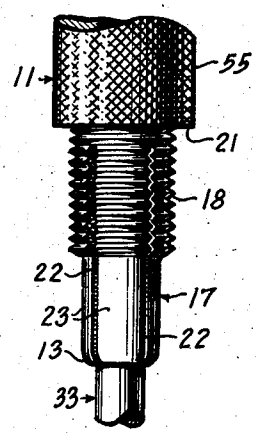


FIG. 7

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PENCIL

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This invention relates to pencils and more particularly to an improved form of holding device for receiving and firmly supporting an endwise movable lead or marking element.

In the manufacture of complicated structures such as airplanes, ships, bridges, etc. it is the practice to work from master patterns or templates. These patterns or templates are made full size to be used as guides by manufacturing departments to produce the desired parts in their required dimensions. To construct the patterns or templates it is necessary to prepare full scale drawings of the parts of which they are the counterparts. A full scale drawing may be laid off with pencil directly upon a sheet of metal which has been sprayed with a white lacquer, or the delineation of the part may be placed on drawing paper or cloth; after the drawing has been made it is then reproduced, in a well known manner, on a metal sheet by a photographic process. The sheet of metal carrying the reproduced drawing is then cut along the lines appearing thereon to effect the template.

The greater the accuracy of dimension required in a template the more uniform must be the width of the lines of the drawing. To secure lines of uniform width the draftsman provides his lead with a chisel point and devotes a great deal of attention to maintaining the point to the desired size. Since it is usual to have lines appearing on the drawing that are several feet in length the draftsmans skill is taxed to attain a result approaching the desired uniformity of width. Attainment of lines of uniform width is made still more difficult if the surface to which the drawing is being applied should have inequalities therein or be of a roughened character since abrasion of the point occurs more rapidly and a widened or irregular line results. Particular difficulty is experienced when working on a drawing cloth made of glass fibers because its texture is very rough. However, glass cloth is a desirable drawing material because it is dimensionally stable. The disadvantage of using glass cloth is that the draftsman must constantly be sharpening the lead to effect the desired point and even then abrasion occurs so rapidly that uniformity of line width is not obtainable.

The principal object of the invention, is therefore, to provide a novel and improved lead holding device with which lines of uniform width are secured and which does not require the lead to be sharpened.

Another object of the invention resides in providing an improved form of marking device

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adapted to support a marking element which is of the same width as the width of the line to be drawn.

Another object of the invention lies in the provision of a holding device of novel construction for supporting a marking element of rectangular shape.

A further object of the invention is the provision of a marking device embodying improved means for gripping and supporting lead so that it is less liable to break.

A still further object of the invention is to provide a marking device which is of simple and economical construction and which is effective and efficient in operation.

Other objects and features of the present invention will be readily apparent to those skilled in the art from the following specification and appended drawings wherein is illustrated a preferred form of the invention, and in which:

Figure 1 is an elevational view of a pencil embodying the present invention.

Figure 2 is an elevational view illustrating the lead gripping means.

Figure 3 is an enlarged, longitudinal sectional view through the pencil.

Figure 4 is a transverse section taken along the line IV—IV of Figure 3.

Figure 5 is a transverse section taken along the line V—V of Figure 3.

Figure 6 is a detail sectional view showing the chuck end of the barrel of the pencil; and

Figure 7 is a detail showing the forward end of the pencil.

Having reference now in detail to the drawings there is illustrated a pencil constructed in accordance with the present invention and illustrated generally by the numeral 10. Pencil 10 comprises a barrel or casing 11 having an axial cylindrical bore 12 opening through the bottom 13 of the barrel and extending longitudinally to a recess 14 formed in the upper end 15 of barrel 11. Recess 14 is of larger diameter than bore 13 and is provided with an internal thread 16.

The lower end of barrel 11 is cut to form a projecting stem 17 of reduced diameter having an externally threaded portion 18, which threaded portion 18 terminates adjacent an annular shoulder 21 provided on barrel 11. Stem 17 is provided with a plurality of longitudinally extending slots 22 which split stem 17 into four prongs or annularly arranged clamping fingers 23 which cooperate to effect a four-jawed collet chuck. Barrel 11 is made of steel whereby fingers 23 will have resiliency so that they can be

flexed or moved toward one another on the application of a compression force to their exterior arcuate wall surfaces 24. It is understood that the material used in making barrel 11 and stem 17 is not limited to steel, though that is preferred, and it is contemplated that any metal or other material having resilient characteristics may be employed. A sleeve or nose-piece 25 having an internally threaded portion 26 and a frusto-conical or tapered portion 27 is fitted over stem 17 to effect a threaded engagement between sleeve 25 and stem 17. The interior wall surfaces 28 of the frusto-conical portion 27 of sleeve 25 are tapered and are adapted to engage the four resilient fingers 23 to apply a compressive force thereto to move them toward the longitudinal axis of barrel 11 as the sleeve 25 is threaded onto portion 18 of stem 17. The upper end of sleeve 25 is reduced to provide an annular projection 31 which is adapted to extend into an annular groove 32 formed in shoulder 21 on barrel 11 and serves to enclose completely the threaded portion 18 and prevents dirt lodging thereon.

