

Aug. 1, 1939.

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2,167,815

FOUNTAIN PEN

Filed March 10, 1938

2 Sheets—Sheet 1

Fig. 1.

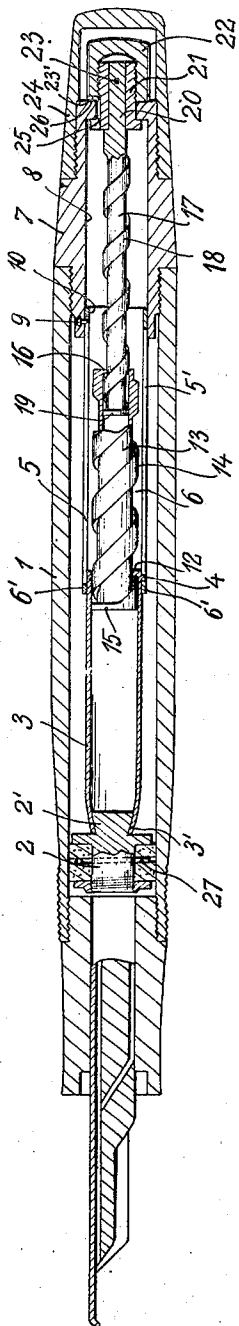


Fig. 2.

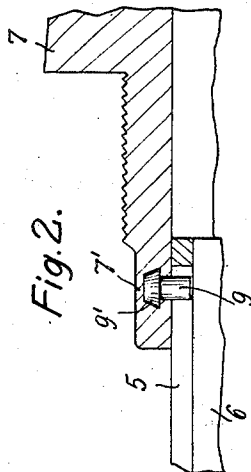


Fig. 3.

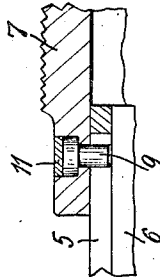
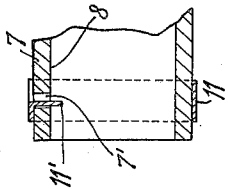


Fig. 4.



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2 Sheets-Sheet 2

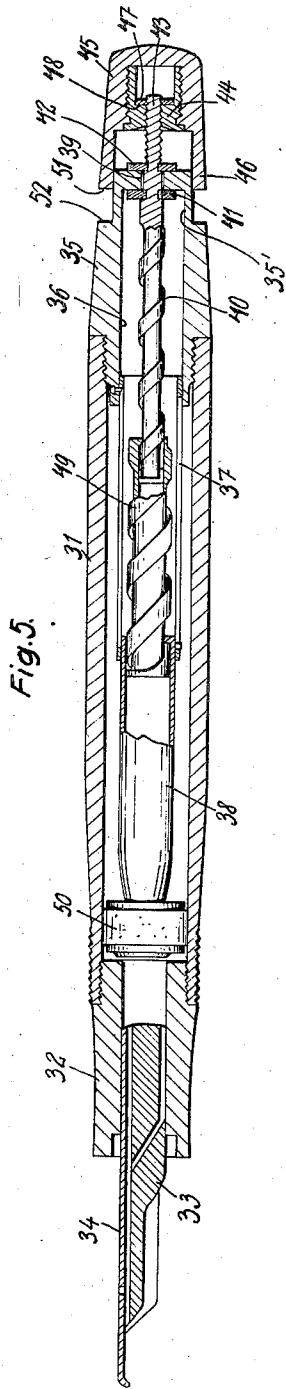


Fig. 5.

