

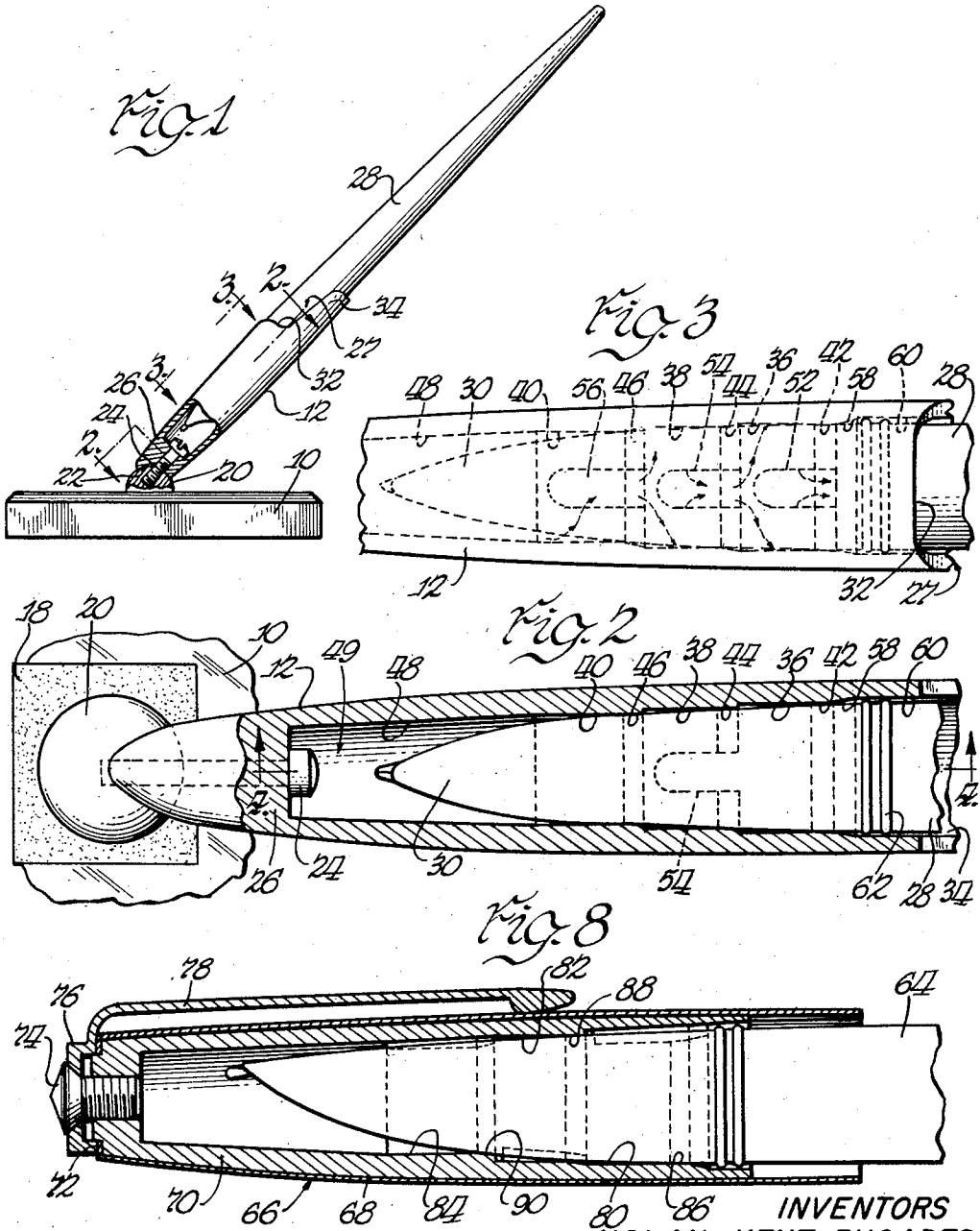
Dec. 8, 1959

N. K. RHOADES ET AL
RECEPTACLE FOR RECEIVING AND ENCLOSING THE
WRITING END OF A FOUNTAIN PEN

2,916,013

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2 Sheets-Sheet 1



INVENTORS
 NOLAN KENT RHOADES
 MERCHANTS & SAVINGS BANK
 ADMINISTRATOR OF THE
 ESTATE OF MARLIN S. BAKER
 BY *Fidler, Cronin & Beardsley*
 ATTORNEYS

