Sept. 8, 1936. C. PFANSTIEHL 2,053,407

PEN POINT

Original Filed Sept. 1, 1934

Fig. 1.

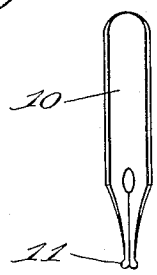


Fig. 2.

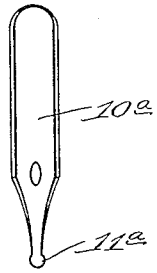
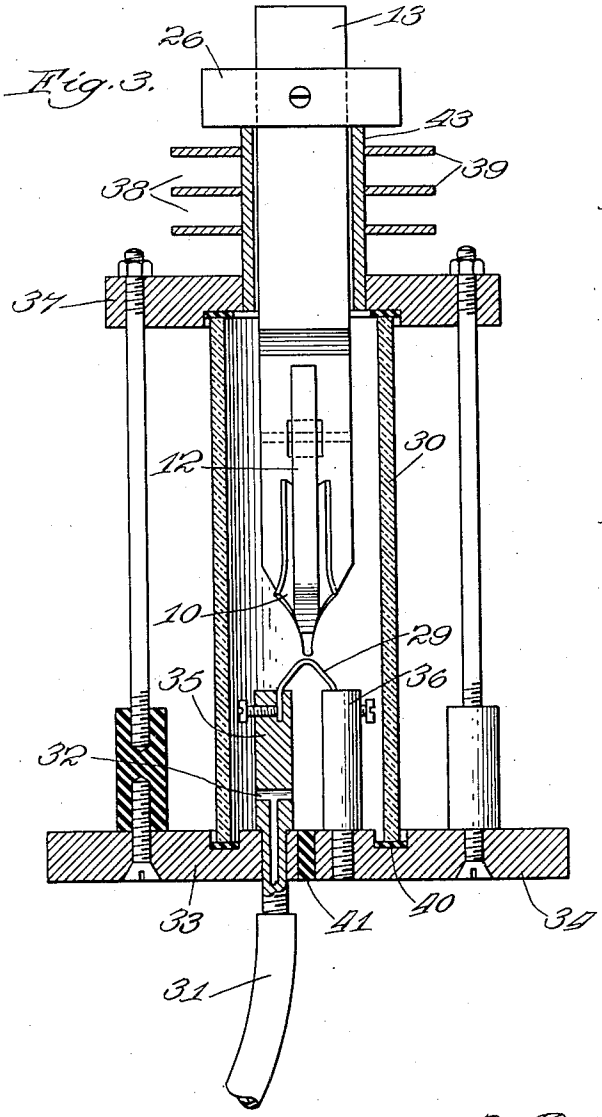


Fig. 3.



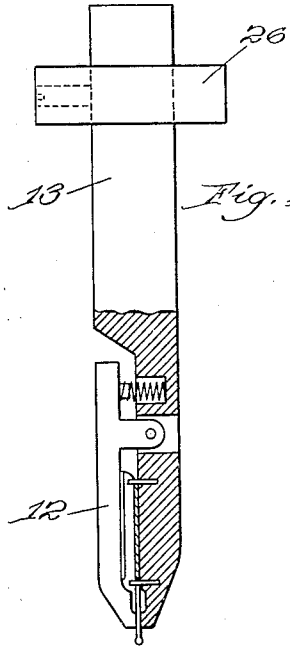
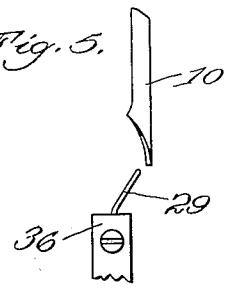


Fig. 4.

Fig. 5.



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PEN POINT

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Original application September 1, 1934, Serial No. 742,493, which in turn is a division of Serial No. 706,565, January 13, 1934. Divided and this application February 24, 1936, Serial No. 65,449

6 Claims. (Cl. 219—15)

This invention relates to pen-points and a method of preparing the same, and particularly to pen-points in which the tip and nib are integral.

In my Patent No. 2,005,752 is described a process of tacking and welding tips to pen nibs, and a method of forming integral tips upon pen-nib material.

The present invention is illustrated in the drawing, in which Fig. 1 represents an integrally formed pen-point having two spherical tips; Fig. 2 represents an integral pen-point having one spherical tip; Fig. 3 is a broken elevation, partly in section, of the fusing apparatus; Fig. 4 is an elevation of the pen-point holder, partly in section, and Fig. 5 is the side elevation showing the relation of the pen-point to the arc.

