

Jan. 2, 1951

H. R. FEHLING
FOUNTAIN PEN

2,536,923

Filed June 4, 1946

2 Sheets-Sheet 1

Fig. 1

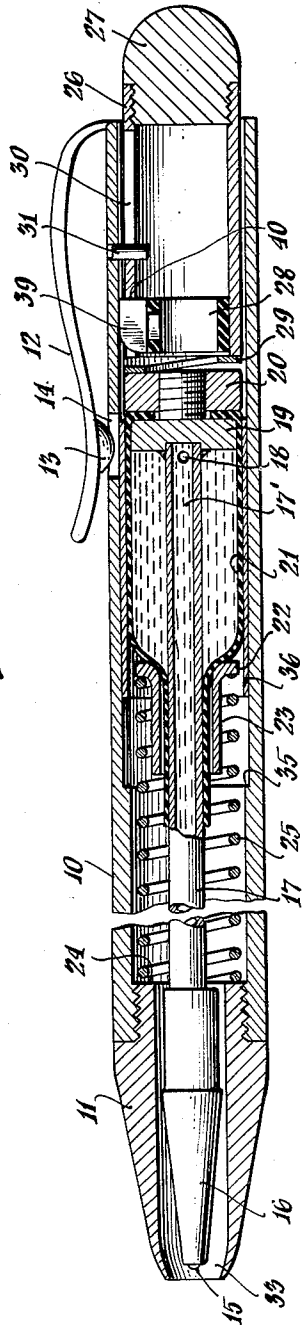


Fig. 2

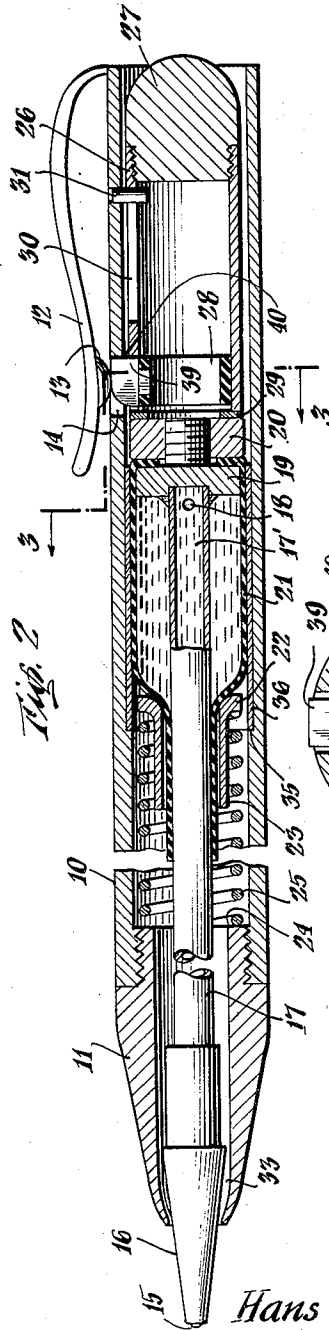
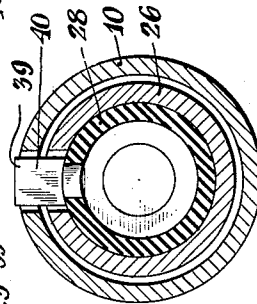