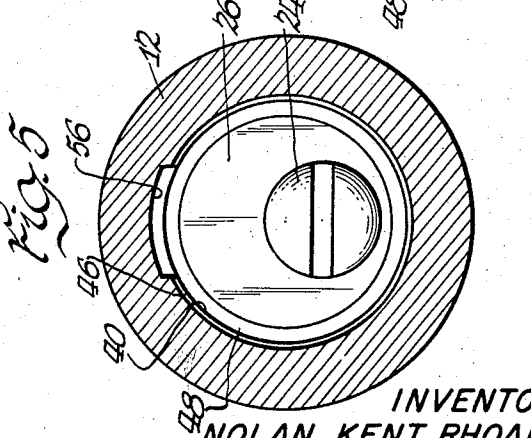
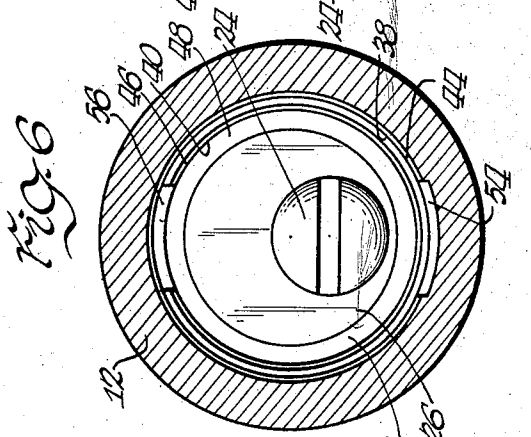
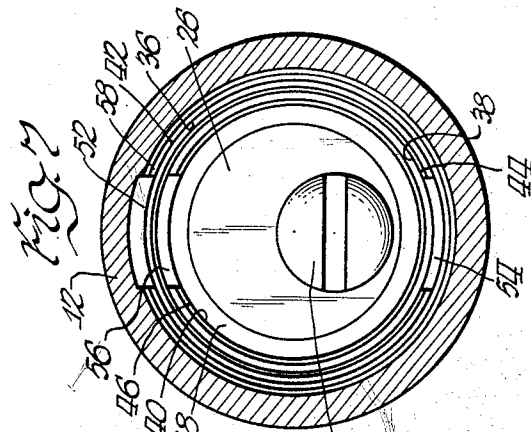
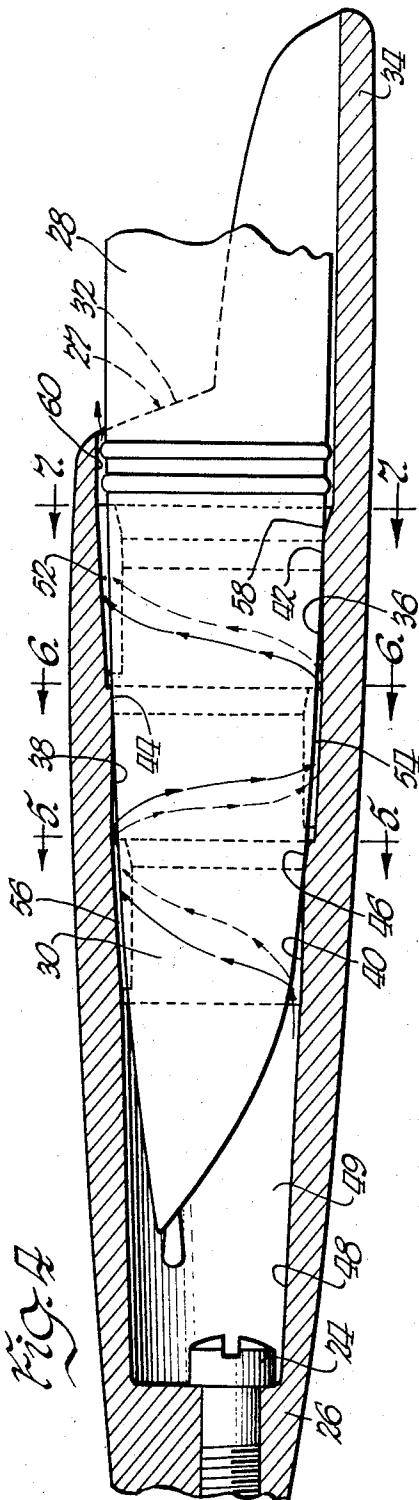
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INVENTORS
NOLAN KENT RHOADES
MERCHANTS & SAVINGS BANK
ADMINISTRATOR OF THE
ESTATE OF MARLIN S. BAKER
BY *Fidler, Cross & Beardsley*
ATTORNEYS

