Sept. 16, 1952 L. P. MARTIN 2,610,612

WRITING INSTRUMENT

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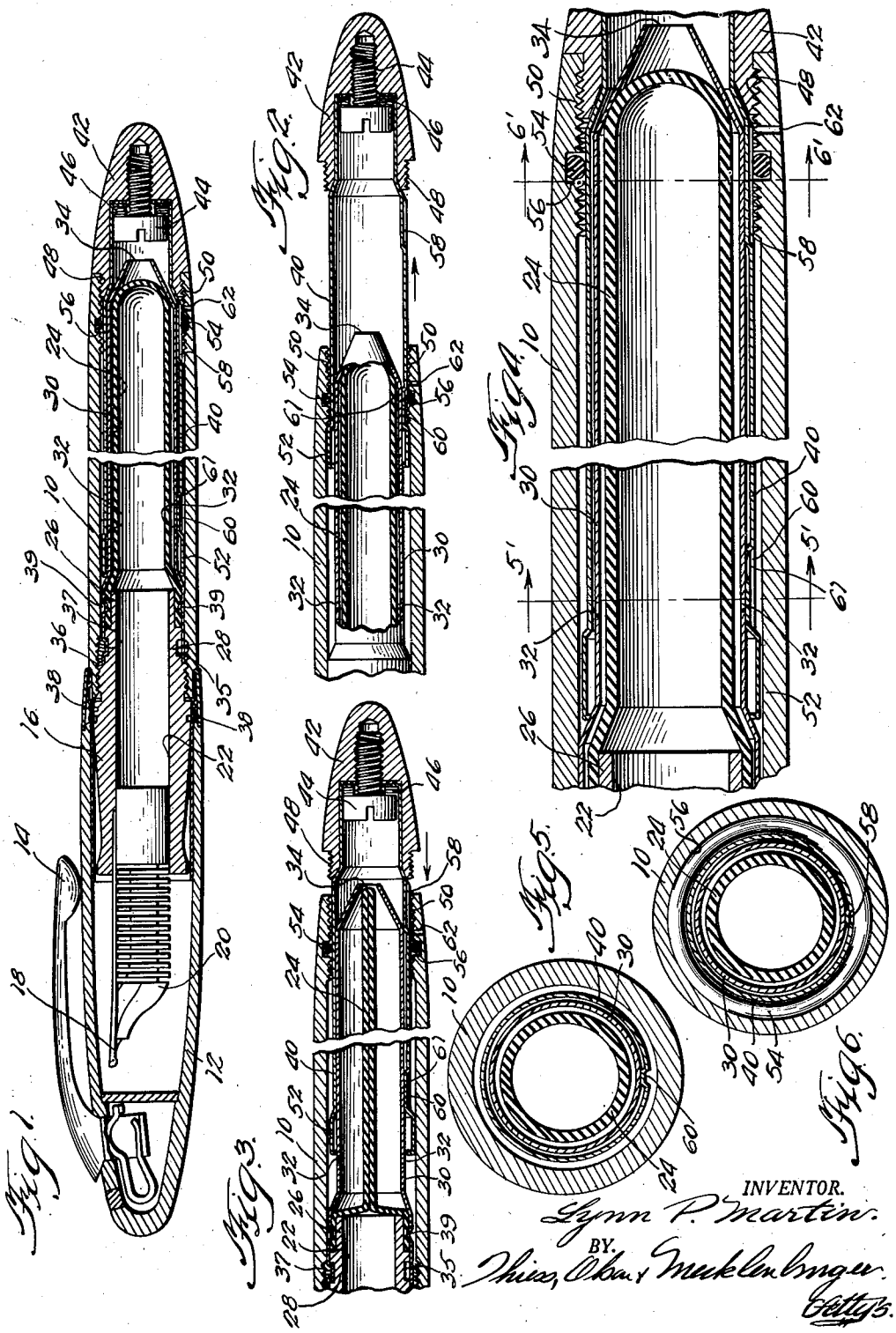

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

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WRITING INSTRUMENT

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6 Claims. (Cl. 120—47)

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This invention relates to writing instruments and more particularly to self-filling fountain pens which utilize air pressure for deflating the ink-containing sac.

