Nov. 11, 1941. W. O. PONATH 2,262,649

MECHANICAL PENCIL

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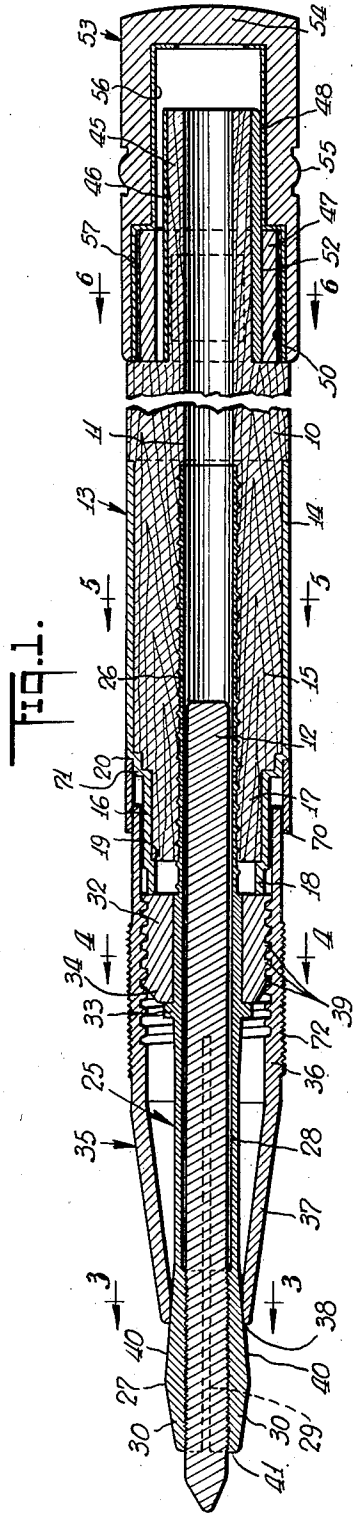


Fig. 1.

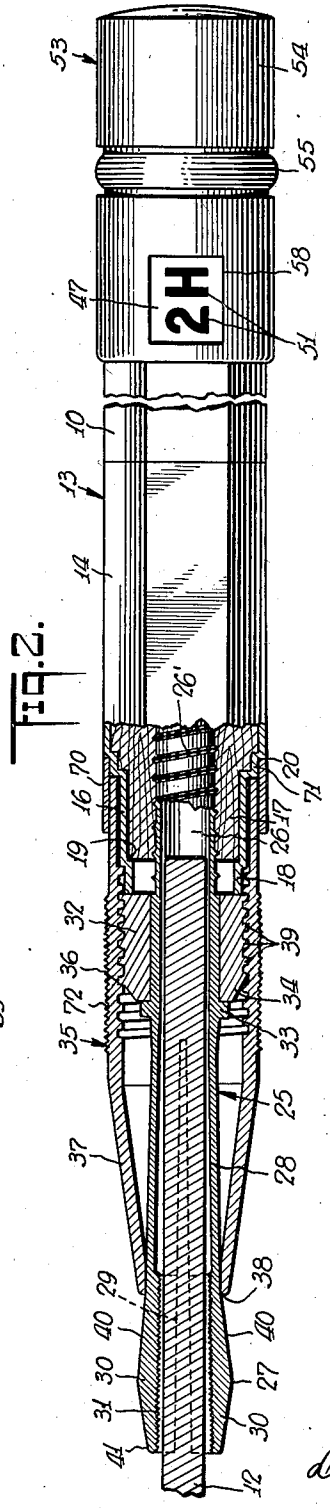



Fig. 2.

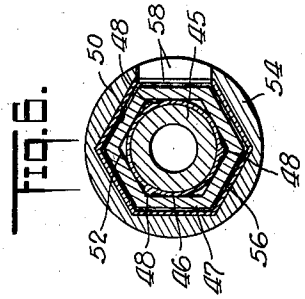


Fig. 6.

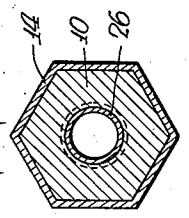


Fig. 5.