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RECEPTACLE FOR RECEIVING AND ENCLOSING THE WRITING END OF A FOUNTAIN PEN

Nolan Kent Rhoades, Milton, and Marlin S. Baker, deceased, late of Janesville, Wis., by Merchants & Savings Bank, administrator, Janesville, Wis., assignors to The Parker Pen Company, Janesville, Wis., a corporation of Wisconsin

Application July 27, 1953, Serial No. 370,505

5 Claims. (Cl. 120—42.01)

This invention relates to fountain pens and has to do more particularly with a receptacle for receiving and enclosing the writing end of a fountain pen, such as a receptacle for a desk pen as in a base of a pen desk set, or a cap for enclosing the writing end of a pocket pen.

The invention has to do more particularly with means for venting the interior of the receptacle and at the same time minimizing evaporation of the ink in the pen during periods of non-use thereof.

It is desirable that evaporation of the ink from a pen be held at a minimum during the relatively long periods of non-use. One effective manner in which such evaporation can be minimized is to provide a receptacle which fits the pen snugly to substantially seal the interior of the receptacle from the exterior, when it is fitted on the pen. The relatively small space in the receptacle rapidly becomes saturated with evaporated ink from the pen, and halts further evaporation. However, a receptacle which thus fits the pen closely, tends to produce a "pumping" action on the ink in the pen when the pen is inserted in and removed from the receptacle, because the close fit on the pen produces compression and rarefaction respectively of the air in the receptacle, resulting in the pumping action mentioned and consequent withdrawal of ink from the pen and flooding at or around the writing end. Accordingly, it has been found desirable to provide means for venting the receptacle so as to maintain the air in the interior at atmospheric pressure.

An object of the present invention is to provide a fountain pen receptacle of novel construction whereby it can be dimensioned to fit a pen in such a way as to check evaporation of ink from the pen, but having such construction that in the use thereof the pumping action referred to is eliminated.

A more specific object is to provide a fountain pen receptacle of the foregoing character having in its inner surface a formation forming in effect a groove which, with the surface of the pen when the pen is positioned in the receptacle, forms a passage effective for substantially equalizing the air pressure in the receptacle and the exterior but which is so shaped as to minimize the evaporation of ink from the writing end of the pen.

Another object is to provide a receptacle of the foregoing character in which the passage is formed with a plurality of abrupt changes in direction, whereby "breathing" resulting from changes in atmospheric pressures and/or temperatures, and consequent evaporation of ink from the writing end of the pen is minimized.

Another object is to provide a fountain pen receptacle of the foregoing character, in which the passage formed is of such character as to provide maximum friction resistance to movement of moisture out of the receptacle.

A still further object is to provide a receptacle for a fountain pen, of the foregoing character, capable of being manufactured by simple and relatively inexpensive operations.

A further object is to provide a fountain pen receptacle of the foregoing character, capable of formation by a

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molding operation, and having such interior shape as to enable removal of a die utilized in molding the article from its interior, in a straight longitudinal movement.

