

May 24, 1960

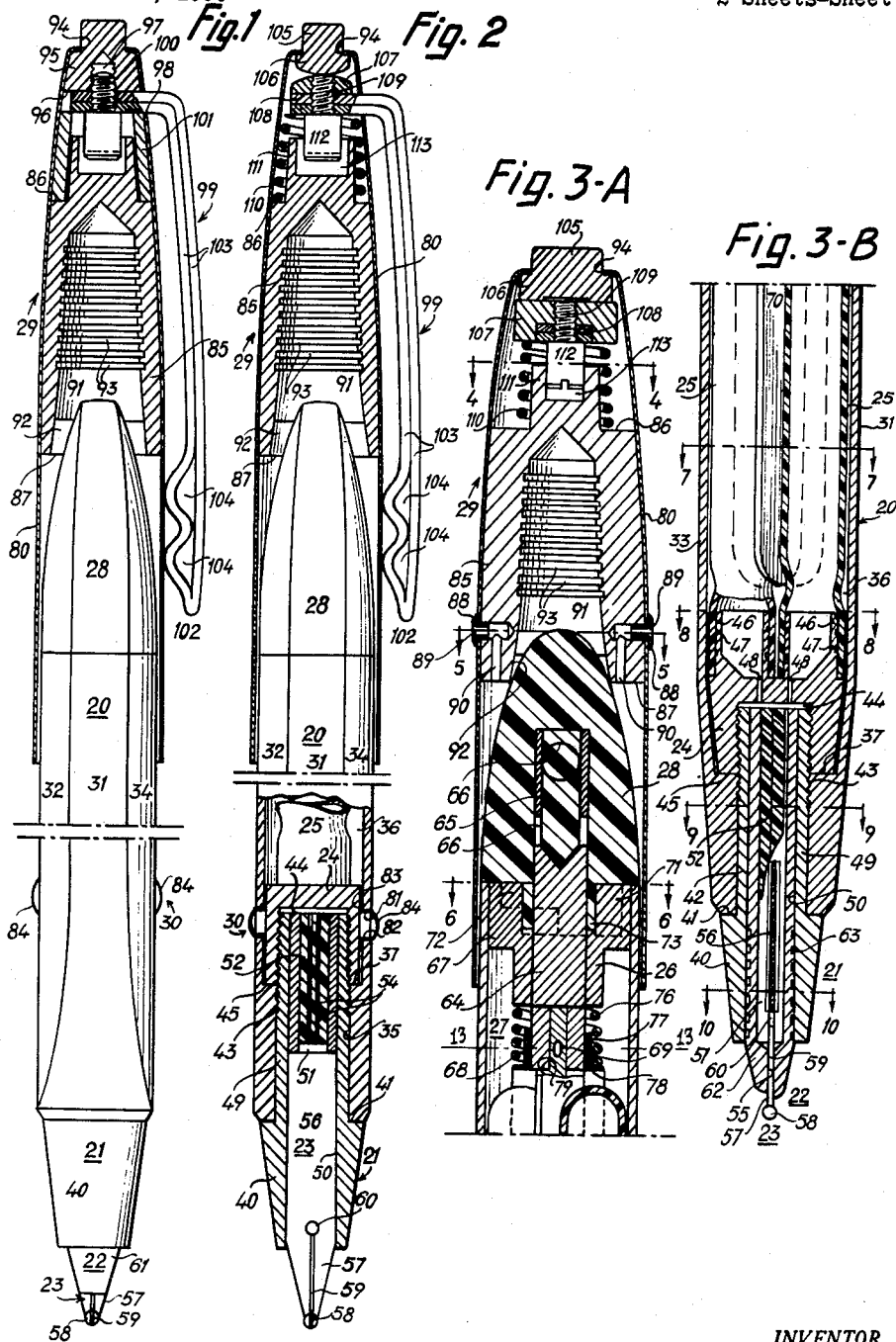
M. P. RIBAS

2,937,618

PLURAL SAC FOUNTAIN PEN

Filed June 8, 1956

2 Sheets-Sheet 1



INVENTOR.