A lead supporting member 33 is mounted in barrel 11 and holds a lead 34 in operative position. Supporting member 33 comprises a cap 35 having an externally threaded reduced portion 36 which is inserted into recess 14 to make threaded engagement with internal thread 16 provided in recess 14 thereby to secure the supporting member 33 to barrel 11. Formed in reduced portion 36 is a longitudinal circular recess or socket 37 which coaxially aligns with bore 12 in barrel 11. Inserted into the socket 37 are the upper ends of a pair of elongated leg members 38 and 39 which are substantially half-round in transverse section, and which pass through bore 12 and a coaxially aligned bore 41 in sleeve 25 to project below sleeve 25. The projecting forward ends 42 of members 38 and 39 are provided with an inward taper as shown. The elongated members 38 and 39 are firmly affixed to cap 35; this mounting is accomplished by the inclusion between the gripping members 38 and 39 of a shim or spacer 43 so that insertion of the assembly into socket 37 effects a force fit.

The head of the cap 35 is cross-slotted as shown at 44, and will accept the end of an appropriate screw driver whereby cap 35 can be made to fit tightly into recess 14. It is understood that cap 35 and elongated leg members 38 and 39 could be integral and formed out of a single piece of stock, which stock after the forming operation would be cut to effect spaced leg members, segmental in transverse section. However to effect an integral construction results in a more expensive device and therefore the construction shown in the drawings is to be preferred.

The substantially half-round or segmental gripping members 38 and 39 are slightly sprung so that the free portions of the gripping members which extend beyond cap 35 diverge outwardly, as shown in Figure 2 to be spaced apart. With the gripping members 38 and 39 thus normally biased to move away from one another it is easier to insert a lead between them.

In assembling the pencil the legs or gripping members 38 and 39 are inserted through the top of barrel 11 and fitted into bore 12. Cap 35 is then threaded into recess 14 to project the forward ends 42 of leg members 38 and 39 beyond the lower end of the barrel 11. Since leg members 38 and 39 are biased, as stated above, to lie normally in spaced apart relation, a lead 34 may be readily inserted at the opening at the lower end and upwardly into the space between members 38 and 39. The sleeve 25 is then threaded onto the stem 17 to force the interior tapered wall surfaces 28 thereof upon the exterior walls of clamping fingers 23. Thus pressure moves the fingers 23 radially inwardly into engagement with the leg members 38 and 39 to press the latter together and cause them to tightly grip lead 34 and securely hold it in position for use.

When the lead 34 has been worn down and additional writing surface is required the sleeve 25 is backed off a distance sufficient to relieve the pressure on clamping fingers 23 and release the grip of leg members 38 and 39 on lead 34. The lead 34 could then be forced outwardly by shaking the pencil 10. However, a more efficient means for withdrawing the lead 34 from barrel 11 is afforded by providing a pair of opposed notches 45, as best shown in Figure 7, at the projecting forward ends 42 of the leg members 38 and 39, the notches extending inwardly from the longitudinal edges of the leg members 38 and 39. With notches 45 provided, as shown, access may be had to the vertical edges of lead 34, permitting the application of lateral pressure thereagainst. Lead 34 can then be moved downwardly by the draftsman's fingers to project the desired amount beyond the forward end of leg members 38 and 39. Sleeve 25 is then again moved upwardly on stem 17 to cause leg members 38 and 39 tightly to grip lead 34.

