PATENT SPECIFICATION 595,436

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COMPLETE SPECIFICATION

Fountain Pen

I, FRANK BERNHARD DEHN, M.Sc., Ph.D., F.R.I.C., of Kingsway House, 103, Kingsway, London, W.C.2, a British subject, Chartered Patent Agent, do hereby declare the nature of this invention (a communication to me from The Parker Pen Company, a corporation duly organized under the laws of the State of Wisconsin, of Corner of Court and Division Streets, Janesville, State of Wisconsin, United States of America), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a fountain pen.

The inks commonly employed in the use of fountain pens are of the type having an acid or neutral base. Such inks are not readily absorbed by the fibres of the paper and tend to lie on the surface of the paper to dry chiefly by evaporation of their liquid content. The ink feed means as customarily employed in fountain pens is arranged to effect control in part, at least, by capillary attraction, and inks of the foregoing character are well suited for use with such feed means. Moreover, they do not have any appreciable deteriorating effect upon the materials of which such pens are normally made.

It is, of course, desirable, in order to avoid the necessity of blotting the paper after writing, to have the ink dry or be absorbed as quickly as possible so that it will not smear. But an ink in drying quickly by evaporation causes difficulty with ordinary pens in that the nibs thereof dry out quickly when the pen is not in use, so that ink is not immediately available at the writing tip of the nib when the tip is first applied to the paper after such a period of disuse. If an attempt is made to avoid this difficulty by so regulating the feed from the reservoir of the pen that a relatively large quantity of ink, which obviously takes longer to dry, is made available close to the writing tip, the pen has a tendency to leak or drip at the tip when held in writing position, particularly if some condition exists to cause a change in the relation between the outside atmosphere and the pressure within the ink reservoir. Thus, the feed in pens of this type is constructed on the basis of a compromise on the one hand of a condition where no leaking or dripping will occur but the nib will dry out if too long in disuse and on the other hand a condition where more ink is supplied to the nib to avoid such quick drying out but dripping or leaking may occur.

It has been found that a so-called alkaline ink is capable of quickly penetrating the resinous, gelatinous or starchy sizes commonly used on writing papers and being absorbed by the fibres of the paper. Such action of the ink completely eliminates the necessity of blotting since, by quickly penetrating the sizing and by being absorbed by the fibres, only an extremely thin film of ink remains on the surface and such film dries almost instantaneously. Unless otherwise provided for, an alkali having sufficient strength to penetrate the sizing, by the very quality which enables it to penetrate such size, attacks and deteriorates many of the materials, e.g., "pyroxylin," utilized in the construction of ordinary pens. Thus, many plastics utilized for the barrel and feed structure of the pen, as well as some of the metals commonly used for nibs, are attacked by such an alkali and deteriorate rapidly in the presence thereof.

Alkaline ink of the foregoing character also has another quality which prevents its use in ordinary pens. Such ink tends to flow too freely through and from the feed structure of such a pen, causing leakage in contradistinction with the action of acid inks.

The communicator's Specification No. 534,657 claims a fountain pen assembly including a capillary ink collecting space which is not only in communication with a capillary ink feed passage but also with an air passage. The capillary connection between the collecting space and the air passage provides a capillary cut-off so as to normally prevent the flow of ink from the collecting space into the air passage. In this prior specification the ink flows

[Price 1/-]

from the reservoir to the feed passage and into the collecting space only whenever the ink flowing through the feed passage exceeds the amount of ink required for writing purposes. The ink reservoir is connected to atmosphere only by way of the air passage and the ink collecting space and the feed passage in series, so that the ink will flow from the reservoir only when the ink collecting space is substantially emptied of ink. In another specification of the communicator No. 537,269, the feed duct is contained within a hollow member which is open to the ink reservoir and the hollow member also is formed with capillary cells. These cells and the ink feed duct as well as a breather throat are contained in the hollow member. The breather throat communicates with the atmosphere. Hence, in this prior specification, surplus ink in the feed duct can readily enter the capillaries to prevent flowing of the pen and atmospheric air can be admitted to the reservoir when the capilliaries are free of ink.