Other objects and advantages of the invention will be apparent upon reference to the following detail description taken in conjunction with the accompanying drawings in which—

Figure 1 is a side view of a fountain pen desk set embodying a receptacle made according to the present invention, with a portion broken away and shown in section;

Figure 2 is an enlarged fragmentary sectional view taken on line 2—2 of Fig. 1;

Figure 3 is an enlarged fragmentary elevational view of a portion of the receptacle and pen indicated by the line 3—3 of Fig. 1;

Figure 4 is an enlarged, fragmentary sectional view of a portion of the structure of Fig. 2 but taken at right angles with the respect to the latter;

Figure 5 is a slightly enlarged sectional view taken on line 5—5 of Fig. 4;

Figure 6 is a slightly enlarged sectional view taken on line 6—6 of Fig. 4;

Figure 7 is a slightly enlarged sectional view taken on line 7—7 of Fig. 4; and

Figure 8 is a view generally similar to Fig. 4 showing a cap embodying the invention and a portion of a pocket pen the writing end of which is inserted in the cap.

The receptacle or cap of the invention includes a tubular member having an inner surface dimensioned for snugly engaging the writing end of the pen, the inner surface having a circuitous groove which, with the surface of the pen, forms a circuitous passage communicating with the space in the receptacle forwardly of the writing end of the pen and opening to the exterior through the open end of the receptacle.

A pen desk set including a receptacle made according to the present invention is shown in Fig. 1 and includes a base 10 of suitable material such as a plastic of suitable shape for placement on a desk. The receptacle 12 is supported on the base 10 by any desired and suitable means such as a magnetic member 20 retained in the base in a known manner, as by a permanent magnet 18.

The receptacle 12 is preferably unitary and provided with a forward surface 22 in the shape of a portion of a sphere for engagement with the ball and is retained on the ball by suitable means such as a screw 24 inserted through an opening of the forward end wall 26 of the receptacle and threaded into a tapped recess in the ball.

The receptacle 12 takes the form of a tubular member having an open outer end 27 for reception of the writing end of the pen 28, and is otherwise imperforate, the forward end wall 26 being closed by the screw 24. Vent openings through the wall of the receptacle such as provided in many previously known types of receptacles, are eliminated, the necessary venting action taking place through the open end of the receptacle around the pen by virtue of the novel venting passage hereinafter described in detail.

The tubular receptacle 12 preferably has an outer, generally tapered surface conforming generally with the taper of the forward end portion of pen 28, which is often provided in fountain pens. As shown particularly in Figs. 2 and 4, the pen 28 has a forward writing end portion 30 tapering to a relatively small dimension at the extreme writing tip end. The inner surface of the receptacle 12 also tapers in a general way in conformity with the taper of the forward end portion 30 of the pen and more particularly having a specific character of tapered conformation as will be pointed out in detail in the description of the groove therein. The receptacle 12

may be made of any desired material suitable for the purpose such as plastic, and is preferably of a plastic of such character as to be adaptable to molding operations. The open outer end 27 includes an edge 32 preferably lying adjacent a plane perpendicular to the longitudinal axis of the receptacle, and a protruding trough or lip 34 adjacent the bottom and side portions extending outwardly beyond the edge 32, for aiding in insertion of the pen into the receptacle.

The inner surface of the receptacle or tubular element 12 is provided with what is in effect a groove which, for efficiency in functioning and convenience in manufacturing, is made up of a plurality of peculiarly shaped depressions. The groove, together with the surface of the pen, forms a vent passage which is shaped in circuitous fashion and preferably includes a plurality of abrupt changes in direction so as to impede the "breathing" action which occurs and which causes evaporation of ink from the writing end of the pen. Preferably such circuitous groove includes a plurality of stages, or sections, provided by a plurality of circumferentially extending portions, and longitudinally extending portions, staggered circumferentially successively in a longitudinal direction, and serially connecting the circumferential portions. The circumferentially extending groove portions are formed by wall sections or surfaces 36, 38 and 40 which are in the shape of channels relative to adjacent portions of the inner surface of the receptacle. Each of the channels throughout its major length is preferably cylindrical in shape, the several channels successively decreasing in diameter in a direction forwardly or inwardly of the receptacle. Adjacent the outer end of each circumferential channel is a sealing surface that is generally tapered in shape and circumferentially continuous except as hereinafter pointed out. These tapered sealing surfaces 42, 44 and 46 respectively are of successively decreasing diameters or transverse dimensions in a direction inwardly or forwardly of the receptacle, in conformity with the decreasing dimensions of the wall surfaces or channels (36, 38, 40) with which they are associated. The tapered sealing surfaces 42, 44 and 46 lie in and define a common warped surface which is shaped complementally to the tapered surface of the forward end portion 30 of the pen, for snug sealing engagement with the pen. The surface defined by the tapered sealing surfaces 42, 44 and 46 approaches the conical in shape, but preferably curves slightly in a longitudinal direction in keeping with a similar and desired shape of the pen, it being understood that a receptacle is designed for a particular shape of pen.