Fig. 3



INVENTOR
Hans R. Fehling
BY *A. A. Wische*
J. F. Padlon
ATTORNEYS

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Fig. 4

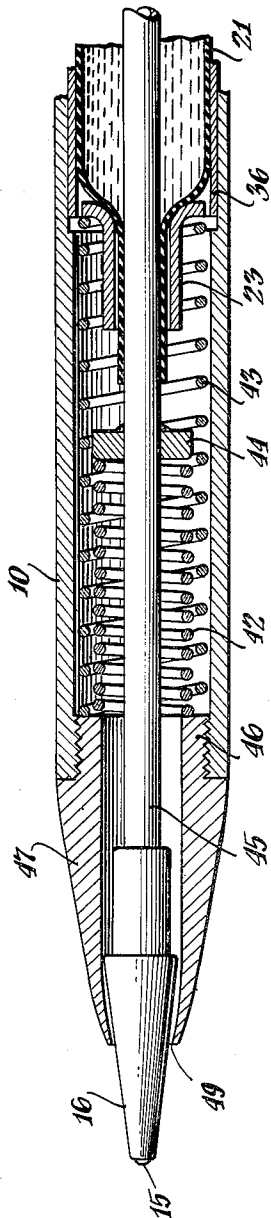
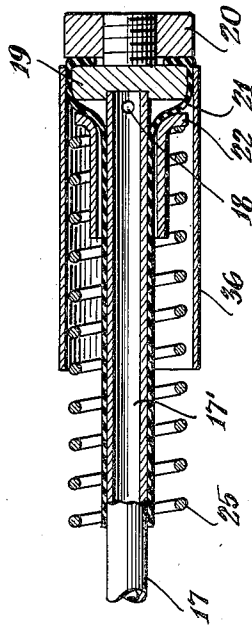


Fig. 5



INVENTOR
Hans B. Fehling
BY *A. A. Wiche*
J. F. Padon
ATTORNEYS

UNITED STATES PATENT OFFICE

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FOUNTAIN PEN

Hans R. Fehling, London, England, assignor, by
mesne assignments, to Eversharp, Inc., Chicago,
Ill., a corporation of Delaware

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15 Claims. (Cl. 120-42.03)

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This invention relates to fountain pens and more particularly to fountain pens in which a ball is mounted for rotation in a housing or setting with part of the ball exposed, the unexposed part of the ball being in contact with a supply of ink so that, as the ball is rotated, a thin film of ink is carried by the ball through the gap between the ball and its housing and such ink is deposited on the writing surface as a thin trace.

It is desirable to provide means to feed ink to the ball point in such a manner that, when the pen is not in use, the capillary forces in the gap between the ball housing and the ball shall be such that the ink does not discharge through the gap, since otherwise the wearer's or user's clothes or handbag is liable to become discolored. The ink is preferably a viscous ink whose viscosity is preferably not less than 15 poises at 37° C. It is also desirable that the viscosity shall have small variations over a comparatively wide temperature range.

In certain prior constructions, the ink has been fed to the ball by a capillary tube, and in some cases the ink has been urged from a reservoir toward the ball by pressure. The disadvantage of the latter construction is that, when the pen is not in use, the applied pressure has caused the ink to seep past the ball with deleterious effects. If, on the other hand, the applied pressure were reduced to prevent such effects, it may not be high enough to feed sufficient ink to the ball under all conditions of writing.

If the ink is fed to the ball from a capillary tube, it is found that temperature and the amount of ink charge in the pen sometimes has a deleterious effect on its operation, and an object of the invention is to provide an instrument of the aforesaid type which avoids these objections and functions satisfactorily under a variety of different conditions.

Another object of the present invention is to provide a fountain pen in which the writing assembly is reciprocally mounted in a housing and is resiliently held in said housing, so that it is capable of moving relatively thereto when the ball is pressed on paper or other surface during writing.

Another object of the invention is to provide a fountain pen in which pressure is automatically applied or increased to urge the ink contained in the pen to flow toward the ball when the writing portion of the pen is in use.

Still another object of the invention is to provide a fountain pen having a writing portion

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in which pressure is automatically applied or increased, urging the ink toward the ball when the writing portion is projected downwardly of the pen and reduced or removed when the writing portion is retracted into the pen proper.

A further object of this invention is to provide a writing instrument with a retractable writing ball point, containing a flexible, yieldable ink container adapted to force ink forwardly toward the ball point and/or removing or reducing the pressure in the container when the ball point is retracted into the body of the pen.