According to the present invention there is provided a fountain pen adapted for use with ink having an alkaline base of sufficient strength to penetrate the size on writing paper and to thereby give the effect of a quick-drying ink, which includes a feed structure having therein a fine capillary passage for feeding the alkaline ink from a reservoir, a pen nib carried by said feed structure and forming therewith a fine capillary feed passage communicating with said first feed passage for additional flow control of alkaline ink, said nib having a slitted writing point providing a further fine capillary ink feed passage communicating with said other feed passages for controlling the flow of alkaline ink, said fine capillary feed passages constituting the entire ink flow connection between the reservoir of alkaline ink and the writing tip of the pen nib, and a shell member completely enclosing said feed structure and said pen nib except the writing tip thereof and forming with said feed structure and said pen nib fine capillary ink spaces adapted to receive and to further control the flow of alkaline ink and a mounting member carrying said feed structure and shell for holding them and said nib in a predetermined assembled and unitary relationship wherein said ink feed passages are maintained in connected feed relation and said capillary spaces are retained in predetermined position for properly controlling the flow of alkaline ink to the writing point of the pen, the arrangement being such that the unitary structure may be applied to and removed from a pen barrel without in any way disturbing the operative relationship of the parts.

In the accompanying drawings:—

Figure 1 is a side elevational view, partially in section, of a fountain pen embodying the features of the invention;

Fig. 2 is a view similar to Fig. 1 showing a partial disassembling of the pen;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2;

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 2; and

Fig. 5 is a fragmentary view of the pen with parts broken away to show the alignment of certain parts.

Alkaline inks commonly used as a base therefor sodium hydroxide (caustic soda), potassium hydroxide (caustic potash), or lithium hydroxide, while caesium hydroxide or rubidium hydroxide may be used, but the first-mentioned hydroxides are preferable from the standpoint of availability and cost. All of the foregoing hydroxides are monovalent. There are other alkalis, such as the divalent alkalis known as alkaline earths, but such alkalis are not used as a base for ink because of their relative insolubility.

Alkaline inks of the above-mentioned type have the property of quickly penetrating the sizes normally used on writing paper. While the sizes include a wide variety of specific forms, they may all be classed generally as resinous, gelatinous, or starchy.

By quickly penetrating the size of the paper, the alkaline ink can be absorbed by the constituents of the paper and, therefore, leaves only a very thin film on the surface and does not leave a relatively heavy surface coating as in the case of acid inks. Thus, alkaline inks by entering into the paper itself are permanently retained therein in such a way as to give the effect of "quick drying." This eliminates the necessity of blotting.

Thus, alkaline ink has a very definite advantage over acid ink but, because of the differences in the flow characteristics or mobility of the two inks, as well as differences in surface tension, among other things, and wettability of the surfaces by the ink, the feed structure of the pen differs from that of the ordinary pen in order to properly handle the alkaline ink under all conditions of use.

The use of alkaline ink also presents another problem in the construction of the pen, namely, that of finding proper materials which will withstand the corrosive action of the alkali therein. Many materials used in pen construction which are entirely suitable for use with acid ink are wholly unsuitable for use with an alkaline ink.

Considering types of commonly manufactured pens, one type of construction used in high-grade pens comprises a flexible rubber sac and a hard rubber feed structure and pen section. The rubber of these parts is suitable for both acid and alkaline inks. However, it has been common practice to secure the sac to the pen section by means of shellac. The shellac is quite readily dissolved by alkaline ink so that, when a pen of this character is used with alkaline ink, the shellac is softened and then a seepage of ink occurs between the sac and the pen section.

In many instances, the pen sections, as well as the barrels, are made of a cellulosic or cellulose base plastic which is attacked or corroded by alkalis. Any cellulose plastic such as pyroxylin is subject to the foregoing objections, as well as phenolic resins which have been used widely for molded products.

A number of other plastics are also found to be subject to corrosion by the alkalis but new plastics are being developed so rapidly and there is such a wide variety of them that the matter may best be approached by naming known plastics which are not attacked by the alkali and which have proper physical properties to be suitable for use in fountain pens. Thus, methyl methacrylate resin, polystyrene, vinyl type of resin, vinylidene chloride resin, melamine resin, natural or synthetic rubber, and allyl resin are all found to be suitable materials for fountain pens using an alkaline ink. While the above-mentioned materials are suitable, the pen disclosed herein is not to be limited to such materials since other plastics similarly suitable may be available. Generally speaking, the higher grade or more expensive plastics are found to be adapted for fountain pens both from the standpoint of physical properties and from the standpoint of alkaline ink, although there may be exceptions to such a general rule. The particular material to be used in any particular part of the pen will also be controlled by the tendency of the ink to wet the surface of such material since this is a factor in capillary action.