In the usual fountain pen of the nib type, the ink reservoir may comprise a collapsible rubber sac which contains the ink supplied to the pen point through a suitable feed means. In order to fill pens of this type a suitable presser bar has generally been provided which is actuated by a lever mounted on the side of the instrument. The presser bar upon movement of the lever collapses the ink sac. The pen point is then inserted into a body of ink, the lever and presser bar released, and the ink is thereby drawn into the sac by the tendency of the flexible sac to resume its normally distended condition. The use of presser bars of this type for deflating collapsible ink sacs in fountain pens has not been entirely satisfactory for the reason that the operating lever is unsightly in appearance and for the reason that sometimes the lever becomes accidentally displaced so that ink is discharged accidentally from the pen when not so intended by the user. Also the presser bar activated filling means have been disadvantageous since it is not practically possible completely to collapse the ink sac in order to permit a full load of ink to be drawn up into the sac during the filling operation.

Accordingly it has been proposed in the past to utilize air pressure to deflate the sac prior to filling. One prior art device which has seen some commercial use is one in which the ink sac is contained within a chamber formed by a pair of telescoping tubular members. In this type of construction the chamber is substantially sealed from the atmosphere except for a small vent placed in the top of one of the telescoping tubes. The device was filled by extending one of the tubular members, placing the finger over the vent hole, telescoping the members whereby the sac was deflated by compressing air in the chamber, inserting the pen point into a body of ink, and then removing the finger from the vent, thereby relieving the pressure in the chamber permitting the sac to become distended by its natural resiliency and to suck up a charge of ink into the sac reservoir. Pens of this character were not entirely satisfactory from a commercial viewpoint for the reason that sometimes the operator neglected to place his finger over the vent at the proper time during the filling operation and so was unable to obtain proper filling. Also under certain conditions the finger did not

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completely close the vent and the sac was only partially collapsed, resulting in only partial filling of the reservoir.

In order to remedy these last mentioned difficulties, other prior art investigators have proposed means for automatically venting the reservoir at the proper time during the filling operation. However, these proposed means have involved a more or less complex arrangement of valves and other moving parts which rendered the commercial construction of such devices not feasible.

Accordingly, it is one object of this invention to provide a self-filling fountain pen which utilizes air pressure for deflating the sac.

A further object of this invention is the provision of an automatic self-filling fountain pen of the air pressure type wherein a minimum of moving parts and auxiliary valves are employed.

A further object of this invention is the provision of a filling device for a fountain pen which may be readily constructed and easily assembled for large scale commerical manufacture.

A still further object of this invention is the provision of a foolproof filling device which requires no skill or special care on the part of the operator to render it completely effective at all times.

A still further object of this invention is the provision of a fountain pen in which a cartridge comprising a pen and ink reservoir section is readily separable from the compression unit in order to provide for ease of disassembly and for independent replacement of parts.

Further and additional objects will appear from the following description, the accompanying drawing and the appended claims.

In accordance with one embodiment of this invention, a fountain pen has been provided which includes an ink feed means, a collapsible ink sac disposed in a chamber, the chamber including a pair of telescopic tubular members and the chamber further being unvented to the atmosphere except through a passageway between said tubular members, an air flow restricting member in the passageway, and a pair of spaced means on one of said tubular members for by-passing the air flow restricting member whereby the chamber is freely vented to the atmosphere between the tubular members when the tubular members are telescopically moved respectively to a distended or extended position and to a returned or retracted position. In this manner the collapsible ink reservoir is deflated

by compressed air when the telescopic members are pushed together but, when the return position is reached, the chamber is automatically vented by the by-passing means to relieve the air pressure so that the sac immediately reinflates by virtue of its natural tendency to assume the distended condition. The sac then readily fills with ink if the pen has been inserted in a suitable body of ink at this point in the operation.

More specifically the present invention contemplates a fountain pen having a barrel, an ink feed means supported in a forward portion of the barrel, an ink sac disposed within the barrel, a tube telescopically slidable within the barrel adapted to form a chamber about the ink sac, said tube being opened at its forward end to receive said ink sac and closed at its rearward end to prevent venting of said chamber through said rearward end, the barrel having an interior annular groove adjacent the rearward end thereof and an annular packing gland received within said annular groove providing an air flow restricting means between the tube and the barrel, means such as a longitudinally extending groove providing an area of reduced cross section on the tube adjacent the rearward end thereof of sufficient length to span the packing gland whereby the chamber is freely vented to the atmosphere between the barrel and the tube when the latter is moved to its full forward position, and means adjacent the forward end of said tube for venting said chamber when the tube is moved to its full rearward or extended position.