Other objects and advantages will become apparent from the following description, taken in conjunction with the accompanying drawings in which:

Fig. 1 is an enlarged, longitudinal section, illustrating one preferred embodiment of the present invention, showing the writing and ink feeding portion in retracted position;

Fig. 2 is a similar view showing the writing and ink feeding portions in projected position;

Fig. 3 is a detail taken on line 3-3 of Fig. 2;

Fig. 4 is a fragmental, enlarged, longitudinal section of an alternative construction, showing the disposition of parts when a slidable assembly is propelled with the ink reservoir filled; and

Fig. 5 is a fragmental, longitudinal partly sectional view of a portion of Fig. 3, showing the disposition of the ink reservoir when empty.

In the drawings, like reference characters denote like parts throughout.

Referring primarily to the embodiment illustrated in Figs. 1, 2, 3, and 5, an outer casing 10 is provided in the form of a barrel or cylinder, into one end of which is screwed an axially bored nose piece 11. Located at or near the other end of said cylinder is a clip 12 having on its under face a knob-like projection 13 disposed over a hole 14 formed in the casing 10.

A writing ball 15 is mounted for rotation in a nozzle or housing 16 which forms an extension of a stem conduit 17 axially passing through nose piece 11 having an orifice 18 at or near the end remote from the ball. Such end of the conduit is sealed by an end closure 19, screwed into a plug member 20 mounted for sliding movement within the casing 10. Between the parts 19 and 20, there is trapped one end of a collapsible bag or sac 21 which surrounds the rear part of the conduit 17, and the forward end of the bag is sealed onto the tube 17, as shown, so as to extend longitudinally along the tube. Between the flange 22 of a collar 23 and the in-

ner end or shoulder 24 of the nozzle 11 is mounted a coil spring 25. Fitted within the casing 10 rearwardly of the member 20 is a sliding cylinder 26. Said cylinder is in connection toward its outer end, with a manually operable knob or projection 27 and at its inner end with a resilient member 28. A spring plate 29 is diagonally positioned between plug member 20 and the inner end of member 25, as shown. A slot 30 in the cylinder 26 receives a pin or stop member 31 projecting inwardly from the casing 10.

Fig. 1 shows the writing portion of the instrument in the retracted position. It will be seen that spring 25 is extended, the knob 27 projects beyond the rear end of the casing 10, and the ball 15 and nozzle 16 are completely encased within the open mouth 33 of nose piece member 11. The bag 21 is filled with an ink, preferably a viscous ink which passes by way of hole or orifice 18 into and along the tube 17 and an axial duct in the member 16 to the ball 15, so that the ball is fed with ink.

To use the instrument, manual pressure is applied to urge the knob 27 axially forward of casing 10 with the result that spring 25 is compressed, and the ball 15 and nozzle 16 are projected beyond the open mouth 33 of the nose 11 and, when the cylinder 26 has been advanced to the requisite extension, resilient member 28 is brought into registry with the aperture 14 and part of the member 28 extends through said aperture thereby locking the instrument in the propelled position. A flange 22 is preferably formed in the casing 10 against which, when the instrument is propelled, the forward end of a cylinder 36 extends from the member 19 to a position forwardly of the flange 22 on the collar 23, and is a sliding fit within the casing 10. The member 28 is made conveniently of rubber or similar material and may be in the form of a hollow cylinder, so that it can be readily depressed, and is provided with a projection 39 which may be of hard rubber or of metal, and it is the projection 39 which extends through hole 14 when the parts are moved to the position shown in Fig. 2.

The forward end of the projection 39 may be chamfered as shown, but the rear face 40 is plane so that it forms an abutment resting against the rear face of the aperture 14 when projected therethrough. The function of the lug or pin 31, cooperating with slot 30 in cylinder 26, is to limit the outward movement of the plunger knob and associated cylinder 26, when the instrument is in a retracted position, but the length of the slot 30 permits the cylinder to be pushed sufficiently far in the casing 10 to allow the projection 39 to pass through the hole 14.