The material of which the nib of the pen is made also has to be considered when it is intended for use with alkaline ink. It may be stated as a general rule that the baser metals are readily corroded by alkalis while the more noble metals are not. Thus, the precious metals such as gold, platinum, rhodium, ruthenium, osmium and irridium are all suitable for use with alkaline inks. The baser metals such as iron, aluminium, zinc and lead are generally not suitable. However, alloys of precious metals with baser metals are satisfactory and, in fact, preferable because of their physical properties. Also, certain alloys of the baser metals, such as stainless steel, are found to be satisfactory, although such alloys may be slowly attacked by acid inks. Many intermediate metals such as tungsten, cobalt, tantalum and nickel are readily attacked either by acid or alkaline inks and hence should not be used.

In a pen of ordinary construction, primarily designed for use with acid inks, the lower flow characteristics or mobility of the acid ink, as compared with that of alkaline ink, permits use of larger feed ducts and a less sensitive control of the ink. To state it in other words, the alkaline ink, having greater flow characteristics or mobility in a pen than acid ink, requires a more sensitive control of the feeding of the ink from the reservoir to the nib to prevent the pen from dripping, leaking or feeding too freely. It has been found that, in a pen adapted for use with alkaline ink, all of the feed passages of the ink feed structure should be of restricted capillary form from the reservoir substantially all the way to the writing tip of the nib. It is also desirable that the feed structure embody cellular means of relatively large capacity to readily take up excess flow, when alkaline ink is to be used, and that such cellular means be directly connected to the feed passage to prevent any tendency to drip or leak from the point of the pen. Moreover, because of the highly mobile character of alkaline ink, it becomes of more importance to control the flow of air to the reservoir, since ink will be released from the reservoir only by entry of air into the reservoir or by expansion of the air already in the reservoir. It has been discovered that by providing a feed means as hereinafter described so arranged as to permit flow of air into the reservoir substantially only when ink flow from the reservoir does not exceed existent writing needs, this condition is controlled. Furthermore, the feed structure must be so constructed that any excess or overflow therein will be utilized at the point of the pen before air is permitted to enter the reservoir and release ink therefrom.

An additional feature of the pen, which enables it to properly handle alkaline ink, lies in the construction of the nib and the manner in which it is mounted in the pen. The nib has a tubular supporting portion providing a rigid support for the slitted front end or writing tip, and is enclosed by a shell, except for its extreme writing tip, in such a manner that the writing tip engages the shell during

writing and thus is held against flexing to any material extent. The slit in the writing tip is thereby maintained at a substantially constant width, which is of restricted size, so that excessive flow because of spreading of the nib at the writing tip cannot occur. Contact of the shell and nib adjacent the writing tip also provides a damming effect serving to prevent any flow or dribbling of ink through the pierce in the nib over the top surface of the nib to the writing tip, and maintains a constant supply of ink in a capillary space over the top surface of the nib to the rear of the point of contact to provide ink for instantaneous starting.

The fountain pen which we have chosen to illustrate our invention in the accompanying drawings has a construction suitable for use with alkaline ink, although it also operates entirely satisfactorily when used with acid ink. This pen comprises a barrel 10, the interior of which constitutes an ink reservoir. It is to be understood that, while our invention has particular utility in a pen of the type illustrated, it also is well adapted for use in a pen embodying an ordinary ink sac as the ink reservoir.

In the pen illustrated in the drawing, the front end structure comprises a shell 11 enclosing a writing point or nib 12 for substantially its entire length except for its extreme writing tip which extends slightly beyond the shell 11, as indicated at 13, for contact with the writing surface, the writing tip being slitted as at 13*a*. Within the shell 11 is located a feed means comprising, in the present instance, a collector or governor indicated generally at 14, and a feed bar 15. The governor 14 is provided with an axial bore of varying diameters one of which fits tightly upon the rear end of the feed bar 15, as at 16, to support and hold the latter in assembled relation. The nib 12 is preferably tubular in form to surround the forward portion of the feed bar 15 and is of such diameter as to fit within the bore in the governor 14 and be retained therein by friction. The diameters of the parts are such that forwardly of the portion 16 supporting the feed bar 15, an annular capillary space 17 is provided between the feed bar and the governor, and an annular capillary space 18 between the feed bar and the nib. The capillary space 18 extends forwardly to the front end of the feed bar where the nib increases in thickness to contact the extreme end of the feed bar as at 20. The shell 11 is provided with an opening 21 in its front end to receive the front end of the feed bar and to permit the nib to extend therethrough. The opening 21 is of such diameter as to provide a small capillary space 22 overlying the nib, and particularly the slitted portion thereof, the slit 13*a* extending rearwardly to the usual pierced hole 23 in the nib. The extreme front end of the shell is bent downwardly into contact with the nib, as at 24.