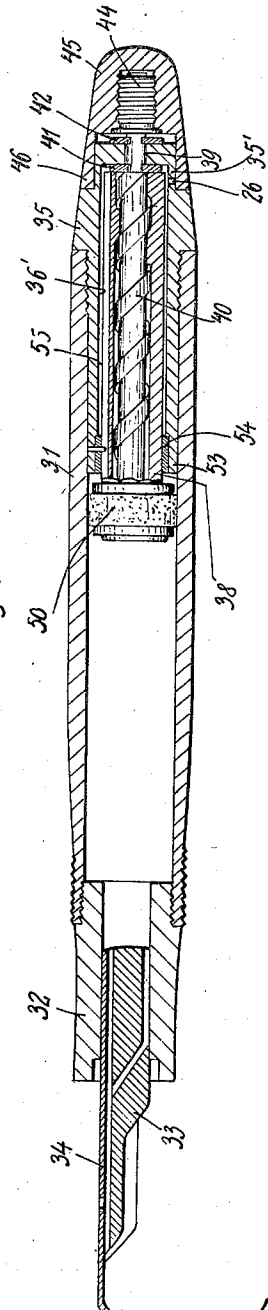


Fig. 6.

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# UNITED STATES PATENT OFFICE

2,167,815

## FOUNTAIN PEN

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In Germany April 2, 1937

10 Claims. (Cl. 120—47)

This invention relates to a fountain pen having a suction piston which is adapted to be moved by means of a plurality of threaded sleeves disposed telescopically one within the other.

5 It is known, that in fountain pens operating with a suction piston the ink space can be enlarged when the piston is moved by means of a plurality, for instance three or four, of threaded sleeves disposed concentrically one within the  
10 other, which are capable of being drawn apart telescopically. Hitherto it has been found very difficult to find room for such sleeves in the limited space available, without detrimentally affecting the reliability of operation and the  
15 strength of the mechanism. One expedient proposed was a compression spring (U. S. A. Patent 1,903,022) issued to G. L. Bassett on March 28, 1933, which was intended to prevent the sleeves from turning. But this compression spring, when  
20 in the compressed state, of course also takes up some space which is lost for the ink filling. The ordinary diameter of fountain pens was no longer sufficient, so that the fountain pens had to be made thicker and less convenient to handle.

25 Moreover in the known screwing piston pens it is to be noted, that the piston is moved by means of threaded spindles, which may also slide telescopically one within the other, in the ink reservoir in the direction of the longitudinal axis. The  
30 rotary motion of the threaded spindles was imparted to them by means of a screw knob which was in most cases protected, when in the inoperative position, by a screw-on cap. This screw knob had a very small diameter, however, so that  
35 fairly considerable force had to be expended for overcoming the resistance due to the friction of the piston in the ink reservoir. It was also very inconvenient first to have to remove the screw-on cap, when the pen had to be refilled. For this  
40 several manipulations were necessary and frequently the screw-on cap was lost. There is the further disadvantage, that, even on the screw knob being merely touched, the piston was put in motion, frequently causing ink to be spurted  
45 out of the pen. This disadvantage could frequently be observed, when for instance the user of the pen fiddled with the screw knob when lost in thought.

In contradistinction thereto the invention relates to a fountain pen having a suction piston moved by a plurality of sleeves disposed one within the other, which is characterised by a guide sleeve or a plurality of guide sleeves, which are axially slidable in the interior of the fountain  
55 pen, but are secured against turning about the

longitudinal axis. These guide sleeves preferably have a guide slot or a plurality of guide slots adapted to be guided on suitable guiding means, for instance a pin, within the rear part of the fountain pen axially till they come against an abutment.

In the guide sleeve moves, suitably in the axial direction, a shank or barrel or sleeve which is provided with a pin or a plurality of pins or the like, which are axially movable in the guide  
10 slots of the guide sleeve. This shank is fixed to the suction piston by deformation, for instance by bending over an undercut part. At the end remote from the suction piston the shank which has a cylindrical bore is provided with a threaded  
15 shoulder for limiting the axial motion of the telescopic sleeves disposed in the same.

The telescopic sleeves are provided externally with a thread of suitable pitch and of a corresponding kind and internally with a cylindrical  
20 bore and are provided at the end facing the piston with a collar or abutment and at the opposite end inside the bore with a shoulder or the like which has a thread corresponding to that of the inner sleeve.