It will be appreciated that, when the instrument is propelled into the position shown in Fig. 2, the spring 25 is compressed as is bag 21, with the result that pressure is applied thereby, urging the ink through the orifice 18 of the duct of conduit 17 up to the seated ball 15. The pressure applied to urge the ink toward the ball will vary in accordance with the degree of fullness of the bag. The arrangement may be such that, when the instrument is retracted, dependent upon the state of fullness of the bag, a degree of pressure may still be applied to the bag to urge the ink toward the ball, but the arrangement and disposition of the parts is such that, when the instrument is in the retracted position, as shown in Fig. 1, the applied pressure is less than the capillary forces in the gap between the ball 15 and its housing 16, so that, when the in-

strument is not in use, there is no appreciable discharge of ink or seepage past the ball 15.

After the instrument has been propelled, and it is desired to retract it, it is only necessary to apply pressure to the clip 12 in the general area above projection 13 to depress the part 39 into the cylinder 10, when under the action of the coil spring 25 the instrument is automatically retracted to the position shown in Fig. 1. The sac member 21 is preferably of rubber, as stated, and is so designed that, when filled with ink, it is elastically distended and fits snugly within the protective cylinder 36, and the provision of this cylinder ensures that the reservoir is free to slide within the casing 10. When the sac member is filled with ink the distended condition thereof will result in some slight amount of pressure being applied to the ink but this pressure will not be enough to cause objectionable seepage at the writing tip.

As previously stated, in the construction shown in Figs. 1 and 2, it will be appreciated that the force of the spring 25 varies in accordance with the state of fullness of the reservoir 21. This is in some respects a disadvantage, since, if the retractive force of the spring is sufficient to withdraw the instrument quickly, the spring may apply a greater pressure than is desirable to the reservoir when the instrument is propelled. This disadvantage is obviated in the construction in Fig. 4 showing a fragmental section of the instrument in the propelled position when the reservoir is full. It is to be noted that the construction shown in Fig. 4 is identical with that shown in Figs. 1 and 2, excepting for the provision of a second coil spring 42 disposed interiorly of the spring 43 and the collar 44 fitted on the tube 45. The spring 42 is positioned between this collar and the inner end 46 of the nose piece 47. When the instrument is propelled from the casing 10, spring 43 applies pressure to compress the reservoir 21, and spring 42 is compressed between members 44 and the inner end 46 of nose piece 47. Spring 42 furthermore is stronger than spring 43 and, when the instrument is to be retracted, the main repelling effort is exerted by this spring and it will thus be seen that the retraction of the instrument is independent of the degree of fullness of the reservoir.

In both embodiments shown herein, it will be appreciated that, when the writing instrument is propelled from the cylinder, the extent of its forward movement is independent of the state of the reservoir. The whole unit moves in effect as an integral unitary structure when pressure is applied to the push button 27. It will be appreciated that the only function of the spring plate member 29 shown in Figs. 1 and 2 is to facilitate entry of the resilient projection 39 into the aperture 14 and to ensure that the instrument is firmly, though resiliently, held in the propelled position against accidental displacement. The coil spring 25 is preferably a comparatively long spring, as shown, to achieve the aforesaid desideratum, namely that, when the instrument is in the retracted position, the pressure exerted on the reservoir is less than the capillary forces in the gap between the ball and housing and, when the instrument is in the propelled position, there is sufficient pressure applied to the reservoir to ensure an even flow through such a gap.

One of the advantages of employing a comparatively long conduit 17 or any equivalent member of small or capillary cross-section is that it may flex slightly and therefore afford a degree

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of resilience in writing, the conduit 17 fulcruming to a limited extent about the line of contact at 49 between the member 16 and the casing 47, as shown for example in Fig. 4. That part of the casing 11 or 47 where the member makes contact when the instrument is propelled may be of conical configuration, so that the rounded part of the member 16 makes line contact, with the result that the lateral yieldability of the writing tip is enhanced. This is an advantage in that it avoids a "solid" feel when the instrument is being used.