The wall surfaces or channels 36, 38 and 40 forwardly of the respective sealing surfaces 42, 44, 46 together with the surface of the pen, define passages due to the relative divergence in a forward or inward direction between the wall surfaces and the pen. The passages of course entirely encircle the pen. The wall surfaces or channels need not be cylindrical in shape from the standpoint of forming the passages so long as the forward or inward relative divergence mentioned exists, but they are preferably cylindrical in shape rather than of increasing dimensions forwardly, for convenience in molding the receptacle. The surface of the forwardmost channel 40 merges forwardly into a surface 48 which may be slightly tapered in forward direction in keeping with the overall tapered shape of the outer surface of the receptacle, but this surface 48 need not be of any particular shape except that it must be of greater dimensions than the adjacent portion of the pen.

The circumferential channels 36, 38, 40 are connected serially and connected to the exterior of the receptacle by channels 52, 54 and 56 extending longitudinally of the receptacle and opening through the respective sealing surfaces 42, 44 and 46. For example, the forwardmost longitudinal channel 56 is formed in the wall surface forming the circumferential channel 40 and extends from

adjacent the forward end of the latter, rearwardly or outwardly through the surface 40 and sealing surface 46, and communicates with the channel 38. Thus the circumferential channels 38 and 40 are interconnected through the longitudinal channel 56, when the pen is in the receptacle.

The next longitudinal channel 54 is similar to the channel 56, and interconnects the channels 38 and 36, but the channel 54 is staggered circumferentially with respect to the channel 56 and preferably is displaced 180° therefrom.

The third or outermost longitudinal channel 52 is similar to the first two, 56 and 54, but establishes communication between the outer circumferential channel 36 and the exterior of the receptacle. The longitudinal channel 52 is also staggered circumferentially with respect to the channel 54 and is similarly preferably displaced 180° therefrom and in such position is in longitudinal alignment with the first or forwardmost longitudinal channel 56.

The third or outermost longitudinal channel 52 opens through the sealing surface 42 to the exterior, this relationship being provided by a surface 58 longitudinally outwardly of the tapered surface 42 and of greater dimension than the adjacent surface of the pen. In the present instance the surface 58 is tapered and merges into another surface 60 of such dimension as to establish communication with the exterior around the pen. If desired, the surface 60 may be of such dimensions in one transverse direction as to engage a cap clutch ring 62 provided on the pen so as to retain the pen in the receptacle against influences toward accidental displacement, while enabling the pen to be readily withdrawn from the receptacle by the user. The surface 60 may be of such dimensions in another transverse direction as to establish a space or passage around the pen for venting the interior of the receptacle to the exterior. If desired, the rear or outermost longitudinal channel 52 may be extended rearwardly through the surface 60 for establishing the communication mentioned with the exterior.

For the purpose of simplicity in manufacture, the longitudinal channels 52, 54, 56 are inclined longitudinally in the direction of the taper of the writing end portion of the pen. Such shape or inclination of the longitudinal channel portions facilitates withdrawal of the die or mandrel utilized in molding the receptacle.

The trough or lip 34, extending longitudinally outwardly beyond the edge 32 of the open end of the receptacle, furnishes a means for facilitating insertion of the pen into the socket. For example, the trough or lip provides what is in effect an opening larger than the opening of the receptacle taken in a plane perpendicular to its longitudinal axis, and in inserting the pen into the receptacle its forward end may be laid on the trough and moved forwardly in a movement in which the trough guides the pen into the receptacle. If desired, the inner surface of the trough 34 may be shaped so that the body of the pen, when the pen is inserted in the receptacle, will engage or rest on the trough and thereby cooperate with the engagement between the pen and the tapered surfaces 42, 44, 46, aiding in retaining the pen in proper position in the receptacle.