Lead 34 which is supported by pencil 10 is required to be rectangular in cross-section. This rectangular lead will be held by pencil 10 against movement either lengthwise or laterally. This constraint of lead 34 is secured by the cooperation of sleeve 25, clamping fingers 23, and gripping leg members 38 and 39. Leg members 38 and 39, being of segmental form, have flat base surfaces 51 which are presented at the opposite flat sides 52 of lead 34 and are adapted to tightly engage therewith under the pressure developed by sleeve 25. This prevents lead 34 moving endwise out from between leg members 38 and 39. Edgewise movement of lead 34 is precluded by the interior arcuate wall surfaces 53 of the clamping fingers 23. Figure 5 illustrates the relative position of clamping fingers 23 and leg members 38 and 39 when the lead 34 is in gripped condition. It is noted that the wall surfaces 53 of opposed fingers 23a and 23b lie across and close the space between leg members 38 and 39 so that the portions of the lateral edges of the lead 34 adjacent walls 53 are confined. In fitting the upper ends of leg members 38 and 39 into socket 37 of cup 35 care is taken to so arrange the leg members that when cap 35 is secured in recess 14 of barrel 11 the position of the longitudinal edges of the leg members 38 and 39 will be such as to permit them to be grasped by the interior arcuate wall surfaces 53 of two opposed clamping fingers 23. Thus an arrangement of parts is required wherein the space between the base surfaces 51 of legs 38 and 39 will open onto the interior wall surfaces 53 of an opposed pair of clamping fingers 23 and will not align with the slots 22 which split stem 17. It is a relatively simple manufacturing operation to properly locate the upper ends of elongated leg members 38 and 39 within socket 37 of cap 35 to insure that the space between these legs will, when the cap 35 is secured, be obstructed at each side by a portion of the wall surface 53 of each of two opposed clamping fingers 23. It is obvious

that the longitudinal edges of the leg members **38** and **39** are not restricted to the position shown in Figure 5 wherein a prolongation of the planes of base **51** substantially bisect arcuate walls **53** of opposed fingers **23***a* and **23***b*. The longitudinal edges can assume any position relative to the arcuate walls so long as a portion of these wall surfaces remains to extend across the entrance to the space. What is to be avoided is a construction wherein the space between bases **51** of legs **38** and **39** aligns with slots **22** when cap **35** is fitted into position.

The pencil construction hereinabove described is particularly adapted for use with flat leads which will have a thickness which is equal to the desired width of the line to be drawn. The particular thickness employed is dependent on the character of the job, whether it is to be used by a draftsman on a lofting operation or by a carpenter on a wood structure. In lofting practice lines having a thickness of between .015 to .020 inch are particularly satisfactory. The present pencil is capable of supporting leads of the extreme thinness mentioned without their breaking or snapping.

Because the thickness of the lead employed in the pencil is equivalent to the width required for the line to be drawn it is obvious that the operation of sharpening of lead is obviated. As a line is drawn the lead abrades without any gaining in thickness, since there can be no gaining. With the thickness of the lead remaining constant as the lead wears away the width of the line drawn by the lead will be uniform.

The width of the lead employed must be only of an amount that will permit the lead readily to ride over declivities and indentations in the surface being drawn on. The width of the lead should be held to a small dimension in order that the size of the pencil might not become too great as to render it clumsy and unwieldy. In lofting practice a width of 0.10 has been found satisfactory for leads of the thinness above stated. The length of lead that could be accommodated is dependent on the length of the pencil.

The hardness of the lead used is dependent on the work being done and the roughness of the surface to which the drawing is being applied. A fairly hard lead, such as 6H, is preferred for lofting work on fiber glass drawing cloth since it provides, without the exertion of great pressure, a clean, sharp, black line which reproduces well when photographed. It is a matter of experience to select the proper hardness and avoid a too hard lead which is too brittle for the work to be done, or a too soft lead which will smear easily.

It is noted that portions of the exterior surfaces of the barrel **11** and the sleeve **25** are knurled as indicated at **55** and **56** for ease in removing and attaching the sleeve **25**.

The construction herein described is characterized by its simplicity and by its efficiency. The employment of leg members **38** and **39** of segmental shape and the proper positioning of these members relative to the clamping fingers **23** affords a very efficient means for firmly and securely holding lead in operative position.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

I claim:

1. In a pencil having a barrel with a bore opening to the exterior at each end thereof, means for supporting thin lead of rectangular section and of a thickness no greater than the width of a line to be drawn, said means comprising a pair of elongated gripping members of segmental section disposed in said bore, having their upper ends positioned adjacent the opening at the upper end of said barrel and fixedly held against movement, their lower ends projecting to the exterior through the opening at the lower end of the barrel, and their flat surfaces in opposition, a plurality of movable clamping elements provided upon said barrel disposed in surrounding relation to said elongated gripping members adjacent their lower ends, with a pair of said clamping elements arranged for engagement with the longitudinal edges of said elongated gripping members, and means operative on said clamping elements to move them into clamped position upon said elongated gripping members to apply a holding pressure upon a rectangularly shaped lead disposed between the flat surfaces of said elongated gripping members to restrain said lead against endwise and edgewise movements.