The individual telescopic tubes are made preferably only by deformation, for instance pressing or heading, and are so arranged that the mechanism can be entirely taken apart. The innermost threaded part, preferably a solid rod having  
30 an external thread and an abutment at its left-hand end, is fixed in a screw knob in a manner known per se, for instance by screwing and/or pinning. In the vicinity of the screw knob the inner telescopic part has on its outer surface  
35 longitudinal grooves which extend into the core of the thread. The screw knob has under its under surface corresponding radial grooves which serve the purpose of connecting the air space between the suction cylinder and screw knob with  
40 the outer air.

The guiding of the sleeve in the fountain pen is preferably effected by pins or the like, a head on which is let into the material of the pen barrel. This head is preferably faceted or tapered  
45 towards the top, so that the artificial material, for instance vulcanite, can be moulded by the action of pressure and heat round the head, in order that the pin will not become loose. According to another constructional form of the invention a ring  
50 is laid round the heads of the pins.

Instead of a separate pin being provided, the ring may have lugs or be embossed or the like for acting as a guide for the sleeve.

The telescopic sleeves are preferably made of 55

metal which for protection against moisture and the like is provided with a protective coating by being galvanised, covered with wax or the like.

The invention also relates to a screw piston pen which is characterised in this, that the piston spindles are turned by means of a screw cap which also acts as the closure for the rear end of the fountain pen. According to a special constructional form of the invention the screw cap has an idle motion and a coupling which takes the spindle along with it only after a certain turning motion of the screw cap. Preferably this coupling is constructed as a friction coupling in such a manner that during the suction stroke it only takes the piston spindle along with it, when the piston was in its extreme forward position, and releases the coupling of the screw knob only when the piston is in its extreme rearward position. In one constructional form of the present invention the rear piston spindle is provided with guide collars which in the form of spring rings are pressed by deformation into corresponding grooves of the guide spindle. The coupling to or abutment against the rear spindle is also established by pressing a spring ring into a corresponding groove in the guide spindle.

In a modified constructional form of the present invention the sleeve-like guiding part is at the rear end of the fountain pen provided with a ring-shaped or ridge-shaped guide which is not liable to warp.

In the accompanying drawings constructional examples of the fountain pen according to the invention are illustrated.

Fig. 1 shows a fountain pen according to the invention in longitudinal section.

In Fig. 2 a detail of Fig. 1 is shown to a larger scale.

Fig. 3 shows another constructional form of the invention.

Fig. 4 shows a further constructional form.

Fig. 5 is a longitudinal section through a fountain pen according to the present invention with the new screw cap with idle motion and friction coupling.

In Fig. 6 another constructional example of the invention with a guide ring is shown.

In the ink reservoir 1 of the fountain pen a suction piston 2 is disposed, which has at its rear part a conical or the like extension 2', over which a sleeve-like barrel 3 can be pushed with its lower end and, as shown at 3', can be firmly pressed by deformation, for instance by beading over or the like. The extension 2' is preferably provided with flutings, grooves or the like and the beading over of the barrel at 3' is effected with corresponding corrugation, so that a practically unreleasable connection results.

The barrel 3 is provided at its end remote from the suction piston 2 with a pin 4 which is adapted to slide in the axial direction in the longitudinal slot 5' of a guide sleeve 6 and finds an abutment at 5'.

The guide sleeve 6 is disposed in the rear part 7 of the fountain pen in such a manner that it can slide in a bore 8. It is secured against turning about the longitudinal axis by pins 9 which extend into the slot 5. A step 10 prevents the sleeve 6 from being withdrawn out of the bore 8 of the rear part 7 of the fountain pen.

In Fig. 2 such a guide pin 9 is shown to a larger scale. The pin 9 has a head 9' which is preferably tapered towards the top and over which the vulcanite mass 7' is pushed together, so that the pin 9 is fixed so as to be practically un-

releasable. This pin may also be fixed, as shown in Fig. 3, by a ring of metal or the like 11, which is pressed around the part 7 over the head of the pin 9 into the vulcanite. The pins 9 have of course to withstand considerable forces and it is therefore important for them to be well secured, so as to avoid any operative trouble, even when the pen is roughly used.