In accordance with a preferred modification of this invention, the tube is provided with an enlarged head portion having a substantial longitudinal dimension such that when the barrel and tube are fully extended the tube will not have a tendency substantially to wobble within the barrel. Another feature of the herein described invention is the provision of a protecting sheath for the ink sac within the barrel. This protecting sheath is provided with openings to permit free access of air to the sac to permit its ready collapse upon compression of the tubular member. The sheath is attached to the ink feed means or gripping section of the pen so that it may be readily removed for access to the collapsible sac. In addition the ink feed means is preferably mounted in a forward section of the barrel by means of a gripping section for the pen. The gripping section is threadably engaged with the barrel and is separable therefrom whereby the barrel and the compression unit may be readily separated from the sheath, the ink sac and the feed means. This construction permits of ready separation and interchangeability of the elements.

For a more complete understanding of this invention, reference is now made to the drawing, wherein

Fig. 1 is a broken longitudinal sectional view of a complete writing instrument constructed in accordance with one embodiment of this invention and showing the filling device in an inoperative or stand-by condition;

Fig. 2 is a fragmentary sectional view of the writing instrument shown in Fig. 1 illustrating the operation of the filling device with the tubular member moved to its full extended or rearward position;

Fig. 3 is similar to Fig. 2 except that it shows the tubular member being telescoped into the barrel with the resulting pressure collapse of the ink sac;

Fig. 4 is an enlarged broken detail view of the filling device in the position indicated in Fig. 1;

Fig. 5 is a cross-sectional view of the device taken along the line 5'—5' of Fig. 4; and

Fig. 6 is a cross-sectional view taken along the line 6'—6' of Fig. 4.

With particular reference to the drawings and more specifically to Fig. 1, a writing instrument is provided having a barrel portion **10** and the usual cap **12** and pocket clip **14**. Mounted forwardly of the barrel **10** and threadably engaged therewith is a gripping portion or section **16** having the usual pen point **18** and feed means **20** mounted in slip-fit relationship thereto. The gripping section **16** is provided with an axial bore **22** which communicates with a collapsible ink sac **24** adhesively or otherwise secured to a projection **26** extending rearwardly of a reduced rear portion **28** of the gripping section **16**. Suitable ink feed passageways (not shown) are provided through the bore **22** and the ink feed means **20** in the manner that is well known in the art in order to supply ink to the pen **18** from the sac **24**. The gripping section **16** together with the pen **18**, the feed means **20**, the collapsible sac **24** and an associated sac protecting sheath **30** constitute a removable cartridge which may be separated from the barrel **10** by unscrewing the gripping section from the barrel at threads **36** (Fig. 1). The sheath **30** is provided with lateral vents **32** and an end vent **34** and is slip-fitted in a removable manner over the rear end **28** of the gripping section **16** so as to provide ready access to the collapsible sac **24** in the event that such access is desired. The gripping section **16** is provided with an annular groove **35** for receiving three spaced detents **37** (one only of which is shown in Figs. 1 and 3) on the sheath **30**. The forward end of the sheath is also provided with an annular depression **39** so that, after the sac **24** has been shellacked on the projection **26** of the section **16**, the annular depression **39** further tightens the sac on the projection **26** with the detents **37** snapping into position within the groove **35**. To remove the sheath from the section, it is only necessary to rock it slightly while pulling to disengage the detents from the channel or groove **35**. If it is desired to remove the ink feed means and the pen from the gripping section **16** it is then only necessary to remove the sac **24** from the rear end of the gripping section and thereafter punch the feed means **20** and the pen **18** from the bore **22**. The various parts of the cartridge may be reassembled in the reverse order. As shown in Fig. 1, a threaded collar **38** is secured to the gripping section **16** for removable attachment of the cap **12** thereto in a manner that will be readily understood.

The compression unit for the fountain pen of this invention comprises the barrel **10** and a tube **40** having an open forward end and a closed rearward end mounted in telescopic relationship to the barrel between the inner side wall of the barrel **10** and the outer side wall of the sleeve **30**. The rearward end of the telescopically mounted tube **40**, as will be most apparent from Fig. 2, is completely closed so that no venting can occur therethrough. A suitably threaded cap member **42** is secured to the rearward end of the tube **40** by means of a screw **44**, a gasket **46** being provided to prevent possible air leakage at this point. Cap **42** is provided with threads **48** which are adapted to engage threads **50** in the rearward end of barrel **10** when the tube **40** is moved to and

secured in the returned or normal stand-by condition indicated in Figs. 1 and 4.