M. Portús Ribas

BY

Glascoat Downing Subold

ATTYS.

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M. P. RIBAS

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2 Sheets-Sheet 2

Fig. 4

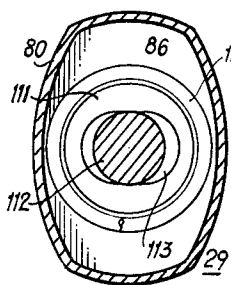


Fig. 5

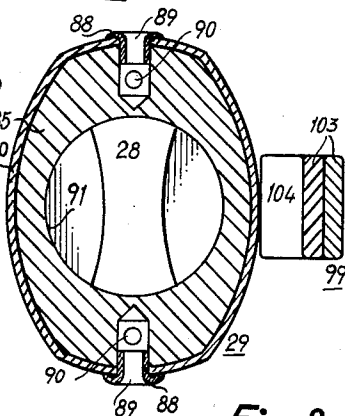


Fig. 6

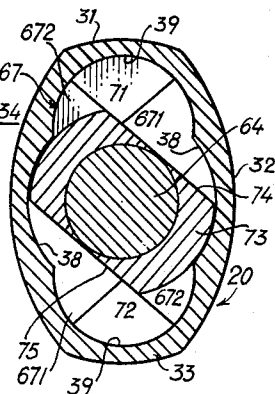


Fig. 7

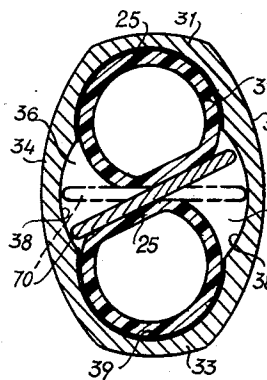


Fig. 8

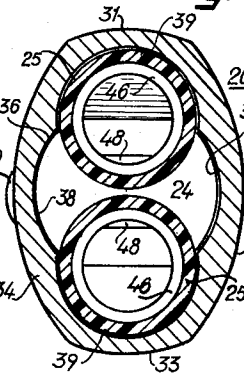


Fig. 9

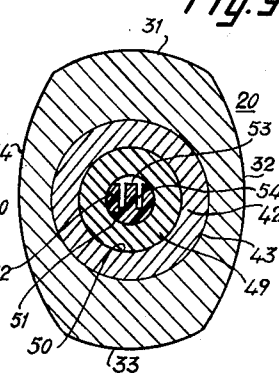


Fig. 10

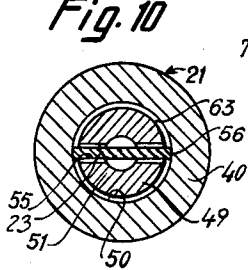


Fig. 11

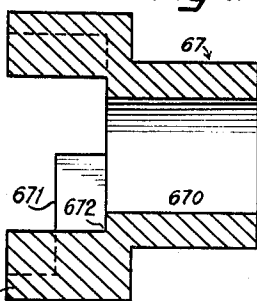


Fig. 12

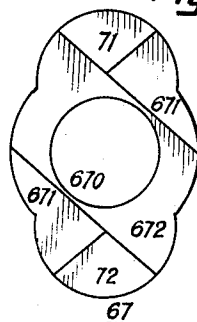
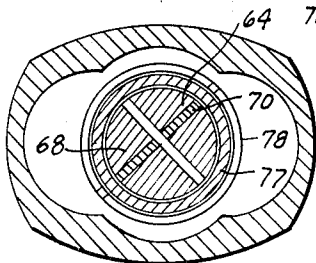


Fig. 13



INVENTOR.

M. Portús Ribas

BY

Glenn Downing Tebbels
ATTYS.

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2,937,618

PLURAL SAC FOUNTAIN PEN

Manuel Portús Ribas, 4 de Febrero St., Torello,
Province of Barcelona, Spain

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Claims priority, application Spain May 3, 1956

4 Claims. (Cl. 120—42.16)

The present invention relates to improvements in the manufacture of writing instruments and more particularly to those instruments of the kind comprising a collapsible container wherein the ink is contained, connected with a collapsing mechanism acting upon such container to effect the refill thereof and with a nib or the like device to transfer the ink to the paper during writing.