As will be seen from Fig. 4, the ring 11 which is placed around the part 7 of the fountain pen may be provided with a bent-over lug 11' which extends through an opening 7' into the interior of the bore 8. The guide may also be provided, instead of by a lug 11', by the ring being suitably embossed or the like, for instance by a pin being formed by embossing or by drawing out of the profile of the ring.

The barrel 3 has an internal cylindrical bore and is provided at that end which is remote from the suction piston 2 with an internal shoulder 12 provided with a thread-like incision.

In the interior of the cylindrical bore of the barrel 3 is disposed so as to be axially slidable a telescopic sleeve 13 having a thread 14, the pitch and shape of which corresponds to the thread-like incision in the internal shoulder 12, so that the telescopic sleeve 13 can be moved in the barrel 3 in the axial direction, turning about its axis in accordance with the pitch of the thread 14.

On the part facing the suction piston 2 the telescopic sleeve 13 has a collar or an abutment 15 which limits the axial motion of the telescopic sleeve 13, when the parts are screwed apart, through striking against the internal shoulder 12 of the barrel 3.

The telescopic sleeve 13 has an internal cylindrical bore and is provided at the end remote from the suction piston 2 with a threaded internal shoulder 16.

In the internal cylindrical bore of the telescopic sleeve 13 is disposed a further telescopic sleeve or spindle 17 which is provided with a thread 18, the pitch and shape of which corresponds to the cut-in thread in the collar 16. At the end facing the suction piston 2 the spindle 17 has a collar or abutment 19 and at the opposite end an extension 20, on which is mounted a threaded cap 21 which extends through a bore in the rear part 7 of the fountain pen and on which a screw knob 22 is fixed and may be secured by a pin 23. The turning knob 22 may be protected by a closing cap 24.

For filling the pen according to the present invention the turning knob 22, in the constructional form shown in Fig. 1, is turned in the clockwise direction. This will cause the threaded spindle 17, the telescopic sleeve 13 and the barrel 3 to slide one into the other. At the same time the projection 4 of the barrel 3 will slide axially in the slot 5' of the guide sleeve 6 and the guide sleeve 6 will be guided, corresponding to the screwing back of the suction piston 2, by the pin 9 and will be screwed back into the bore 8 of the rear part 7 of the pen.

Owing to the mechanism being divided into three or more telescopic parts, the suction piston 2 can be turned back further than has hitherto been possible, so that a greater ink capacity is obtained. The guiding by the guide sleeve 6 by means of the guide slot 5, in which the guide sleeve 6 is prevented from turning in the bore 8 by the pin 9 and the suction piston 2 with the barrel 3 is secured against turning by the pin 4 in the guide slot 5', prevents any idle motion.

The packing of the piston 2 which may for instance consist of a cork ring may be secured against turning by a pin 27. It has hitherto been regarded as unnecessary to guide the piston 2 in the axial direction, as, owing to its friction against the inside of the wall of the ink reservoir 1 the piston 2 offered resistance to turning about its axis. When however the packing of the suction piston 2 has become dry or worn, it slides along the inside of the wall of the ink reservoir 1 and it has been found that, after being in use for some time, the piston 2 will no longer have the requisite friction, will turn about its longitudinal axis when the turning knob 22 of the suction piston 2 is turned and no axial displacement will take place.

The peculiar construction of the telescopic parts, such that they have a smooth cylindrical internal bore and an internal shoulder 12, 16 with a thread-like incision and only on the outside a full thread, makes possible a compact and nevertheless strong mode of construction, so that without increasing the external diameter beyond the normal diameter of fountain pens, the telescopic mechanism can be disposed in the interior, even when it consists of three or more telescopic members.

The present invention also relates to a connection of the air space behind the suction piston 2 and the turning knob 22 with the outer air. For this purpose there are provided in the threaded piece 21 on the outer periphery in the axial direction longitudinal grooves 25 which extend into the core of the thread. On the other hand the turning knob has at its lower surface 23' radial passages 26 which are in communication with the grooves or passages 25, so that the air can escape from the interior of the ink reservoir between the suction piston 2 and the turning knob 22 through the grooves 25 and 26 to the outside and vice versa.