The tube 40 is loosely mounted between the inner side wall of the barrel 10 and the outer side wall of the sheath 30 in order to provide an annular passageway for the movement of air into and out of the chamber enclosing the sheath 30 and the sac 24 and formed by the barrel 10 and the tube 40. Thus when the tube 40 is reciprocated within the barrel 10, the chamber is considerably varied in size and the sole means provided for the entry and expulsion of air into and from the chamber is the annular passageway between the side walls of the tube 40 and the barrel 10.

The forward end of the tube 40 is provided with an enlarged head portion 52 which in cooperation with the forward limits of the threads 50 in the rear end of the barrel 10 provides a stop for limiting the rearward movement of the tube 40 with respect to the barrel 10. Also the head or enlarged portion 52 of the tube 40 has a substantial longitudinal dimension so that when the tube 40 is in the fully extended position as shown in Fig. 2 it will not have a tendency excessively to wobble with respect to the barrel 10. Thus a substantially straight line axial relationship is always maintained between the tube 40 and the barrel 10 to permit the operator to readily return the tube 40 to position without bending or binding these respective elements. It will be noted that the head or enlarged portion 52 does not fit tightly within the barrel 10 and the free passage of air between the head 52 and the barrel 10 is always permitted when the tube 40 is reciprocated in either direction.

In order to provide means for operatively sealing the chamber containing the ink sac during the compression stroke of the piston or tubular member 40, there is provided a ring packing gland 54 seated within an annular groove 56 provided adjacent the rearward end of the barrel 10. The packing gland is thus fixed with respect to the barrel 10 and the tubular member 40 is slidable therethrough as will be well understood. The function of this packing gland is to seal off the chamber during the compression stroke of the tubular member so that the air pressure built up during this operation will collapse the sac in the manner indicated in Fig. 3. However, in order to relieve the pressure within the chamber after the tubular member has been moved to its forward position thus permitting the sac to expand, there is provided in the tubular member one or more grooves 58 in the rear end thereof. These grooves preferably extend longitudinally and are of sufficient length to span the packing gland 54 when the tubular member 40 is in its return position and prior to the time that the cap 42 is screwed on to the barrel portion 10 by means of the cooperating threads 48 and 50. Thus the groove 58 provides a bypass for the packing gland 54 so that the chamber is freely vented to the atmosphere shortly before the tubular member 40 reaches its fully returned or retracted position. By venting the chamber through the groove 58 the sac is permitted to become distended by its natural resiliency and it draws a full charge of ink into itself when the pen 18 and the ink feed means 20 are immersed in a suitable liquid ink supply during the filling operation.

One or more longitudinally extending grooves 60 are also provided on a forward end of the tubular member 40 so that when the tubular

member is in the fully extended position the groove 60 spans the packing gland 54, thus again venting the chamber to the atmosphere. Thus any vacuum created when the tubular member 40 is extended is dispelled through the groove 60 prior to the time that the compression stroke is commenced as above described. In addition, tubular member 40 is provided with one or more vent holes 61 in the groove or grooves 60, these vent holes also being positioned so that they are positioned to the rear of the packing gland 54 when the tubular member is fully extended. If desired, the grooves 60 may be omitted, the function thereof being supplied by the vent holes 61. In such a case any vacuum created in the chamber will, upon full extension of the tubular member, be dispelled through the vent holes 61 and the annular passageway between the tubular member 40 and the sheath 30.

The procedure followed for discharging and filling of the pen will be apparent from the above description. Also the foregoing description makes it clear how the various parts may be readily assembled to produce a highly satisfactory commercial article. The sheath 30 for the ink sac 24 is provided to prevent the collapse of the sac in a longitudinal direction (i. e. in the manner of an accordion) and also to prevent contact of the sac with the tubular member 40. If such contact were permitted the frictional engagement of the tubular member with the sac during the filling operation would have a tendency to twist, stretch, or bend the sac resulting in undue wear and would prematurely expel any unused ink that may be contained within the reservoir. Also the sheath by virtue of its snug fit around the sac 24 serves to prevent the collapsible sac from being pulled out of shape when a suction or vacuum is applied in the chamber upon the withdrawal of the tubular member 40 to the extended position. As pointed out above, the sheath by virtue of the annular depression 39 tends to tighten the fit of the sac 24 on the rear portion of the gripping section 16 by a squeezing action. The openings 32 and 34 in the sheath 30 are necessary in order to provide free access of the compressed air to the sac to permit of the collapsing operation. The sheath 30 has been shown in the form of a metal sleeve. However, it will be apparent that it may be formed of screen, plastic, or, in fact, any material that is sufficiently rigid to hold the sac from collapsing when not intended by the user.