The circumferential channels 40, 38 and 36 together with the longitudinal channels 56, 54 and 52 form, when the pen is in the receptacle, a continuous passage leading from the space 49 in the receptacle forwardly of the pen to the exterior. The passage is circuitous in shape and includes a plurality of abrupt changes in direction. Preferably, and as illustrated, the abrupt changes in direction are of the order of 90° and there are four such changes in direction. These changes in direction impede the flow of air into or out of the receptacle when the pen is in place therein. Beginning with the forwardmost circumferential channel 40, any air, in order to flow out of the receptacle, must pass through the longitudinal chan-

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nel 56 into the circumferential channel 38, then pass around the pen to the opposite side to the longitudinal channel 54, and in doing so must make an abrupt or substantially 90° change in direction after flowing from the longitudinal channel 56 into the circumferential channel 38. A similar abrupt change in direction of flow again takes place from the circumferential channel 38 into the longitudinal channel 54. Such changes in direction retard the flow of air into or out of the receptacle. Since the space in the receptacle is relatively small it soon becomes saturated and thereupon evaporation ceases.

Another feature of importance in the retarding action of evaporation of ink is the fact that moisture laden air is lighter than dry air and seeks a higher level than the dry air. When the receptacle with the pen in position therein is in an inclined position such as shown in Fig. 1, as is customary when the pen is not in use, the channels 56, 54 and 52 are positioned relatively on the upper and lower sides of the receptacle. This relationship is pointed up in Fig. 4, showing the receptacle and pen in horizontal position. In such position the channel 56 is on the upper side while the channel 54 is on the lower side. A similar condition exists when the receptacle is positioned as shown in Fig. 1. Air fills the space 49 in the receptacle and the upper portion of the circumferential channel 40, including the longitudinal channel 56 therein. When and if any evaporation of ink from the pen takes place, the air becomes humid. Such humid air may flow through the longitudinal channel 56 into the next circumferential channel 38 but because the moisture-laden air is lighter than the dry air there is little or no tendency for the moist air in the intermediate channel 38 to flow circumferentially down into the lower portion of that channel, where it must flow if it is to flow through the next longitudinal channel 54. Therefore the humid air is more or less trapped in the space between the pen and the receptacle. The only evaporation permitted in the receptacle is that amount that will saturate the air space 49 and the minor spaces in the circumferential channel 40 and the upper portion of the circumferential channel 38. Thus the circuitous shape of the continuous passage provides portions thereof on opposite sides transversely of the receptacle so that when the receptacle with the pen therein is positioned in a normal inclined position when not in use, such as shown in Fig. 1, evaporation of the ink is checked and substantially eliminated while provision is made for enabling venting of the receptacle so as to eliminate a pumping action when the pen is inserted in and removed from the socket.

A still further feature of importance in retarding or checking evaporation is the relatively great length of the passage formed between the receptacle and pen. Other factors being equal, the greater the length of the passage, the greater will be the frictional resistance to movement of humid air therethrough. In the present instance, the passage is of substantially greater linear dimension than the dimension longitudinally between the innermost and outermost areas of sealing engagement between the receptacle and pen.

In the withdrawing movement of the pen from the receptacle the space in the receptacle is increased with consequent rarefaction of the air therein. Such rarefaction causes a suction action on the ink in the pen due to the increase in pressure of the air in the pen relative to the rarefied air in the receptacle. However, because of the continuous passage leading to the exterior, any pressure change in the air in the receptacle is rapidly equalized and the pumping action on the ink in the pen is avoided.

A pumping action also tends to develop in the movement of inserting the pen into the receptacle. Insertion of the pen tends to increase the pressure of the air in the receptacle and force the ink in the pen inwardly from the writing end portion thereof. However the venting action provided by the continuous passage rapidly equal-

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izes the pressure inside the receptacle with that of the atmosphere.