The main object of the invention is to provide a new writing instrument of the kind referred which is capable of containing a greater amount of the ink than is usually permissible in the common fountain pens, although occupying less space in the pocket or purse where it is kept, and adapted to retain some ink reserve which permits one to continue using the instrument some time after the normal ink reserve is exhausted.

A further object of the invention is to provide a new refilling mechanism for use in writing instruments of the kind referred to by means of which a fraction of a turn applied on a driving organ is enough to effect the complete refill of the ink container. In other words the refilling operation with this instrument can be performed in an essentially small fraction of the time required with the instruments known in the art.

A further object of the present invention is to provide a novel nib for writing instruments of the specified kind which makes it possible to write with the two sides thereof, preferably with different stiffness in both sides, for example a stiffness for the normal writing and a second stiffness for signing, although it may be manufactured at a cost by far reduced as compared with the common nibs.

Therefore, according to the invention, the writing instrument which will be described comprises a barrel provided with a bushing in its writing end carrying mounted therein a conductor or supporting and feeding element for a nib adapted for contact engagement with a writing surface and to distribute some amount of ink thereon, the said barrel enclosing two or more sacks or collapsible ink containers with their inner space connected in common with the said conductor, and means to collapse the said sacks so that a variation of the inner volume thereof is produced.

Other and further objects of the invention will be apparent from the following detailed discussion of some preferred embodiments of the invention taken together with the accompanying drawings in which

Fig. 1 is a plan view of the instrument, open or in writing position, with the cap shown in diametral section;

Fig. 2 is a similar view to that of Fig. 1 but with the writing end of the pen partially cut away to show its parts and with a further embodiment of cap;

Fig. 3-A is an enlarged vertical sectional view of the upper end portion of the instrument;

Fig. 3-B is an enlarged vertical sectional view of the lower end portion of the instrument;

Fig. 4 is an enlarged transverse sectional view in the plane of line 4—4 on Fig. 3-A;

Fig. 5 is an enlarged transverse sectional view in the plane of line 5—5 on Fig. 3-A;

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Fig. 6 is an enlarged transverse sectional view in the plane of line 6—6 on Fig. 3-A;

Fig. 7 is an enlarged transverse sectional view in the plane of line 7—7 on Fig. 3-B;

Fig. 8 is an enlarged transverse sectional view in the plane of line 8—8 on Fig. 3-B;

Fig. 9 is an enlarged transverse sectional view in the plane of line 9—9 on Fig. 3-B;

Fig. 10 is an enlarged transverse sectional view in the plane of line 10—10 on Fig. 3-B;

Fig. 11 is a diametral section of the bearing member of the filling mechanism;

Fig. 12 is an end view as observed from the left of Fig. 11; and

Fig. 13 is an enlarged transverse sectional view in the plane of line 13—13 on Fig. 3-A.

As it will be appreciated in the figures, the pen is formed of a barrel 20 of elongated shape and slightly tapered towards the writing end of the instrument where it has connected the bushing 21 which supports the conductor 22 provided with the nib 23. Within the barrel, the conductor is connected to the support 24 which receives the two sacks or collapsible containers 25 for the ink. The rear, open end of the barrel receives a bearing 26 wherein the refilling mechanism 27 can revolve, the latter being operable from the outside by means of the protruding knob 28. The figures show a cap 29 fitted upon the rear end of the instrument which can be withdrawn from this location and applied upon the writing end of the instrument for the purpose of protecting the nib. In this new position the cap is frictionally fast by means of the catches 30.

The cross sectional shapes of the barrel 20 can be appreciated from Figs. 6 to 9, inclusive, and it is chosen for two considerations of paramount importance in the art.