Ink from the reservoir is fed to the nib by a feed fissure 25 comprising a radial slit or saw cut in the governor 14 extending forwardly to a point just short of the front end of the governor and opening into the reservoir at its rear end, the rear portion of the feed fissure preferably being enlarged as at 26. The feed fissure 25 together with the capillary spaces 17 and 18 and the slit 13*a* in the nib thus provide an ink feed passage extending from the reservoir to the writing tip of the nib.

To cooperate with a multiple-stroke filling device (not shown) when the interior of the barrel 10 constitutes the reservoir of the pen, a breather tube 30 may be mounted in a bore 31 provided in the rear end of the feed bar 15, the bore 31 being provided with a radial aperture 32 opening into the annular capillary space 17.

During use of the pen, ink in excess over that required for existent writing needs may be caused to flow from the reservoir, such as in the case where the heat of the writer's hand causes the air in the reservoir to expand. To prevent such excess ink from leaking at the writing tip, the governor 14 is provided with means to take up such excess flow. To this end, the governor is provided with a plurality of circumferential slits or cells 33 of capillary size and intersecting the feed fissure 25. Thus, when excess flow of ink occurs in the feed fissure, the excess over that required for existent writing conditions will be taken up by the cells 33 to prevent leakage at the writing tip of the pen.

Since air must be permitted to enter the barrel as ink is withdrawn therefrom, the governor 14 is also provided with an air channel 34 extending longitudinally thereof on the side opposite the feed fissure 25 and intersecting the cells 33. The air channel 34 does not open directly into the reservoir so that air entering the shell through the opening 21 and passing through the channel 34 must pass through the cell 33 and into the feed fissure 25 to bubble back into reservoir. Thus, when the cells 33 are filled with ink under conditions of excess flow, no air can pass to the reservoir and ink used at the writing tip will be withdrawn from the cells 33 before any

air can pass to the reservoir to permit ink to flow therefrom.

The various capillary passages in the feed structure must, of course, be so relatively dimensioned as to supply ink to the writing tip in proper quantities. Control of the flow of ink is of particular importance in the case of alkaline ink, and accuracy of dimension of the various ink passages is therefore essential in a pen adapted to use such ink. Generally the various ink spaces within the feed structure are such that the dimensions thereof are graduated toward the writing tip, that is, the dimensions gradually decrease toward the writing tip with the slit 13*a* in the nib being the smallest. Thus, this slit will have the greatest capillary pull and ink will be drawn from the reservoir through the feed structure to the writing tip. The capillary cells 33 are also dimensioned so that, when filled, ink will be withdrawn therefrom into the feed fissure 25. Thus, the cells 33 are of larger dimension than the feed fissure.

As an example of the sizes of the various ink passages within the feed structure, which are suitable for controlling the flow of alkaline ink and which bear the proper relation to each other, the upper or rear portion 26 of the passage 25, particularly at the point where such passage opens into the reservoir, may have a width from .007 to .010 of an inch, the smaller size being used in a pen having a fine point and the latter being used with a pen having a heavy point. The lower or forward portion of the passage 25 adjacent the cells 33 is somewhat smaller, having a width preferably of .005 of an inch. The annular space 17 between the feed bar 15 and the governor 14 may have a radial dimension of .0065 of an inch while the annular passage 18 between the nib and the feed bar may have a radial dimension of .006 of an inch. The slit 13*a* in the nib, however, has the smallest capillary dimension in the entire feed passage and preferably is .001 to .0015 of an inch. Thus, the various portions of the feed passage are substantially of decreasing capillary size toward the writing tip of the pen so that ink will be fed to the writing tip mainly through capillary action. The capillary space 22 between the nib 12 and the shell 11 is preferably .005 so that the nib slit, which is of smaller capillary size, can readily draw ink therefrom for instantaneous starting. The shell 11 by being bent into contact with the nib at 24 provides a damming effect, preventing ink from running down over the top surface of the nib from the pierced hole 23 in the nib.