The three tapered sealing surfaces 42, 44 and 46 as mentioned above lie in a tapered, warped surface shaped complementally to the tapered surface of the surface of the writing end of the pen barrel or casing. Accordingly the three sealing surfaces, while being of minor longitudinal dimension relatively to the corresponding circumferential channels, are of sufficient longitudinal dimension to form an effective seal with the pen so that no passage of air or vapor is enabled to pass between those surfaces and the pen but must be baffled through the longitudinal channels opening through the sealing surface. Thus a tight seal is established between the receptacle and the pen, circumferentially continuous except for the minor circumferential extent of the longitudinal passages. It will be understood that the circumferential dimension of the longitudinal channels may be of any of various dimensions, but is preferably minor so as to cause the baffling action and abrupt changes in direction of the flow of vapor out of the receptacle.

The snug engagement between the sealing surfaces 42, 44 and 46 and the pen and the longitudinal spacing thereof produce an effective gripping action on the pen such as to normally retain the pen in properly aligned position in the receptacle. This gripping action eliminates wobbling or drooping of the pen in the receptacle. However as mentioned above, if desired, additional support may be provided by the trough or lip 34 by shaping it for engagement by the body of the pen.

The principles of the invention as embodied in the structure described hereinabove may be readily incorporated in a cap for a pocket pen as illustrated in Fig. 8. In the structure disclosed in Fig. 8 the pen 64 may be similar to the pen 28 in that the forward end portions of the two are similar. However, in the case of a pocket pen 64 the body is preferably shorter than in a pen designed for a desk set.

In the construction in Fig. 8 the pen is provided with a cap 66 having an outer shell-like tubular member 68 which may be of metal and an insert 70 essentially similar to the receptacle 12. The insert 70 and the outer shell 68 are secured together at their respective inner or closed ends by a suitable construction which may include an inturned flange 72 on the outer shell engaged by the end wall of the insert 70. A screw 74 is inserted through a collar portion 76 of a pocket clip 78 and threaded into a tapped hole in the insert. The outer shell and insert are thus firmly secured together while the pocket clip is also secured in place. The insert 70 is formed with channels 80, 82, 84 and 86, 88, 90 similar in all material respects to the channels 36, 38, 40, and 52, 54, 56, respectively, referred to above, for forming a continuous circuitous passage venting the interior space in the cap with the exterior when the cap is in position on the pen. The outer shell 68 is preferably longer than the insert 70 so as to extend rearwardly therebeyond and form an overall long tapered appearance in general conformity with the long taper provided on the pen body. Preferably the outer open end of the insert 70 lies in a plane perpendicular to the longitudinal axis and is not provided with a trough or lip such as 34, since such trough or lip need not be provided in a cap for a pocket pen as will be readily understood.

We claim:

1. A receptacle for receiving and enclosing the writing end of a fountain pen, comprising an effectively integral tubular member having a rearward open end and being otherwise closed, the inner surface of the tubular member having a plurality of sealing areas lying in a circumferential surface and each extending circumferentially thereof, said sealing areas limiting insertion of the pen into the receptacle to maintain a space at the forward end thereof, and said inner surface having a plurality of circumferential channels offset longitudinally from

said sealing areas respectively, said inner surface also having longitudinal channels respectively communicating between adjacent circumferential channels and opening from the rearmost circumferential channel rearwardly through the open end edge of the surface, said longitudinal channels being located successively on diametrically opposite sides of the receptacle, and the circumferential and longitudinal channels being of such number that any air in the inner end of the receptacle must make at least two changes in direction of substantially right-angle magnitude in passing out the open end of the receptacle, said circumferential and longitudinal channels being of such shape that a mandrel used to form them in molding the receptacle can be removed longitudinally from the molded receptacle.