Hitherto it has been the practice to make the mechanism of screw piston pens of vulcanite or other materials which are resistant to corrosion, as the air in the interior is always saturated with the moisture coming from the ink and metal parts would be attacked.

According to the present invention it is possible to make the telescopic members of metal, for instance of brass or the like. These parts may be provided with a protective layer which is resistant to moisture or corrosion. This may be effected by galvanising with resistant metals, for instance by gilding, or by coating with protective layers of wax, grease or the like. By this means the metal parts of the telescopic mechanism are coated with a thin layer which protects the metal against corrosion, so that no disturbance in operation can occur, due to the action of the moisture or the like and injury to the thread.

In Fig. 5 a fountain pen having a sleeve-like barrel 31 is shown, which has at its forward end a screwed-in member 32 and in the latter an ink guide 33 and a nib 34.

The rear part of the barrel is provided with a sleeve-like screwed-in part 35, the internal bore 36 of which serves as a guide for the sliding or guiding sleeve 37 or the sleeve-like piston-shank 38 (Fig. 6).

At the rear end of the threaded part 35 is a bore 39, in which the rear part of the threaded spindle 40 is journaled and secured against axial displacement by two collars 41, 42.

The extreme rear part of the screw spindle 40 terminates in a threaded extension 43, on to

which a nut 44, preferably of brass or the like, is screwed so as to be capable of turning. The nut 44 is fixed in a screw cap 45. The screw cap 45 is so constructed that it forms a cap-like closure gradually merging into the barrel 31 and engages with a sleeve or bell-like part 46 over a correspondingly reduced spigot-like part 35' of the screwed-on part.

The threaded spigot 43, over which the nut 44 can be screwed, is provided with an abutment or a coupling 47. The ring-shaped collars 41, 42 and the abutment or coupling 47 are preferably pressed by the deformation of spring rings firmly into grooves provided on the spindle 40.

When the piston-operated fountain pen is to be filled, the piston 50 is in the position shown in Fig. 6, that is towards the rear end. On the turning knob 45 being turned in the counter-clockwise direction, the nut will first screw along the threaded extension 43, until the abutment 47 comes against the inner surface 48 of the nut. When the parts bear against one another in this way, as shown in Fig. 5, then, on the screw cap 45 being further turned, the piston 50 will be brought to the left into the position shown in Fig. 5. On the screw cap 45 being then turned in the clockwise direction, the nut 44 will not yet become released from the spindle 43, but the coupling 47 will by friction hold the nut 44, the piston 50 will be moved to the right as seen when looking at the drawings and ink is sucked in between the nib and the ink guide. As soon as the piston 50 comes to the right against an abutment, the blocking of the coupling 47 becomes released and the screw cap 45 is screwed with its edge 51 tightly against the shoulder 52 of the screwed-in part 35.

Owing to the novel construction of the screwing with the blocking of the coupling, it is certain that the piston will be brought right into its extreme positions and consequently that the ink space will be filled to its utmost capacity with ink, as otherwise the blocking of the coupling 47 with the shoulder 48 will not take place.

Fig. 6 shows a further constructional form of the invention. When certain materials, for instance plastic materials such as cellulose horn, phenol-aldehyde condensation products, cellulose derivatives such as acetyl-cellulose and the like, it has been found that they tend to become misshapen and to warp and that, according to circumstances they swell or shrink. This presents the disadvantage, that for instance the sleeve-like piston shank 38 or the guide sleeve 37 (Fig. 5) will jam in the bore 36 of the screwed-in part 35 and the motion imparting arrangement may be torn or destroyed, owing to excessive friction. In order to obviate these disadvantages, according to the present invention there is provided in the inner part 53 of the screwed-in part 35, in a corresponding recess of the same, an annular or similarly shaped guiding part 54 of non-swelling or non-shrinking material, for instance of a metal, such as brass, of vulcanite or the like, so that the piston shank 38 or the guide sleeve 37 is guided only along a short piece in the guiding part 54 and in the rear part of the bore 36 or 36' has a certain clearance, as shown at 55 in Fig. 6. This prevents any jamming of the moving parts, when materials are used, which will not retain their shape in all circumstances. The guiding part may, as shown in Fig. 6, have the form of an internal ring surface or a hollow cylinder or the form of an annular rib or the like.