The cells 33 vary in size with the smallest at the rear and the largest at the front end of the governor so as to empty progressively from the front, but are all of larger dimension than that portion of the feed fissure 25 with which they connect. Thus, the cells may vary in width from .008 of an inch for the rearmost cell to .012 of an inch for the front cell. The cells are preferably arranged in three groups with the rearmost group .008 of an inch in width, the middle group .010 of an inch and the forward group .012 of an inch. Preferably twenty-five cells are provided with nine cells in the rear group, nine in the intermediate group, and seven in the front group. The annular space, indicated at 35, between the governor and shell is also of capillary size serving to receive excess flow and is correspondingly dimensioned. Thus, such annular space may have a radial dimension .007 of an inch at its rear end gradually enlarging to .0094 of an inch at its front end. When air flow to the reservoir is shut off by the filling of the cells, the smaller portion of the passage 25, upon demand for ink at the writing tip, will draw ink from the capillary cells 33 since such portion of the passage is of smaller size than the cells. Withdrawal of ink from the cells will occur first from the front cells and then progress rearwardly since the front cells are of larger dimension than the rearmost cells. Withdrawal of ink from the annular space between the governor and the shell will occur in a similar manner.

The feed structure, so constructed, exercises a highly sensitive control over the feeding of ink from the reservoir, thus adapting it for use with alkaline ink. Because of the greater flow characteristics or mobility of alkaline ink, the cells 33 and their readiness to take up ink in case of excess flow are of great importance with such ink to prevent leaking or flooding at the writing tip, although they are also beneficial in controlling the flow of acid ink. Not only is the readiness of the cells to take up excess ink of importance, but also their action in blocking the flow of air to the reservoir at times of excess flow and the consequent immediate reduction in ink flow from the reservoir is an important feature of the pen in making it suitable for use with alkaline ink.

The shell 11 covers the nib except for the extreme writing tip thereof and thus exercises a control over the flow of ink down to the writing tip. The shell by contacting the nib adjacent the writing tip stiffens the nib and prevents it from flexing to any material extent under writing pressure. Thus the nib slit 13*a* will

be maintained at a substantially constant width suitable for the highly mobile character of the alkaline ink. The shell also permits the pen to be grasped close to the writing tip without the fingers becoming smeared with ink. Such protection for the fingers is particularly desirable, when alkaline ink is used, to protect the fingers against the staining action of the ink.

Another feature of the invention lies in the construction whereby proper alignment of the parts may be readily attained. Such alignment of these parts is highly desirable to permit them to function properly. Thus, the nib 13 bears a predetermined relation to the air channel 34 and the feed fissure 25 and also should be aligned to cooperate with the shape of the shell and the feed bar 15. Furthermore, the projection of the writing tip beyond the shell preferably conforms to definite limits. The alignment of the parts thus is a matter requiring care in assembly.

Such alignment can best be attained by constructing the front end structure so that it may be assembled as a unit. The parts constituting the front end structure thus may be escured together in a manner to prevent misadjustment during assembly of the unit on the barrel and to permit removal of the unit from the barrel without disassembling of the parts of the unit. To this end the parts of the unit are held together in a manner which rigidly holds the parts in place and which does not permit their disassembly by the procedure utilized in detaching the unit from the barrel. A unit thus may be placed on a barrel without danger of disaligning the parts of the unit.

In order to attain this feature, a member in the form of a nipple 36 is provided, which serves to hold the parts of the front end structure assembled and provides a convenient means for attaching the front end structure as a unit to the barrel. The nipple in its preferred form comprises an elongated cylindrical member having a central bore 37 dimensioned to receive a shank 40 of the governor 14. The shank 40 has a frictional fit within the bore 37. and the governor is positioned in abutment with the front end of the nipple 36. Externally the nipple 36 is preferably threaded throughout its length and to secure it in assembled relationship with the front end structure, a portion of these external threads on the nipple engage corresponding threads on the interior of the rear end of the shell 11. The nipple is of sufficient length so that a substantial portion thereof extends beyond the shell 11 and is threaded into the front end of the barrel 10. Between the rear end of the shell and the front end of the barrel and encircling the nipple 36, is a cap-retaining clutch ring 41. Thus, since the parts of the unit are maintained in predetermined relation by the nipple and the latter is fixed in the shell before attaching to the barrel, the rotative movement of the unit in screwing the nipple into the barrel will not disturb the adjustment of the parts of the unit.