2. A receptacle for receiving and enclosing the writing end of a fountain pen, comprising an effectively integral tubular member having a rearward open end and being otherwise closed, the inner surface of said tubular member having a plurality of longitudinally spaced, circumferentially extending sealing surfaces tapering forwardly from the open rear end of the tubular member, said sealing surfaces limiting insertion of the pen into the receptacle to maintain a space at the forward end thereof, and said inner surface having a substantially cylindrical portion extending forwardly from each sealing surface forming a circumferential channel, and said inner surface having a longitudinal channel extending through each said sealing surface interconnecting adjacent circumferential channels and leading from the rearmost circumferential channel through the open-end edge of the inner surface, said longitudinal channels being located successively on diametrically opposite sides of the receptacle, and the circumferential and longitudinal channels being of such number that any air in the inner end of the receptacle must make at least two changes in direction of substantially right-angle magnitude in passing out the open end of the receptacle, said circumferential and longitudinal channels being of such shape that a mandrel used to form them in molding the receptacle can be removed longitudinally from the molded receptacle.

3. A receptacle for receiving and enclosing the writing end of a fountain pen, comprising a tubular member having a rearward open end and being otherwise closed, the inner surface of said tubular member being generally tapered in a forward direction complementally to the normally tapered forward end portion of a pen, said inner surface having a plurality of longitudinally spaced circumferential sealing surfaces, said sealing surfaces limiting insertion of the pen into the receptacle to maintain a space at the forward end thereof, said sealing surfaces lying in and determining a tapered surface and engageable with the pen when the latter is inserted in the tubular member, said sealing surfaces being of minor dimension longitudinally, circumferential channels leading forwardly from respective sealing surfaces of substantially greater longitudinal dimension than the sealing surfaces and diverging forwardly relative to said tapered surface, and having longitudinal channels in the respective circumferential channels opening through the respective sealing surfaces and interconnecting adjacent circumferential channels and leading from the rearmost circumferential channel through the open-end edge of the said inner surface, said longitudinal channels being relatively staggered circumferentially in directions longitudinally of the tubular member and being inclined longi-

tudinally in the direction of the taper of said tapered surface.

4. A receptacle for receiving and enclosing the writing end of a fountain pen, comprising a tubular member closed at one end and open at the other end and having a groove in its inner surface opening through the edge of said open end, said inner surface having portions on opposite sides of said groove engageable with a pen inserted in the receptacle for limiting insertion of the pen into the receptacle to maintain a space between the pen and receptacle at the closed end of the receptacle and for sealing said space from the atmosphere except for the connection of said space to atmosphere through said groove, said groove having a circumferential section and first and second longitudinal sections, said sections being serially connected and said circumferential section being intermediate said first and second longitudinal sections, said first longitudinal section interconnecting said circumferential section and said space, and said second longitudinal section connecting said circumferential section with the atmosphere at the open end of said receptacle, said space being thereby connected with atmosphere through said groove, said first and second longitudinal sections being staggered circumferentially of said tubular member to be unaligned longitudinally thereof thereby providing, for any air in said space in passing from said space through said groove to atmosphere, a circuitous passage comprising two abrupt changes in direction of substantially right angle magnitude.

5. The combination of a fountain pen and a receptacle for receiving and enclosing the writing end of the pen, comprising a fountain pen having a writing end portion, and a tubular member open at one end and being otherwise closed, said tubular member having a circuitous-path, continuous groove in its inner surface opening through the open-end edge of the tubular member and leading forwardly therefrom toward the closed end, the surface of the pen and the inner surface of the tubular member having interengagement at portions throughout a range from the open end of the tubular member to a position rearwardly of the forward end of said groove, and there being a space surrounding the forward end of the pen and communicating with the groove, and the surface of the pen together with said groove defining a passage open at its ends but otherwise closed and connecting said space with the atmosphere, the groove having a circumferential section and first and second longitudinal sections, said sections being serially connected and said circumferential section being intermediate said longitudinal sections, said first longitudinal section interconnecting said circumferential section and said space, said second longitudinal section connecting said circumferential section with the atmosphere at the open end of said receptacle, said first and second longitudinal sections being staggered circumferentially of said tubular element to be unaligned longitudinally thereof thereby providing, for any air in said space in passing from said space through said groove to atmosphere, a circuitous-path groove with two abrupt change in the direction of substantially right angle magnitude.

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