As shown in Fig. 6, that part of the interior

of the barrel 31, which is behind the piston, that is the part not containing ink, may be in communication with the outer air through a hole 26 which leads to the atmosphere through the rear part 35' of the screwed-in part 35, for preventing compression of the air behind the piston, when the latter is screwed back.

What we claim is:

1. In a fountain pen, a suction piston reciprocable in said pen, a spindle operatively connected to said piston for reciprocating the latter, a screw cap for operating said spindle, said screw cap forming a closure for the rear end of said pen, and coupling means between said screw cap and said spindle, said means permitting a limited idle movement of said screw cap.

2. In a fountain pen, a suction piston reciprocable in said pen, a plurality of threaded sleeves disposed telescopically one within the other in said pen and operatively connected to said piston for reciprocating the latter, a guide sleeve for said piston longitudinally slidable in said pen about said threaded sleeves, means for preventing turning of said guide sleeve about its axis, a knob operatively connected to said threaded sleeves for actuating the latter, and coupling means between said knob and said threaded sleeves, said means permitting a limited idle movement of said knob.

3. A fountain pen as claimed in claim 2 wherein said guide sleeve is provided with a longitudinal slot, and means on the inner rear portion of said pen cooperating with said slot for limiting the longitudinal movement of said guide sleeve.

4. A fountain pen as claimed in claim 2 wherein said guide sleeve is provided with a longitudinal slot, a pin on the inner rear portion of said pen cooperating with said slot for limiting the longitudinal movement of said guide sleeve, a shank on said piston slidable within said guide sleeve, a second slot in said guide sleeve, and means on said shank cooperating with said second slot for guiding said shank and for limiting its longitudinal displacement.

5. In a fountain pen, a suction piston reciprocable in said pen, a guide sleeve longitudinally slidable in said pen, a longitudinally extending slot in said sleeve, stationary means cooperating with said slot for guiding said sleeve and preventing turning of the latter about its axis, a shank on said piston extending longitudinally into said

guide sleeve, a second slot in said guide sleeve, means on the free end of said shank cooperating with said second slot for guiding said shank in said guide sleeve, a telescopic sleeve reciprocable in said shank, said telescopic sleeve having a series of threads about its outer periphery, means on the inner periphery of said shank cooperating with the threads on said sleeve, a spindle reciprocable in said telescopic sleeve, means on the inner periphery of said telescopic sleeve cooperating with said spindle, a rotatable member for operating said spindle, and means for coupling said member to said spindle, said last named means permitting a limited idle movement of said rotatable member independent of said spindle.

6. A fountain pen as claimed in claim 5 including means for establishing communication of the air space between said suction piston and said rotatable member with the atmosphere.

7. A fountain pen as claimed in claim 5 including a protective layer of moisture-proof material around said sleeves.

8. A fountain pen as claimed in claim 5 including means interposed between the bore of said pen and said guide sleeve for maintaining a clearance between said sleeve and said bore.

9. In a fountain pen, a suction piston reciprocable in said pen, a spindle operatively connected to said piston for reciprocating the latter, means for supporting said spindle in said pen, a threaded extension on the free end of said spindle, an internally threaded member freely rotatable on said threaded extension for operating said spindle, and means cooperating with said internally threaded member and said threaded extension for connecting and disconnecting said member from said spindle.

10. A fountain pen as claimed in claim 9 wherein said last named means comprises a fixed abutment on the free end of said threaded extension for frictional engagement with said member upon rotation of the latter in one direction, and a second fixed abutment engageable by said spindle for releasing the frictional engagement between said first named abutment and said member.

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