According to a first consideration the outer surface of the barrel is formed of four curvilinear surfaces 31, 32, 33 and 34. The surfaces 31 and 33 correspond to a same cylinder, while the surfaces 32 and 34 correspond to different cylinders having the respective axis somewhat offset beyond the opposite surface. According to this construction it is possible to manufacture the barrel and the refilling knob 28 by injecting, casting or molding usual materials, and thereafter the described cylindrical surfaces can be ground to give to the pen the appearance of a fountain pen thoroughly machined, yet at the cost of a cheap pen made of cast, injected or molded components. Furthermore the color choice is wider when it is the case of the materials adapted to be injected or cast as distinct from the case of the rods from which the priced pens are machined.

Further advantages of this outer construction are the fact that owing to its flattened shape the pen does not tend to roll when it is placed over a surface, and that it occupies less space in the pocket or purse where it is held. Also, this oval construction reduces the fatigue of the writer since it conforms better between the fingers of the hand and allows a more even distribution of the pressures thereon.

The second consideration resides in the fact that it permits one to arrange within the barrel two or more sacks, as will be described hereafter. The cross-sections of the sacks and the outer shell thereof being different, the heat transfer from the hand through this shell and up to the ink containers takes place in very unfavourable conditions and thereby the final heating of the air contained within the said sacks over the ink provision is slower, thereby avoiding the possibility of an ink draft occurring towards the nib due to a rapid rise of the inner temperature of the instrument. From the above description, it will be apparent that the provision of two ink

containing sacks provides a greater ink supply whereby the instrument is capable of use for a relatively long period of time between refilling operations.

The barrel 20 tapers towards the front end thereof and the end of the bushing 21 projecting therefrom is of generally conical form. At this end there is the axial bore 35 where the bushing 21 is mounted. The inner end of the bore 35 leads to the hollow 36 of the barrel formed with an accurately machined bottom wall 37 from which the cylindrical walls 38 of the barrel extend towards the rear end of the latter in coaxial arrangement with the bore and with the other walls 39, likewise cylindrical and eccentric as regards the former ones and with their axis contained in a longitudinal, median plane of the instrument.

Hitherto, difficulties have been always experienced in connection with the assembling of the pen, and it is usually necessary to use gauges and cement to bind its several components so that they remain thereafter connected in a sufficiently lasting condition. Contrarily, owing to the special construction which will be described hereafter, these aids may be entirely dispensed with. To this end the bushing 21 has the tapered portion 40 whose largest end is adjacent to the end of the barrel and abuts it in a confronting plane 41 from which the cylindrical portion 42 extends, the latter having a diameter corresponding to that of the bore 35 and a length which is sufficient to protrude slightly within the space 36 of the barrel. This protruding portion is provided with a fine thread 43 which screws into a correspondingly threaded bore 44 formed in the support 24, the outer section of which corresponds to the inner section of the barrel so that the support cannot revolve within the barrel. This support is formed, moreover, with a terminal plane 45 which engages with the bottom 37. Thus, it is sufficient, to mount the ensemble in the barrel, to screw home the bushing 21 once set in position on the support 24.

From the rear face of the support 24 extend two parallel nipples 46 receiving the two sacks 25 which, thus are located in parallel arrangement within the space 36 and adjacent to the eccentric surfaces 39. An impervious seal is provided between the mouths of the sacks 25 and the nipples 46 by any known means, for example by means of peripheral grooves 47. The deflection of the said sacks produces variations of volume in the inner spaces thereof, which may be used to effect the refill and discharge of the device. In the appropriate place of the description reference will be had to a device for deflecting the said sacks.

The capillary conduits 48 have been provided at the bottom of the nipples 46 and communicate with the bottom of the bore 44 with the purpose of feeding the conductor with ink. These conduits 48 are arranged very close to the longitudinal axis of the device as will be seen in Figures 3 and 8, so that in the inclined position of the pen during the writing both sacks are exhausted simultaneously, but at the moment of the ink reserve being terminated, there still remains some amount of ink under the lower conduit which may be used until attaining an opportunity for refilling the pen.