It will further be appreciated that clip member 12 functions as a pocket clip and, if the instrument is inserted into a pocket before being repelled, it will automatically be repelled by the action of this clip; this is advantageous and is a safety measure.

In view of the foregoing, it will be noted that the invention consists in the provision of an instrument in which the writing and ink containing and feeding assembly is mounted for propulsion and retraction relatively to a casing and in which pressure is automatically applied, or increased, urging the ink toward the ball. Furthermore, when the writing portion of the instrument is retracted such pressure is automatically removed or reduced, preferably to a pressure not exceeding the capillary pressure in the gap between the ball and its housing.

Furthermore, the invention provides a unit which is mounted for propulsion and retraction relatively to a casing and in which, when propelled, is held resiliently within the casing, so that it is capable of movement relatively thereto when the ball is pressed on the paper during writing.

The invention provides an instrument of the said type in which pressure is applied to the ink reservoir when the instrument is propelled and such pressure is removed or reduced when the instrument is retracted and in which the force applied to retract the instrument is independent of the degree of fullness of the reservoir.

The pressure is applied or increased when the unit is propelled, and pressure is removed or reduced when the instrument is retracted and the propulsion stroke, i. e., the distance which the unit travels relative to the casing when propelled or retracted, is constant and independent of the degree of fullness of the reservoir or the pressure applied to it.

In carrying the invention into effect, the ink reservoir preferably surrounds wholly or in part the member feeding the ink to the ball and means are provided for applying to or increasing and removing or reducing from said reservoir pressure when the instrument is propelled from and retracted into the instrument casing.

While I have herein shown and described only certain embodiments of certain features of my present invention, it is to be understood that they are to be regarded merely as illustrative and that I do not intend to limit myself thereto, except as may be required by the following claims. I claim:

1. A fountain pen comprising a casing, a retractable writing unit in the casing, means for carrying a supply of ink, means in the casing adapted to exert pressure on the ink in said first means to insure flow of ink from said first means to the writing unit, exteriorly accessible means for projecting the writing unit forward of said casing into writing position, and means for causing said pressure exerting means to operate

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automatically upon operation of said projecting means:

2. A fountain pen comprising a casing, a writing unit adapted for propulsion and retraction relatively of said casing, an ink reservoir in the casing in communication with the writing unit, means for applying and removing pressure on the ink in said reservoir when the writing unit is respectively propelled from and retracted into the casing, and exteriorly accessible means for propelling the unit from and retracting it into the casing.

3. A fountain pen comprising a casing and a projectible and retractable assembly constituting a writing unit adapted normally to remain in the casing, a conduit in communication with the writing unit, contractible means for carrying a supply of ink, said contractible means communicating with said conduit, means in the casing to apply pressure on the ink-carrying means to urge the ink supply toward the writing unit, and manually-operable means for simultaneously operating said pressure applying means and projecting the writing unit forward of said casing.

4. A fountain pen according to claim 3, in which said contractible ink-carrying means surrounds an extended portion of the conduit and in which a collar is set intermediate said ink-carrying means and said pressure applying means to equalize the force applied on said ink-carrying means.

5. A fountain pen according to claim 3, in which said conduit has a stop member and is partly surrounded by an auxiliary spring member adapted to smoothly retract the writing unit into the casing independently of the pressure exerted on said ink-carrying means.

6. In a writing instrument, a casing, a longitudinally movable writing unit mounted in the casing, said unit including a writing tip at its front end and being movable from a retracted position to a projected position, an ink reservoir in the casing in communication with the writing tip, exteriorly accessible means for projecting and retracting the writing unit, and means in the casing actuated by projection of the writing unit for applying pressure to the ink in the reservoir.