It will be noted that the barrel 10 is provided with a vent 62 adjacent the rear end thereof between the packing gland 54 and the lower limit of the cap 42 when the latter is fully screwed into the rear end of the barrel 10 to the fully retracted position shown in Figs. 1 and 4. This vent is provided so that when the cap 42 is screwed on to the barrel 10 a pressure will not form within the chamber which would cause a partial expulsion of the ink from the sac. The vent 62 also serves to permit the air chamber to "breathe" when the instrument is assembled ready for use, thus preventing leakage of the pen upon fluctuation of atmospheric pressure or temperature conditions, as is well known in the art.

It will be understood that the packing gland 54 may be formed of any material which will serve as a means for restricting the passage of air through the annular passageway formed between the tubular member 40 and the barrel 10. For example, the packing gland may be formed

of rubber, felt, nylon or other suitable material. As a matter of fact, the packing gland itself may be dispensed with and a suitable shoulder or ridge may be provided to form the desired air flow restricting means in the passageway. It is not necessary that the seal formed by the air restricting means be perfect. It should be sufficiently loose so as to permit free reciprocation of the tube **40** but sufficiently tight to permit the desired pressure to build up on a normal compression stroke so as to substantially completely collapse the ink sac immediately prior to filling. If desired, a suitable lubricant may be employed to avoid any possible undesired frictional resistance in the reciprocation of the tubular member **40** through the packing gland.

In the foregoing a preferred embodiment of this invention has been described. However, it will be apparent that certain modifications may be made. For example, the ink sac need not be received within the tube **40** but may be remote therefrom. Also, if desired, the tube **40** may be of increased diameter so that it slides over the barrel **10** instead of within it. In such a construction the anular packing gland **56** may be mounted in fixed relationship to the inside wall of the tube **40** adjacent its forward end and suitably spaced longitudinally extending grooves adapted to span the gland or other vent means to by-pass the gland may be provided in the walls of the barrel **10** as will be understood.

Longitudinally extending grooves **58** have been specifically shown for venting the chamber when the tubular member **40** is moved to a returned position. If desired, however, such venting means could take the form of a reduced cylindrical portion of the tubular member in the embodiment shown.

While a particular embodiment of this invention is shown above, it will be understood, of course, that the invention is not to be limited thereto, since many modifications may be made, and it is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the true spirit and scope of this invention.

I claim:

1. A compression unit for collapsing an ink sac in a writing instrument which comprises a first tubular member open at its rear end, a second tubular member telescopically mounted through the rear end and within said first tubular member, said second tubular member having a open forward end and a closed unvented rearward end, means on the forward end of said first tubular member for securing an ink sac and feed means for a writing instrument, a packing gland intermediate said tubular members retained in an annular groove adjacent the rear end of said first tubular member, means defining a longitudinally extending groove adjacent the rear end of the outer surface of said second tubular member adapted to span said packing gland to provide free passage of air between said tubular members when positioned in a relatively telescoped position, means at the rearward end of said first tubular member for removably securing said second tubular member in said telescoped position, said first tubular member having a vent positioned in the side wall thereof between said last mentioned means and said packing gland, and means defining an aperture in the forward end of said second tubular member for by-passing the packing gland when said tubular members are positioned in a telescopically extended position.

2. In a fountain pen, the combination of a barrel, an ink sac disposed within said barrel, ink feed means supporting said ink sac secured to a forward end of said barrel, a tube telescopically slidable within said barrel adapted to form a chamber about said ink sac, said tube being open at its forward end to receive said ink sac and closed at its rearward end to prevent venting of said chamber through said rearward end, said barrel having an interior annular groove adjacent the rearward end thereof, an annular packing gland received within said annular groove providing an air flow restricting means between said tube and said barrel, means forming an exterior longitudinally extending groove on said tube adjacent the rear end thereof and of sufficient length to span said gland whereby said chamber is freely vented to the atmosphere between said barrel and said tube when the latter is positioned in a forward position, means including an aperture in the forward end of said tube for by-passing said packing gland and venting said chamber when said tube is in a rearward position, threaded means cooperating between the rearward ends of said barrel and said tube for securing said tube in said forward position, and means between said annular groove and said threaded means forming a vent in said barrel.