As will be seen in Figures 2, 3, 9 and 10, the conductor 22 consists of a cylindrical body 49 having an outer diameter corresponding to that of the bore 50 in the bushing, so that it may be pressure fitted in the latter. The conductor has an axial hole 51 which extends from its rear end to a location close to its front end, but it does not communicate directly with the outside. A rear section in this hole is partially obturated by the conduit 52 formed of a cylindrical member fastened by any suitable means, for example pressure fitted, within the hole 51 and provided with a flat 53 in its upper portion and two capillary passageways 54 extending vertically from the latter, thereby constituting suitable leaders for the feeding of the nib and for the recovering of air for the sacks.

A substantial portion of the body 49 is formed with a horizontal, diametral cut 55 placed in communication with the said axial hole 51. The nib 23 is housed in this cut so that a substantial portion thereof is included within the said hole. This, during the performance of the instrument, is filled with the ink which comes thereto through the described capillary spaces from the sacks and, since it forms wide cavities at both sides of the nib, obviates all of the electrolysis phenomena normally encountered when using very conductive links in view of their high pH. Furthermore, as the contact surface of the conduit plastic with the metal of the nib is substantially reduced to the edges of the latter, the electrostatic action of the plastic is also reduced, thereby considerably restricting the typical action of braking or exciting the ink flow when the outer agents tend to change the sense of the said electrostatic charges.

The nib 23 bisects the hole 51 as is indicated in Fig. 10 and the portion of the hole at one side of the nib functions as a normal conductor for the ink flow to the writing end of the nib while the portion of the hole at the opposite side of the nib provides an air passage for the recovering of the sacks upon diminishing their ink contents without the necessity of adding special devices to make possible this performance in both writing positions, as is normally encountered in the devices devised for this use. Furthermore, it has the effect of an ink dam when permitting the accumulation of any excess of ink that could take place because of a rapid overheating or shock.

The nib 23 is formed of a metallic strip, slightly wedged rearwardly to effect its fastening within the cut 55, but in its essentials it is flat and shows a rectangular, rear section 56 which engages the conductor and a front triangular portion 57, provided at its vertex with the points 58 and with a split 59 extending up to the opening 60.

This nib is located within the median plane of the instrument so that the inclination over the writing surface is not affected by the face thereof which is being used. To widen the use feasibilities of the nib in both its writing positions, the conductor ends 61, 62 placed at both faces of the nib may be cut to different lengths thereby providing different degrees of deflection to the nib according to the writing position selected. This permits one to have a normal writing and a harder writing, corresponding to the placing of the longer conductor on the upper part, which may be used, for example, for signing.

The edges of the nib come to the wall of the bushing so that they intersect the peripheral grooves 63, of capillary measurements, formed in the lower third of the conductor. These grooves make a complementary dam effect, but as the ink layer thus formed is split in half, the possibility of ejection of some amount of ink is reduced, or at least the amount of ink ejected is less.

The nib being flat, it becomes possible for the manufacturer to determine a priori and accurately the width of the stroke irrespective of the pressure that the user will make during the writing. On the other hand, once the point is welded and the nib opened from point 58 up to the opening, the separation retains a constant value in all its length and equivalent to the thickness of the tool used in this operation, since the material of the nib is deprived of internal tensions due to the tiled shape of the common nibs. On the other hand, the deflection of the nib in response to the writing pressure is performed in a vertical plane, viz. no variation of the split or the resulting stroke width will take place. This considerably widens the range of use of the pen, since it can be used to write with several carbon copies without this increasing the thickness of the stroke on the first original sheet.

From the described construction it will be recognized that the ink is excluded from contacting the outer plastics, and thereby there is no need for bearing in mind this

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critical feature in the choice of the materials which are to form the outer members of the pen. Owing to the same reason it is now possible to use either acid or alkali inks, as well as the so-called "fast drying inks."

In spite of its great capacity, the new pen can be refilled in a time far shorter than the usual, with a single fraction of a turn applied on the refilling knob 28. To this end the knob is formed of a molded or injected component whose outer shape is complementary of that of the barrel body at its rear end. Owing to the flattened shape of this barrel, the member 28 may be easily grasped to impart thereto a rotation and to return it to its initial position in the refilling operation.