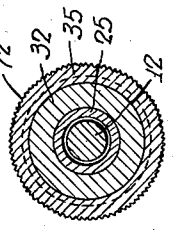


Fig. 4.

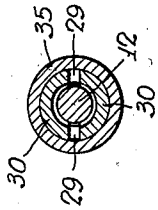


Fig. 3.

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Fig. 7.

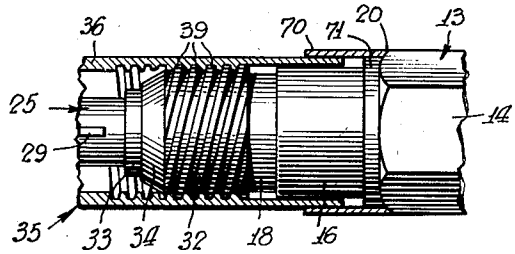



Fig. 8.

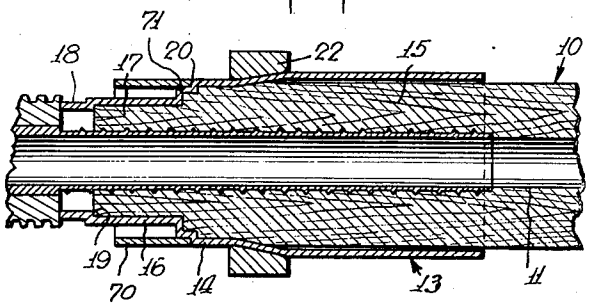



Fig. 9.

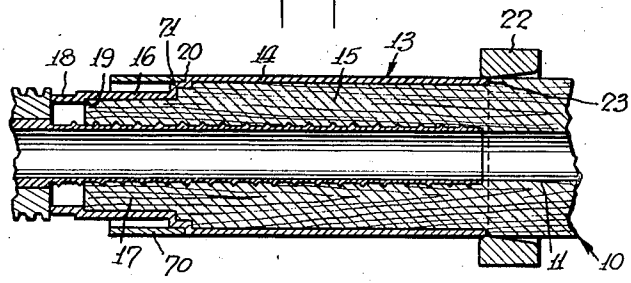



Fig. 10.

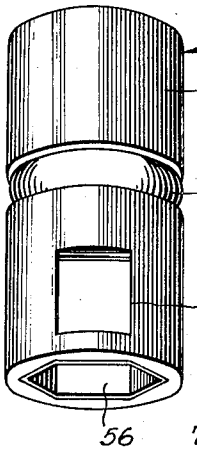
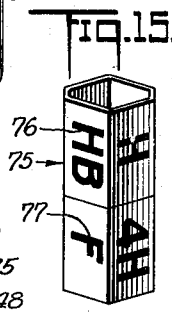



Fig. 15.



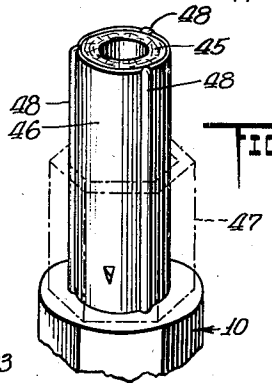




Fig. 11.

Fig. 12.

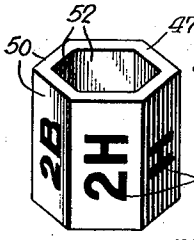



Fig. 13.

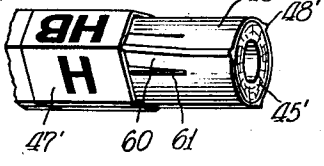
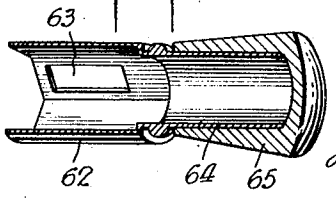



Fig. 14.




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# UNITED STATES PATENT OFFICE

2,262,649

## MECHANICAL PENCIL

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Application December 23, 1939, Serial No. 310,765

4 Claims. (Cl. 120—21)

The present invention relates to pencils, and more particularly of the so-called clutch type. In a pencil of this general type, a clutch is clamped into lead gripping position by a threaded tip, and when released by the turning of said tip, permits the lead to drop out to any desired writing length.