7. In a writing instrument of the type employing a rotatably mounted ball as the writing tip, which tip is adapted to be protectively encased when the instrument is not in use, an ink receptacle which is provided at its front end with an ink feeding duct leading to the ball, exteriorly accessible means for moving the tip forwardly into an exposed writing position, and means actuated by the forward movement of the tip for applying pressure on the ink in the receptacle.

8. In a writing instrument of the type employing a rotatably mounted ball as the writing tip, a casing, manually operable means for projecting and retracting the writing tip relative to the front end of the casing from a protectively enclosed position to an exposed writing position, an ink receptacle which is movable with the tip and is provided at its front end with an ink feeding duct leading to the tip, exteriorly accessible means for projecting the tip, and means automatically actuated by said projection of the tip for applying pressure on the ink in the receptacle, said pressure on the ink being relieved upon retraction of the writing tip.

9. In a writing instrument of the type having a barrel with a tip comprising a ball writing point in a corresponding socket, an ink reservoir in said barrel including a flexible wall and a pressure

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device in said barrel adapted to react against said flexible wall to urge the ink forward from the reservoir in a continuous column filling the ball socket; the combination therewith of a manually displaceable member mounted upon said barrel and exposing the ball at will in writing or shielding it in non-writing position, and means under control of said displaceable member to relieve the pressure exerted by said pressure device when said member is in point shielding position.

10. A writing instrument of the ball point type, comprising a barrel having a writing ball point at the forward end thereof, a socket accommodating said ball point, said barrel having an ink reservoir therein in communication with said socket, said reservoir including a flexible wall element, a pressure device in said barrel adapted to react against said flexible wall to propel the ink forward from the reservoir and to maintain the ball socket filled, a member mounted on said barrel maintaining the writing point in shielded position while out of use, and during writing coacting with the rear part of the barrel, said member when in the latter position coacting with the pressure device to activate the same.

11. In a writing instrument of the type comprising a barrel with a tip having a ball writing point in a corresponding socket, an ink reservoir in said barrel including a flexible wall and a device in said barrel adapted to react against said flexible wall to urge the ink forward from the reservoir in a continuous column filling the ball socket; the combination therewith of an end member on the rear of the barrel and having two settings in one of which the point is in retracted, inoperative, shielded position and in the other of which the point is in advanced operative and protruding position, said elements being constructed and arranged to activate said pressure device in the writing setting and to render said device ineffective in the non-writing setting of the instrument.

12. A writing instrument of the type comprising a barrel, a cartridge therein having a ball writing point lodged in a corresponding socket at the forward end thereof, an operating member at the rear of the barrel coacting with said car-

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tridge alternatively to dispose the point thereof in advanced or writing position or in retracted or shielded position, said cartridge having an ink reservoir with a flexible wall element, a pressure device within said cartridge adapted to react against said flexible wall to urge the ink content forward, said operating member being correlated with said pressure device for substantially inoperative condition thereof when the cartridge is retracted and to render the same effective when the cartridge is in advanced or writing position.

13. A writing instrument comprising a barrel, a writing tip, an ink supply means, an ink feeding means for said tip, all contained in said barrel; and means operable to condition said instrument for writing purposes and simultaneously to bring about the exertion of pressure on the ink in said supply means to feed said ink to said ink feeding means.

14. The combination recited in claim 13 in which the ink feeding means is a ball point, the barrel has a normally inactive ink propulsive agency confined therein and the means operable to condition the instrument is interrelated with said ink propulsive agency to set the same into action upon operation of said conditioning means.

15. The combination recited in claim 13 in which the ink feeding means is a ball point, the barrel has a normally inactive ink propulsive member confined therein and the means operable to condition the instrument comprises a member on the barrel manually displaceable preparatory to writing, to set the ink propulsive member into action.

HANS R. FEHLING.

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