This member 28 is molded or injected on the end of a rod 64 formed with an axial bore 65 at its rear end and radial holes 66 which communicate with the latter so that the injection or molding material comes into these spaces and, upon hardening, gives an intimate fastening of the member with the rod.

The rod 64 is guided for rotation and slides in axial direction in the hole 670 of the bearing 26 which forms a part of the member 67 pressure fitted within the open rear end of the barrel 20. This rod protrudes within the barrel and is formed with a longitudinal diametral cut 68 wherein the rear end of the tongue-shaped, metallic strip 70 is received and fastened by means of the screw 69. The tongue extends longitudinally and forwardly between the two sacks 25 as will be appreciated by the broken line showing in Fig. 7. In the position illustrated it permits the two sacks to attain their maximum loading capacity, but it is obvious that when the knob 28 is rotated anticlockwise the tongue will revolve thereby flattening the two sacks from opposite sides. In Fig. 7 there is shown an intermediate position within this movement and thus producing a reduction in its volume and corresponding ejection of the fluid contained therein through the capillary passageways of the front end of the pin. During the reverse motion the resiliency of the material of which the sacks are made make each of them reassume its original shape, thereby increasing in volume, a negative pressure being created therein which may be used to draw into the sacks a corresponding amount of ink.

It is to be observed that for the sake of maximum clarity of disclosure, the showing of the sacks 25 and the tongue 70 are shown in inverted position in Fig. 7 and wherein the dot-and-dash outline of the tongue indicates the normal rest position of the device while the solid outline indicates an intermediate position relative to the sack collapsing position.

It will be understood that a rotation of about 90° is sufficient to attain the maximum volume variation of the sacks and, therefore, the refilling of the instrument, or the cleaning thereof. In this connection it is to be kept in mind that, because of the great capacity of the two sacks together and the great speed with which the refilling and unloading can be performed, the ink is drawn and ejected with a great velocity through the capillary passageways which intercommunicate the sacks with the nib, thereby drawing therealong the eventual sediments or impurities which could be set and minimizing the chances of clogging.

The member 67 is mounted within the barrel 20 so that its rear face 671 is somewhat recessed within the hollow of the latter and has two longitudinal projections 71, 72 at the edges thereof, placed diametrically opposite on the greater diameter of the barrel cross section. These projections are of triangular shape in their cross section, with the edges thereof intumed, as will be appreciated in Fig. 6. Furthermore, the said member 67 is provided, in its face 671, with a transversely inclined groove 672 in the bottom of which the bore 670 abuts, the flanks of this groove being disposed in planes which are longitudinal to the instrument and in continuation of the left and right sides of the projections 71 and 72, res-

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spectively. The member 28 has an axial extension 73 formed of a cylindrical body the diameter of which is greater than the spacing between the edges of the projections 71, 72 and provided with two longitudinal, parallel faces 74, 75 the spacing of which is equivalent to the width of the groove 672. The extension 73, in the normal using position illustrated in the figures, engages the groove 672 under the action of the compression spring 76, so that this extension is prevented from rotating, the refilling mechanism thus remaining in a limited, angular position of the device. But it is obvious that the ensemble can be rotated anticlockwise (Fig. 6) until the face 74 of the extension 73 comes in contact engagement with the right face of the projection 71 and the face 75 of this extension comes in contact with the left face of the projection 72, after having displaced in axial direction the described refilling mechanism by pulling the knob 28 until the end of the bushing 77 which surrounds the end of the rod 64 contacts the end of the bearing 26. Between these two limit positions are performed the operations of filling and refilling of the device. The spring 76 rests against the inner end of the bearing 26 and reacts against an outwardly extending shoulder 78 formed at the end farthest from the said bearing, of the bushing 77. This shoulder rests against the lateral edges, recessed at 79, of the strip 70 so that they tend to maintain the movable ensemble applied against the rear end of the barrel. The friction developed by this pressure contact is sufficient to maintain in position the refilling knob 28.