An object of the invention is to provide a pencil of the above type, which is of rugged and inexpensive construction, which is made of few parts that are not apt to become deranged or jammed in use, and that can be readily and expeditiously assembled, which can be easily, conveniently and expeditiously set into lead released or clutched position, and in which the lead is effectively held in said latter position against writing pressure.

Another object is to provide a pencil of the above type, in which the thrust of the clutch upon the lead is applied with equal effectiveness, regardless of wear in the clutch structure incurred in use, or variations in the diameter of the lead, and in which, regardless of the force manually applied in setting the clutch, the lead will not be weakened or broken at the clutched area.

Another object is to provide a pencil of the above type, in which the lead is effectively clutched under all conditions of use, clear to the lower extremity of the lead carrying structure, with exposure to view of the entire length of unclutched writing point, so that the user can reliably gauge the point to a length sufficient to resist writing pressure.

Another object is to provide a pencil of the above type, in which in the release of the clutch for adjustment or replacement of the lead, no part of the clutch structure need or can be disassembled from the pencil, and in which the position of the clutch sleeve by which the clutch is set is determined by the lead without interference from any clutch stop element.

Another object is to provide a method for affixing a metal clutch carrying sleeve to the forward end of the wood case, which is simple, expeditious, inexpensive and secure.

Another object is to provide in a pencil of the above character, indicating means at the upper end thereof which is of simple and rugged construction, and can be readily set to identify any lead with which the pencil is charged, which setting is not subject to fortuitous shifting, and which indicating device is so correlated with the shaft of the pencil that torque may be applied thereon for the operation of the clutch at the point end of the pencil.

Various other objects of the invention will be apparent from the following particular description, and from an inspection of the accompanying drawings, in which—

Fig. 1 is a longitudinal section on an enlarged scale of a clutch pencil embodying the present invention, and shown in lead clutched position,

Fig. 2 is a view of the pencil, partly in longitudinal section and partly in elevation, and showing said pencil in clutch released position,

Figs. 3, 4, 5 and 6 are transverse sections taken on lines 3—3, 4—4, 5—5 and 6—6 respectively of Fig. 1,

Fig. 7 is a fragmentary view, partly in section and partly in elevation, of an intermediate portion of the pencil,

Figs. 8 and 9 are sections showing successive steps in the assembly of a metal sleeve to the forward end of the wood case of the pencil,

Fig. 10 is a perspective of the window cap forming part of the indicating device,

Fig. 11 is a perspective of another portion of the indicating device,

Fig. 12 is a perspective of the indicia sleeve of the indicating device,

Fig. 13 is the shank of a modified form of indicia device, shown in perspective,

Fig. 14 is a perspective view but in section of the cap element for the embodiment of Fig. 13 and

Fig. 15 is a view similar to Fig. 12 of another modification.

Referring now to the drawings, the wood barrel or case 10, preferably of the usual hexagonal cross-section, has an axial bore 11 of diameter slightly larger than that of the large diameter long lead 12 used in such pencils.

The lead clutching assembly hereinafter described more fully, includes a tubular clutch sleeve 25 made from a single piece of tube stock, desirably of stainless steel and having a pair of diametrically opposed slots 29 longitudinally thereof to its forward end, to form a pair of opposed clutch jaws 30. Each of jaws 30 is conformed at its inner face as a cylindrical segment, on a radius not smaller and desirably slightly larger than the radius of the lead, so that said lead will be engaged by the inner surface of said jaws which are preferably corrugated, as for instance by threading at 31, to enhance the lead gripping action of the jaws 30. Thus the lead is not engaged by the longitudinal side edges of the jaws, so that there is no hin-

drance to the free fall of the lead in open jaw position.

The clutch sleeve **25** is roughened externally at its carrying shank **26**. Preferably such roughening is in the form of threads with knurls **26'** longitudinally of the clutch sleeve and across the threads. The threaded shank **26** is of outer diameter such, that it may be readily introduced into the initially somewhat larger diameter of the lower end of bore **11**.