Since the nipple 36 is threaded both into the shell and into the barrel, it is desirable to provide means to prevent disassembly of the nipple and shell when the nipple is unscrewed from the barrel to remove the front end unit. To this end a cement is employed to secure the nipple to the shell, which cement preferably is placed on the threads engaging the shell. Such cement not only serves to secure the parts together as a unit, but also provides an air and ink-tight seal so that the parts of the front end structure will effect proper feeding of the ink.

It is also desirable to utilize a cement in the threads joining the nipple with the barrel for sealing purposes. Since cement thus is utilized both between the nipple and the barrel and the nipple and the shell, it is desirable that the two cements differ in some characteristic so that one may be loosened without freeing the cement at the other point. Thus since it is the intent to maintain the front end structure in assembled relationship, the cement securing the nipple to the barrel is of a type which is more readily freed than the cement holding the nipple to the shell. In the preferred construction, both cements are of thermoplastic character so that under proper treatment they may be readily freed without danger of breaking any of the parts. The cement securing the nipple to the barrel, however, has a lower critical temperature than that of the cement connecting the nipple to the shell. Thus by controlling the heat applied to the pen to loosen the cement, the cement securing the nipple to the barrel may be freed without plasticizing the other cement. Thermoplastic cements are available on the market of a type resistant to alkalis, and may be employed for this purpose.

The shell 11, feed bar 15, governor 14, and breather tube 30, if employed, are made of one of the above-mentioned plastics which are resistant to alkalis. The barrel 10 is also made of the same material, if it serves as a reservoir, and even if a sac is used, the barrel is preferably made of the same material as the shell 11 in order to provide a matching appearance. The sac, if used, is made of rubber, either natural or synthetic, which

is resistant to alkalis, and is cemented to the feed member by a cement which cannot be dissolved by an alkali. The nib 13 is made of one of the precious metals, preferably an alloy thereof to provide sufficient hardness and stiffness. Thus, the pen is made of materials throughout which are resistant to the corrosive action of alkaline ink.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A fountain pen adapted for use with ink having an alkaline base of sufficient strength to penetrate the size on writing paper and to thereby give the effect of a quick-drying ink, which includes a feed structure having therein a fine capillary passage for feeding the alkaline ink from a reservoir, a pen nib carried by said feed structure and forming therewith a fine capillary feed passage communicating with said first feed passage for additional flow control of alkaline ink, said nib having a slitted writing point providing a further fine capillary ink feed passage communicating with said other feed passages for controlling the flow of alkaline ink, said fine capillary feed passages constituting the entire ink flow connection between the reservoir of alkaline ink and the writing tip of the pen nib, and a shell member completely enclosing said feed structure and said pen nib except the writing tip thereof and forming with said feed structure and said pen nib fine capillary ink spaces adapted to receive and to further control the flow of alkaline ink and a mounting member carrying said feed structure and shell for holding them and said nib in a predetermined assembled and unitary relationship wherein said ink feed passages are maintained in connected feed relation and said capillary spaces are retained in predetermined position for properly controlling the flow of alkaline ink to the writing point of the pen, the arrangement being such that the unitary structure may be applied to and removed from a pen barrel without in any way disturbing the operative relationship of the parts.

2. A fountain pen, according to claim 1, in which the shell is provided with a breather opening in its front end to admit air to the feed structure.

3. In a fountain pen, according to claim 1 or claim 2, including a barrel, a unitary front end structure comprising a writing point, ink feeding means for controlling the flow of ink to the writing point, a shell, and a nipple secured in the shell and holding the writing point and feeding means in operative relation with the shell, said nipple being constructed for detachable engagement with the barrel whereby the front end structure may be detached from the barrel as a unit.

4. A fountain pen, as set forth in the claims 1 to 3 wherein the portions of the pen which are in contact with the alkaline ink are formed of materials which are resistant to the deteriorating effect of the alkaline ink.

5. A fountain pen, according to claim 3, in which a cement rigidly secures said nipple to the shell and a second cement secures said nipple to the barrel, said second cement being of different character from the first mentioned cement and being adapted to be freed by treatment differing from the treatment for freeing the first mentioned cement whereby the nipple may be detached from the barrel and the shell.