3. In a fountain pen, the combination of a barrel, an ink sac disposed within said barrel, ink feed means supporting said ink sac secured to a forward end of said barrel, a tube telescopically slidable within said barrel adapted to form a chamber about said ink sac, said tube being open at its forward end to receive said ink sac and closed at its rearward end to prevent venting of said chamber through said rearward end, said barrel having an interior annular groove adjacent the rearward end thereof, an annular packing gland received within said annular groove providing an air flow restricting means between said tube and said barrel, means forming exterior longitudinally extending grooves on said tube adjacent the opposite ends thereof and of sufficient length to span said gland whereby said chamber is freely vented to the atmosphere between said barrel and said tube when the latter is positioned respectively in a forward position and in a rearward position, threaded means cooperating between the rearward ends of said barrel and said tube for securing said tube in said forward position, means between said annular groove and said threaded means forming a vent in said barrel, and stop means for preventing axial separation of said tube and said barrel, said stop means including a substantially rigid portion of increased diameter formed at the forward end of said tube extending for a substantial longitudinal distance thereof whereby relative wobbling of said tube with respect to said barrel is substantially prevented when said tube is in the rearward position.

4. A compression unit for collapsing an ink sac in a writing instrument which comprises a first tubular member open at its rear end, a second tubular member telescopically mounted through the rear end and within said first tubular member, said second tubular member having an open forward end and a closed unvented rearward end, means on the forward end of said first tubular member for securing an ink sac and feed means for a writing instrument, an annular air flow restricting member intermediate said tubular members secured to and within said first tubular member adjacent the rear end thereof,

means defining an inwardly extending deformation adjacent the rear end of the outer surface of said second tubular member adapted to span said air flow restricting member to provide free passage of air between said tubular members when positioned in a telescopically retracted position, means at the rearward end of said first tubular member for removably securing said second tubular member in said retracted position, said first tubular member having a vent positioned in a side wall thereof between said last mentioned means and said air flow restricting member, and means in the forward end of said second tubular member for by-passing the air flow restricting member when said tubular members are positioned in a telescopically extended position.

5. In a fountain pen, the combination of a barrel, an ink sac disposed within the barrel, ink feed means supporting said ink sac secured to a forward end of said barrel, a tube telescopically slidable within said barrel adapted to form a chamber about said sac, said tube being open at its forward end to receive said sac and closed at its rearward end to prevent venting of said chamber through said rearward end, an annular air flow restricting means positioned between said tube and said barrel and secured to said barrel adjacent the rear end thereof, means defining an inwardly extending deformation adjacent the rear end of said tube adapted to span said air flow restricting member whereby said chamber is freely vented to the atmosphere between said barrel and said tube when the latter is positioned in a forward position, means in the forward end of said tube for by-passing said air flow restricting member and venting said chamber when said tube is in a rearward position, means cooperating between the rearward ends of said barrel and said tube for securing said tube in said forward position, and means between said last mentioned means and said air flow restricting means forming a vent in said barrel.

6. A compression unit for collapsing an ink sac in a writing instrument which comprises a first tubular member open at its rear end, a

second tubular member telescopically mounted through the rear end and within said first tubular member defining an annular air passageway therebetween, said second tubular member having an open forward end and a closed unvented rearward end, means on the forward end of said first tubular member for supporting an ink sac and feed means for a writing instrument, an annular flow restricting member in said passageway intermediate said tubular members supported by and within said first tubular member adjacent the rear end thereof, means defining an inwardly extending deformation adjacent the rear end of the outer surface of said second tubular member adapted to span said air flow restricting member to provide free passage of air through said annular passageway and to by-pass said air flow restricting member when said tubular members are positioned in telescopically retracted position, means for removably securing said second tubular member in said retracted position, said annular passageway having a vent positioned in a wall thereof rearwardly of said air flow restricting member, and means in said second tubular member forwardly of said deformation for by-passing the air flow restricting member when said tubular members are positioned in a telescopically extended position.

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