Thereupon, the wood of the casing is securely clamped about the clutch sleeve shank with such pressure as to force the fiber of the wood snugly into engagement with the threads and knurls of the clutch sleeve. This compression is preferably effected in the operation of applying to the forward end of the wooden barrel a soft metal ferrule **13** preferably of aluminum.

The ferrule **13** which is hexagonal along its main length and presents sides **14** as shown in Fig. 2, and is cylindrical and reduced at its forward end as at **16** beyond shoulder **20** has an initial bore somewhat larger than the diameter of the wood as best shown in Fig. 8. A die, shown at **22** is then drawn longitudinally over the ferrule in which operation, as best shown in Figs. 8 and 9, it reduces the diameter of the ferrule by swaging operation to such extent as not only to take up the initial clearance about the wood as shown in Fig. 8, but to force the metal ferrule into the wood, so that upon completion of the operation as suggested in Fig. 9, the outer surface of the ferrule comes substantially flush with the outer wall of the wooden barrel therebeyond. The wood has thus been reduced in diameter at the portion encircled by the ferrule to an extent equal to the thickness of the metal of the ferrule. In this operation the ferrule sleeve has been elongated somewhat as suggested in Fig. 9 and the shoulder **23** has been formed in the wood, which is abutted by the rim of the ferrule. The reduction in diameter of the wood in the application of the ferrule has resulted in forcing the fiber thereof snugly about the thread **26** and into the milled or knurled grooves **26'** of the clutch sleeve shank, which served as the mandrel in the foregoing drawing operation.

By the construction set forth, the clutch sleeve is firmly secured with respect to the wooden barrel, so that it is retained by the threads against longitudinal displacement and by the knurls against rotary displacement relative to the barrel.

The forward end **18** of the metal ferrule **13** preferably extends forward beyond the forward end of the wood case **10** and is further reduced in diameter to provide an annular shoulder **19** engaging said barrel end and protecting it against possible fracture.

Frictionally embracing an intermediate portion of the clutch member **25** is a tip screw **32**, made desirably of brass, and firmly held against axial movement between the forward end of the sleeve **13** and an annular radial flange **33** formed on said clutch member. This tip screw **32** is desirably tapered at its forward end **34** to facilitate slippage thereover of a tip **35** in the assembly of the pencil.

The tip **35**, desirably of stainless steel, has a cylindrical section **36** threaded over the tip screw **32**, and a forward end section **37** tapering towards a clutch clamping rim **38**. The tip screw **32** has a thread **39** of comparatively high pitch, so that the tip **35** will move axially a comparatively large distance with a small turning thereof, and said thread is desirably left hand, so that by holding the tip **35** with the left hand and turning the pencil barrel **10** clockwise, said tip will advance forwardly into clutch clamping position. In order to frictionally retain the tip **35** effectively against rotation in adjusted clutch clamping position on the tip screw **32**, the high pitch threads **39** are desirably of the multiple type. I have found that for a tip screw of about one-quarter of an inch in diameter, thirty triple threads of the acme type per inch is advantageous. To avoid an unsightly gap between the tip **35** and shoulder **20** of ferrule **13**, a collar **70** snugly encircles a step **71** at the base of the forward end **16** of the ferrule **13**, which collar abuts shoulder **20** and snugly embraces the base of tip **35**. Desirably the main cylindrical length of tip **35** is knurled at **72** for non-slipping grip by the user.

In lead clutched position, the jaws **30** extend forwardly beyond tip **35**, and are cammed together in lead gripping position against their inherent resiliency by the rim **38** of said tip when said tip is turned for forward movement. To provide for this camming action, the jaws **30** are formed with a forwardly flaring cam conformation **40**, and when a lead is interposed between said jaws, they will be forced in lead gripping position by the clamping action of the rim tip **38** on said conformation. This lead gripping action is enhanced by the tapering of the forward end of jaws **30** to a relatively sharp rim **41**. In the absence of a lead between the jaws **30**, these jaws can be forced together sufficiently to permit the tip **35** to be screwed off or on the pencil.