6. A fountain pen, as set forth in claim 5, in which the cements are of thermoplastic character with the cement securing the nipple to the barrel having a lower critical temperature than the cement connecting the nipple to the shell, whereby through control of heat applied to the pen, the cement securing the nipple to the barrel may be freed without plasticizing the other cement.

7. A fountain pen, as set forth in claims 5 and 6, characterized by the two cements employed being of a type resistant to alkaline ink.

Dated this 23rd day of May, 1945.

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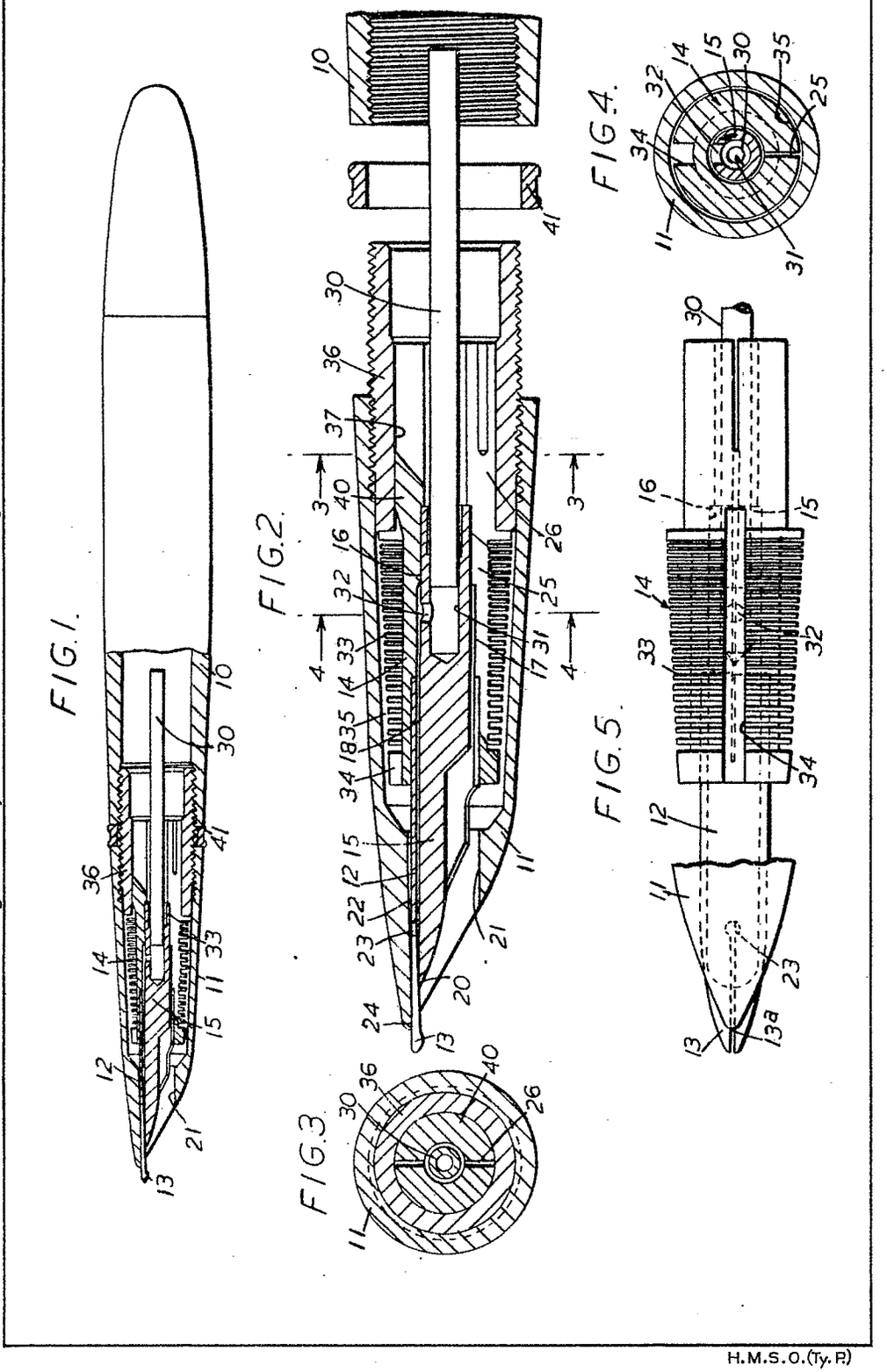

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