The instrument is provided with a cap 29 for protecting the nib when it is not in use. As will be seen in Figures 1 to 3, inclusive, the cap comprises a metallic shell 80 which can be fitted with a slight friction over the rear end of the instrument when it is in use. For the protection of the nib when the instrument is not in use, the shell can be slid gently over the front end of the barrel 20.

For fastening the cap in this position, I have provided the catches 30 consisting of pressed members which show a shallow cylindrical portion 81 which is plugged in radial holes 82 formed in the major faces of the barrel and near the front end of the latter. The inner end of the members 81, corresponding to the mouth of the pressing is flared so that it forms an outwardly extending flange 83 preventing the catch from escaping through the hole 82 and serve the further purpose of resting against the lateral surface of the support 24. The length of the cylindrical portion is equivalent to the thickness of the barrel wall, so that the outer end thereof just protrudes from the lateral surface of the barrel. These ends are formed in the shape of outwardly convex bottoms 84, for the pressed member, so that they admit some elastic deflection upon being depressed by the metallic shell of the cap when the latter is inserted in position.

An inner member 85 fits within the shell 80 and is constituted by a member of suitable plastic showing a lateral surface corresponding to the inner surface of the shell, and two faced ends 86, 87 respectively. Although the inner member may be fastened in position within the cap shell by mere pressure fitting it is preferable to use the fastening devices illustrated, consisting of two small rivets 89 which cross the shell 80 through holes provided for this purpose at opposite sides thereof and are secured to the body of the member 85. The stem of each of said rivets is hollow so that it provides an inner passage 89 which extends transversely to some extent within the member 85. Thereafter the longitudinal conduits 90 extend from these passages and up to the face 87 abutting in the lower portion of the cap to form suitable vents.

The inner member 85 has a tapered hole 91 which extends from the end thereof closest to the mouth of the cap and to a location near the opposite end thereof. The tapering of the hole 91 corresponds to that of the bushing 21 and its depth is that suitable to protect the nib and element therewith associated when the cap is completely

inserted over the writing end of the instrument. The mouth of this tapered hole has a flaring 92 with an angle slightly greater, which allows the setting of the inner member with the rear end of the instrument when the ensemble is in the writing disposition illustrated in the figures, and with the end of the bushing 21 in the closed position.

A plurality of circular grooves 93 have been formed in the tapered hole 91. The purpose of these grooves is to increase the contact surfaces between the plastic and the air retained within the inner member when the pen is in closed position, thereby enhancing the thermal exchange between the inside and the outside and reducing the chances for condensations taking place within the inner member when the cap is cooler than the remainder of the pen. On the other hand, if these grooves are given a capillary measurement as regards the inks used, they may perform the effect of a dam to hold some amounts of ink that could be inadvertently ejected from the nib.

The rear end 86 of the inner member is somewhat spaced from the end of the shell 80, thus forming a space wherein the clip fastening device is housed. The terminal end of this cover has an axial hole 94 through which a metallic or plastic ferrule 95 protrudes, the inner portion of the latter fitting with the inner surface of the cap and is provided with a faced base 96 having perforated therein an axial bore 97. Flush with the base 96, the shell 80 is provided with a rectangular opening 98 disposed with one major side thereof in registry with the edge of the said base 96. The end of the clip 99 runs through this opening and is fastened to the ferrule by means of the screw 100 engageable with the hole 97 which, to this end, is suitably threaded. The fastening of the ensemble is completed by the presence of the member or spacing bushing 101 which fits within the shell 80 and clamped between the end of the clip and the upper base 86 of the inner.

As will be seen in Figures 1, 2 and 5 the clip is constituted by a flat laminated wire, bent at 180° at the free end 102 of the clip and with its ends superimposed at the fastening end thereof. The two wire arms thus formed are adjacent to one another for the greater part of the clip length, so that upon elastic deflection of their intermediate portion 103 produced to insert or to withdraw the pen from the edge of a pocket or the like, these parts are bent independently of one another with different ratio, thereby permitting greater efficiency and safety in the performance of the clip. Also the material stress is reduced, so that there is no loss in tension as normally encountered with the common laminar clips.