In lead clutched position shown in Fig. 1, the entire portion of the lead beyond the forward end of the jaws **30** is exposed to view, so that the user can determine the proper length thereof for withstanding writing pressure tending to break said lead. By turning the pencil barrel **10** about one-half revolution counter-clockwise with respect to the tip **35**, said tip will move rearwardly into the position shown in Fig. 2, and the clutch jaws **30** will be spread apart by their inherent resiliency to permit the lead to be dropped out to the desired writing length or withdrawn into the interior of the pencil. The extent of rearward movement of the tip **35** is limited by the step **71** of the sleeve **13**. The cam conformations **40** on the jaws are the sole means for limiting the forward movement of the tip **35** from this step member **71** for lead clutching operation. Thus the effectiveness of the lead clutching operation will not be impaired with the wear of the cam conformations **40**.

At the rear end, the pencil is provided with a lead grade indicating device. In order to support this device, the rear end of the wood case **10** is provided with a reduced section **45** over which is press-fitted a ferrule **46** desirably of brass. This ferrule **46** may be more assuredly secured to the wood case by puncturing said ferrule radially inwardly at spaced points, so that the resulting barbs penetrate the wood case.

Locked over the ferrule **46** against rotation but axially removable with respect thereto is an indicia sleeve or barrel **47** desirably of aluminum. For so supporting this indicia barrel **47**, the ferrule **46** is provided on its outer side with a plurality of longitudinally extending ribs **48**, three of these being shown equally spaced circumferentially. The indicia member **47** is formed with an outer polygonal conformation **50** desirably hexagonal, the flats of which bear respectively different indices **51** corresponding to lead grades,

and with an internal hexagonal bore 52 of such shape that when telescoped over the ferrule 46 as shown in Fig. 6, the ribs 48 will be snugly and frictionally retained in alternate apices of said bore. This arrangement holds the indicia barrel 47 against rotary movement, while the frictional hold of said barrel on ferrule 46 and its ribs 48 permits it to be axially removed and replaced by another similar barrel bearing a different range of lead grades.

Telescoped over the indicia barrel 47 is a window cap 53, having an outer section 54 desirably of bone and desirably provided with an ornamental bead 55, and a bushing 56 desirably of brass, press-fitted or molded in the inside of said bone section 53. This bushing 56 has an enlarged sleeve section 57 substantially the same length as that of the indicia barrel 47, with an inner hexagonal conformation slightly larger than the outer conformation of said indicia barrel. The outer cap covering 54 and the bushing 56 are provided with registering window openings 58, through which the indicia 51 on the outer flats of the barrel 47 are selectively exposed. These openings 58 are formed by the absence of one of the hexagon sides of the bushing 56, and a corresponding portion of the outer bone covering 54.

The cap 53 may be slipped on the indicia barrel 47 in any one of six rotative positions with respect thereto to expose any one of the indicia 51 corresponding with the grade of the lead in the pencil. In any setting of this window cap 53, the hexagonal conformations between said cap and the indicia barrel 47 will positively lock said cap against relative rotation with respect to said barrel, so that there is no possibility of accidental relative rotational displacement between said members. The frictional hold of the outer cylindrical part of said bushing against the ribs 48, of ferrule 46 retains the window cap 53 with its bone covering 54 against coming off but permits the same to be axially pulled off by the user when desired for setting or for change of the indicia barrel. Furthermore, the locking of this window cap 53 on the indicia barrel 47 against rotation also locks it against rotation with respect to the pencil barrel 10, so that said cap may be used as a rotatable finger piece in the release or clamping of the clutch 27. This latter operation is effected by holding the tip 35 against rotation in one hand and rotating the window cap 53 in the desired direction with the other hand.

Thus a draftsman may set the indicating device to identify the grade of lead with which the pencil is charged, and he may reset said indicating device to correspond to the grade of lead inserted in the pencil.