2. In a pencil having a barrel with a bore opening to the exterior at each end thereof, means for supporting thin lead of rectangular section and of a thickness no greater than the width of a line to be drawn, said means comprising a pair of elongated resilient supporting members of segmental section disposed in said bore, having their upper ends positioned adjacent the opening at the upper end of said barrel and fixedly held against movement, their lower ends projecting to the exterior through the opening at the lower end of the barrel, and their flat surfaces in opposition, the free portions of said elongated resilient supporting members being biased for movement away from one another, a plurality of movable clamping elements provided upon said barrel and annularly disposed about said elongated supporting members adjacent their lower ends, with a pair of said clamping elements arranged for engagement with the longitudinal edges of said elongated supporting members, and means operative on said clamping elements to move them into clamped position upon said elongated supporting members to apply a holding pressure upon a rectangularly shaped lead disposed between the flat surfaces of said elongated supporting members to restrain said lead against endwise and edgewise movements.

3. In a pencil having a cylindrical barrel with an axial opening therethrough, means for supporting thin lead of rectangular section and of a thickness no greater than the width of a line to be drawn, said means comprising a pair of elongated resilient supporting members of segmental section disposed in said axial opening, means, having a threaded engagement with the upper end of said barrel, for fixedly holding the upper ends of said supporting members against movement and for positioning them with their flat surfaces opposed, the free portions of said elongated resilient supporting members being biased for movement away from one another and the lower ends thereof projecting to the exterior of the barrel, a plurality of movable clamping elements formed integral with said barrel annularly disposed about said elongated supporting members adjacent their lower ends, with a pair of said clamping elements arranged for engagement with the longitudinal edges of said elon-

gated supporting members, and a sleeve threaded on the lower end of said barrel to embrace said clamping elements and to move them into clamping position upon said elongated supporting members to apply a holding pressure upon a rectangularly shaped lead disposed between the flat surfaces of said elongated supporting members.

4. In a pencil having a barrel with a bore opening to the exterior at each end thereof, means for supporting thin lead of rectangular section and of a thickness no greater than the width of a line to be drawn, said means comprising a pair of elongated gripping members disposed in said bore, having their upper ends supported adjacent the opening at the upper end of the barrel and their opposite ends projecting to the exterior to extend below said barrel, each of said elongated gripping members having a flat surface, the elongated gripping members being arranged in the bore to position said flat surfaces opposite each other, means operable on said elongated gripping members for applying a force thereon to restrain a lead of rectangular shape disposed between said flat surfaces against endwise and edgewise movements, said last mentioned means comprising flexible fingers arranged to engage the longitudinal edges of said elongated gripping members and a movable means carried by said barrel for applying pressure on said flexible fingers, said projecting ends of said elongated gripping members having notches provided at their longitudinal edges to afford access to the lead located between the gripping members whereby the lead can be grasped and moved endwise outwardly of the barrel.

5. In a pencil having a barrel with a bore opening to the exterior at each end thereof, a lead supporting member mounted in said bore for holding thin rectangular shaped lead of a thickness no greater than the width of a line to be drawn comprising a pair of elongated gripping members of segmental section disposed in said bore, supported at one of their ends adjacent the opening at the upper end of the barrel and having their opposite ends projecting out of said bore to extend below said barrel, each of said elongated gripping members having a flat surface, the elongated gripping members being arranged in the bore to position said flat surfaces in opposition, a plurality of movable clamping elements provided upon said barrel disposed annularly about said elongated gripping members spaced from their lower ends, means carried by said barrel operative on said clamping members to move them into clamped position upon said elongated gripping members to apply a holding pressure upon a rectangularly shaped lead disposed between the flat surfaces of said elongated gripping members, said projecting ends of said elongated gripping members having notches provided at their longitudinal edges to afford access to the lead located between the gripping members whereby the lead can be grasped and moved endwise outwardly of the barrel.

6. In a pencil having a barrel with a bore opening to the exterior at the upper end of the barrel, means for supporting thin lead of rectangular section and of a thickness no greater than the width of a line to be drawn, said means comprising a pair of elongated resilient supporting members of segmental section disposed in said bore, having their upper ends positioned adjacent the upper opening in said barrel and their opposite ends projecting to the exterior to extend below said barrel, means, having a threaded engagement with the upper end of said barrel, fixedly supporting the upper ends of said elongated resilient supporting members, the free portions of said elongated resilient supporting members being biased for movement away from one another, each of said elongated supporting members having a flat surface, the elongated supporting members being arranged in the bore to position said flat surfaces in opposition, a plurality of movable clamping elements provided upon said barrel annularly disposed about and adjacent the lower ends of said elongate supporting members, with a pair of said clamping elements arranged for engagement with the longitudinal edges of said elongated supporting members, sleeve means movably mounted on said barrel, embracing said clamping elements and operative thereon to move them into clamping position upon said elongated supporting members to apply a holding pressure upon a rectangularly shaped lead disposed between the flat surfaces of said elongated supporting members, said projecting ends of said elongated supporting members having notches provided at their longitudinal edges to afford access to the lead disposed between the elongated supporting members whereby the lead can be grasped and moved endwise outwardly of the barrel.

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