As it has been found, the common clips in order to be efficient in their function of safely retaining the pen or like instrument in position on the edge of a pocket or pocket-book, have to be provided of a considerable strength, with the result that they normally produce a noticeable wear of the clothes at the places where the pen is commonly carried. This wear is still more noticeable with fine clothes. This drawback is obviated with the clip according to the invention by the fact that it is provided with two semicircularly bent portions 104 in their inner arms, which distribute in a better manner the fastening pressure without reducing the effectiveness of the clip.

In the priced models the performance of the clip may be still improved so that, besides its deflecting action above described, they have a separating motion as regards the cap, manually controlled by the user, so that in this case, as the own pressure of the clip does not operate during the sliding thereof over the cloth, this pressure can be substantially increased, also to provide an additional safety against theft.

This embodiment is that described with reference to Figures 2 to 4, inclusive. In this instance, the ferrule 95 is substituted by a push-button 105 protruding in sliding disposition through the terminal opening 94 of the shell

80 and formed, within the shell, with a widened flange 106. Against this flange rests an intermediate member 107 having a transversely extending groove 108 aligned with the opening 98 through which the clip comes to the outside. The inner end of the clip is fastened in this groove by means of the screw 109 which crosses the latter through a hole provided for this purpose and is fastened in an axial threaded hole formed in the member 107. The ensemble is maintained in the position illustrated by means of the helical spring 110 which reacts between the inner end of the clip and the upper face 86 of the inner member 85, and is guided by an axial tenon 111 extending upwardly from the said face. For the purpose of restricting the oscillation of the clip to the axial plane of the instrument, the screw 109 is provided with a comparatively long head 112 which fits in a groove 113 transversely extending in the upper face of the said tenon.

When the end of the push-button 105 is axially depressed, it recoils in a corresponding manner within the cap shell while overcoming the resistance of the spring 110 and the clip 99 oscillating in counterclockwise direction, its end will leave the cap to permit the insertion therebetween of the pocket edge in which it is desired to fasten the instrument. Upon releasing the described push-button, the force of the spring 110 applies the salient portions thereof 104 strongly against the side of the cap thereby clamping the cloth therebetween. Of course, the outer surface of the cap may be provided at suitable locations with surface constructions enhancing the adherence of the fingers when operating the push-button.

At all events the clip proper is constituted by a flat strip, cylindrical wire thereby avoiding the sharp edges normally occurring when cutting or stamping the plate clips. Furthermore, since the clip is made of laminated wire, it may be manufactured starting from any bimetal, without leaving exposed surfaces at the outside of the cap and without the need for applying further protective coatings which are destroyed with use and spoil the appearance of the instrument.

It is obvious, of course, that some variations, such as size and shape, as well as suitable materials can be used in the present invention without departing from the scope thereof as defined in the appended claims.

I claim:

1. A writing instrument, comprising an elongated barrel provided with a bushing at the writing end thereof, a writing nib supported within said bushing, a pair of elongated collapsible ink containers mounted within said barrel in parallel side-by-side relation and at opposite sides of the axis of the barrel, cooperating means within said barrel and said bushing for conducting ink from said container to said writing nib, means disposed between said sacks and being supported for rotation about said axis for collapsing said container with resulting variations of the volume thereof, a support disposed within said barrel adjacent the writing end thereof, said bushing having its inner end threaded into said support, the bushing having a portion bearing on the writing end of said barrel, said support being provided with a pair of nipples with which said ink containers are in communication, and said support being provided with capillary passages communicating with said bushing.

2. A writing instrument according to claim 1, wherein said container collapsing means comprises a strip member, and means for rotating said strip about said axis for effecting the collapsing of said container.

3. A writing instrument according to claim 2, together with a rotation blocking means in the position of maximum capacity of the container.

4. A writing instrument according to claim 2, wherein said strip member is connected to a rod, a bearing fixed with respect to said barrel, a housing in which a portion of said rod can be received in the position of maximum capacity of the container, and resilient means holding

said rod portion engaged with the housing while allowing same to free the said portion with respect to the housing during the operation of the refilling device.

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