With each pencil may be supplied two indicia barrels 47, each containing its own separate group of letters or indicia 51. For instance, one of the indicia barrels 47 such as that shown in the drawings may bear the indices 2B, B, HB, F, H and 2H on its respect flats, and the other may bear the indices 2H, 3H, 4H, 5H, 6H and HB on its respective flats. These indicia barrels 47 may be interchangeably used in accordance with the grade of the lead used in the pencil, so that the user has available to him a wide range of lead grade designations.

In Figs. 13 and 14 is shown, another embodiment of indicia device which for most purposes is a preferred form. For this purpose a ferrule similar to that shown in Fig. 11 is used and the corresponding parts bear the same reference numerals 45', 46' and 48' as those used in Fig. 11. The indicia barrel 47' similar to barrel 47 of Fig. 11 is telescoped over the ferrule 46'. It is releasably locked in position by a rectangular locking tongue 60 stamped out of the ferrule 46' by longitudinal slots 61 at opposite sides of one of the ribs and a connecting transverse slot. This tongue protrudes slightly from the wood and acts, as shown in Fig. 13, to latch the rear edge of the indicia barrel 47' upon the ferrule. The indicia barrel may, however, readily be removed whenever desired by simply pressing the latch tongue 60 inward against the wood so that the indicia barrel may be readily slipped thereover. It may be replaced by another indicia barrel such as that shown in Fig. 12 which will become lodged in position in the manner above described. The wood core 45 of course forms a stop that prevents the latching tongue form being forced inward below the surface of the barrel.

The window cap shown in Fig. 14 is desirably a hexagonal aluminum sleeve 62 with the window opening 63 therein and is formed with a cylindrical extension 64 of reduced diameter, over which is telescoped and securely held a non-metallic button 65, preferably of bone. It is the cylindrical extension 64 that frictionally fits over ribs 48' and prevents the window cap of Fig. 14 from working off, the hexagonal section 63 being keyed with respect to barrel 47' against relative rotation.

Instead of the two interchangeable indicia barrels of Figs. 12 and 13, it is desirable as shown in Fig. 15 to employ a single indicia barrel 75 having one tier 76 of indicia corresponding to those of Fig. 12 and a second tier 77 corresponding to those of Fig. 13. Thus, no extra indicia barrel need be kept in reserve and the full choice of indications of the barrels of Figs. 12 and 13 is available. The latch 60 of Fig. 13 would serve to lock the indicia barrel in place with either tier 76 or tier 77 aligned with window opening 63.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pencil of the clutch type including a handle, a clutch, comprising a pair of jaws normally held apart in lead released position by the inherent resiliency thereof, a tip screw rigid with said clutch, a tip threaded over said screw and telescoped over the forward end of said handle, and means responsive to the rotation of said tip in a direction to cause forward movement thereof for pressing said jaws radially inwardly into lead gripping position against their inherent resiliency.

2. The method of assembling the clutch sleeve of a clutch pencil to the wooden barrel thereof, which consists in introducing the roughened shank of said sleeve into a longitudinal bore in said barrel, telescoping a soft metal ferrule of bore larger than said barrel thereover, and swaging said ferrule onto said wood barrel by application of radially inward force thereon progressively along its length, to bring the sleeve sub-

stantially flush with the outer wall of said barrel and thereby to compress the wood into the roughened surface of the shank of the sleeve.

3. The method of assembling a clutch sleeve and a ferrule to the hexagonal wooden barrel of a lead pencil of the clutch type, which includes the introduction of the roughened outer surface of the shank of the clutch sleeve loosely into a corresponding bore of the barrel, telescoping a hexagonal ferrule with an inturned end over said ferrule and swaging said ferrule onto said wooden case by means of a drawing die having a hexagonal die conformation corresponding to the outer conformation of said barrel, whereby the length of the ferrule is caused to compress the wood inwardly for snug engagement with the roughened surface of the shank, of the clutch sleeve.

4. In a pencil of the clutch type, a wooden barrel, a clutch sleeve and a ferrule rigidly connected, said clutch sleeve having a threaded, knurled shank within a corresponding bore of said barrel, said shank snugly lining said barrel and extending substantially flush with the bore thereof, and said metal ferrule enclosing the forward end of said barrel and extending substantially flush with the wall thereof.

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