In carrying out the operation a pen-nib 10 is grasped in the jaws 12. The jaws are part of a copper holder 13 which is provided with a collar 26. After placing the pen-nib in the jaws 12 it is placed within the fusing apparatus shown in Fig. 3. This apparatus comprises a tungsten filament 29, centrally located near the bottom of a Pyrex glass enclosed chamber 30, set in rubber gaskets 40. A hose 31 having outlets 32 is provided below the filament for the admission of a gentle stream of hydrogen or other readily ionizable gas. Hydrogen is preferred because of its tendency to prevent the formation of a metallic arc and because it provides a reducing atmosphere. The base of chamber 30 is divided by insulation 41 into portions 33 and 34. Filament 29 is set in copper terminals 35 and 36, which are electrically connected to a welding circuit which is more fully described in my copending application Serial No. 706,565. A copper cover 37 is provided at the top of the chamber 30, and is supplied with a central aperture 42 for the nib and holder to pass through. This opening is preferably substantially closed by the holder, but sufficient space is left for the gases to escape. Rising from the cover 37 is the neck 38, provided with copper cooling fins 39. Other cooling means may of course be substituted, for example, water cooling means. The collar 26 of the holder 13 seats itself upon the shoulders 43 of the neck 38, and thereby establishes the proper distance between the tip 11 and the filament 29.

As shown in Fig. 4, the nib is held by the jaws 12 a very short distance from the tip. Generally this distance will be from $\frac{1}{32}$ to $\frac{1}{16}$ of an inch or less, but the distance depends upon the thickness of the nib and other factors which will be obvious to one skilled in the art. The cooling effect of the jaws plus the connected cooling means on the neck is sufficient to prevent any of the nib except that exposed from fusing, or even reaching a temperature which will draw the temper from the nib. The duration of the arc is preferably timed so that it will not continue unduly after formation of a spherical globule upon the tip of the nib.

Fig. 5 shows a preferred setting of the filament, although other arrangements may be used if desired.

The tungsten filament is continuously heated.

The arc circuit comprises a 220 or 110 volt A. C. supply which is stepped up by a transformer to 800–1000 volts. The tungsten filament is continuously heated by a high amperage low voltage current, for example, 30 amperes and 1½ volts. The operation of the arc is controlled by a timing switch which may be set to cause an arc of any desired duration. With a hot tungsten filament and an ionized atmosphere of hydrogen and a gap of about ⅛" between the hot filament and the pen nib, a time of the order of 1 to 2 seconds is satisfactory.

The hot filament ionizes the hydrogen and thereby greatly lowers the resistance of the gap so that only 800–1000 volts is necessary to start the arc with hydrogen.

In carrying out the tip-forming operation, the pen-nib which has been placed in the jaws 12 of the holder 13 with the tip of the nib exposed only $\frac{1}{16}$" or less beyond the end of the jaws is placed within the fusing apparatus shown in Fig. 3. In the meantime the tungsten filament current has been started so that the filament is hot and a stream of hydrogen is passed gently through the chamber 30 and ionizes as it passes the filament. The stream should be sufficiently slow so that the atmosphere in the chamber is substantially quiescent. The timing switch is then started. The operation of the arc heats the pin nib by heat received substantially entirely from below and the jaws of the holder 13 act as conductors to cool the remaining portions of the nib so that they do not fuse, nor is the temper thereof lost. For example, with a steel pen a substantially perfect sphere or globule of steel may be formed on the end of the pen, which may be readily split in the usual way. Substantially no buffing is required, but a perfectly smooth writing point is obtained.

Likewise an ordinary steel pen-nib may be formed to shape and split but the end not polished for writing. It may then be placed in the

welding apparatus with the two points of the nib separated a few thousandths of an inch and exposed to the arc in the usual manner, except that the time and maximum current should be cut down considerably. In this manner a rounded surface of glassy smoothness is produced on each separate point of the pen.

When an air-hardening steel is used for the nib, the sudden heating and cooling produces the maximum hardness at the tip of the pen. For this purpose the use of a hydrogen atmosphere is beneficial in view of the fact that it conducts heat away much more rapidly than air.

Fig. 1 shows a steel pen 10 treated with its point split to produce a spheroidal globule 11 upon each tip. The treatment may be carried so far as to produce a substantially spherical globule, or it may be stopped somewhat short of this when the tip is simply rounded or smoothed, in a somewhat similar fashion to the manner in which a rough piece of glass may be smoothed by heat. In either event, with a properly hardening steel, the tip itself is hardened to a degree which is not possible to the entire pen.

The process may be used with other types of metallic pen-point material to produce spherical tips.

In Fig. 2 is shown a point 10a with an integral single tip 11a which may be split in the customary manner.

This application is a division of Serial No. 742,493, filed September 1, 1934 which was a division of application Serial Number 706,565 filed January 13, 1934.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

What I claim as new and desire to secure by Letters Patent, is:

1. The method of forming a tip upon a pen-nib which comprises vertically suspending a pen-nib above an electric arc and fusing a tip of the nib by said arc to form a substantially spherical globule thereon, and cooling the globule to produce a spheroidally tipped nib, while maintaining the remainder of the nib substantially below fusion temperature.

2. The method as set forth in claim 1 in which the pen-nib is of air hardening steel.

3. The method as set forth in claim 1 in which the pen-nib is of air hardening steel and the cooling is carried out in an atmosphere of hydrogen.

4. The method as set forth in claim 1 in which one spheroid is formed upon the pen-nib and is subsequently split.

5. The method as set forth in claim 1 in which the pen-nib is split, the tips separated and globules formed on each by fusion, while they are so separated.

6. The method as set forth in claim 1 in which the tip of the pen-nib is an electrode of the arc.

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