June 16, 1953 J. P. GOWLAND 2,642,042

WRITING INSTRUMENT

Filed March 17, 1950

Fig. 1.

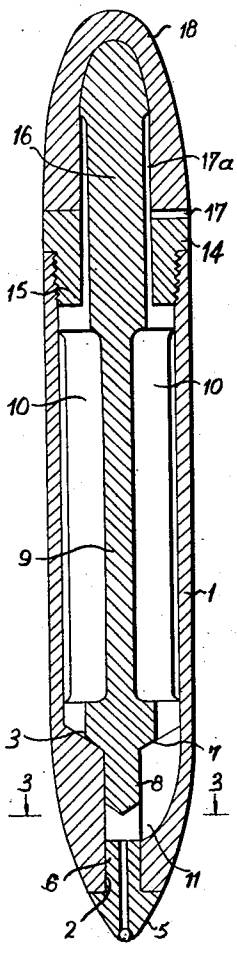


Fig. 2.

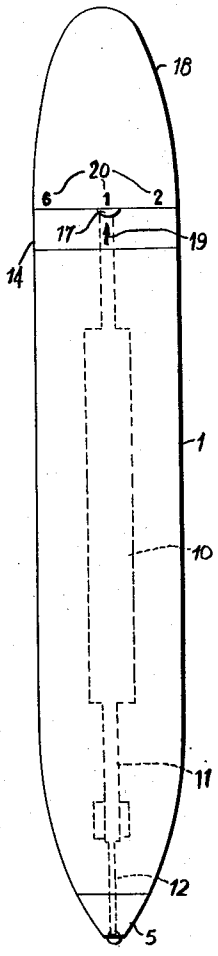


Fig. 5.

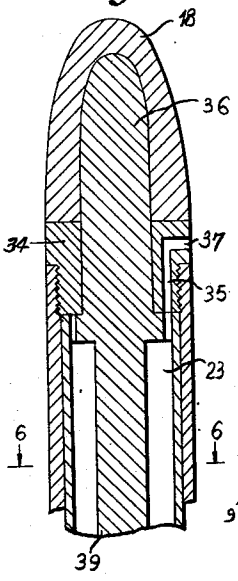


Fig. 1a.

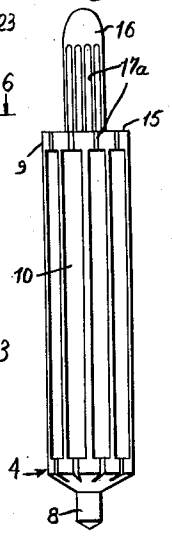


Fig. 6.

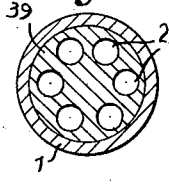


Fig. 7.



Fig. 3.

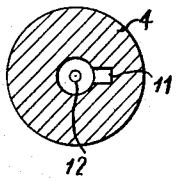
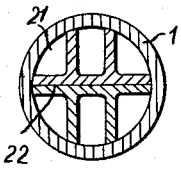


Fig. 4.



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Patented June 16, 1953 2,642,042

UNITED STATES PATENT OFFICE

2,642,042

WRITING INSTRUMENT

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Application March 17, 1950, Serial No. 150,334
In Great Britain March 23, 1949

10 Claims. (Cl. 120—42.17)

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This invention relates to writing instruments of the kind known as ball pens, in which a rotatable ball partially protrudes from a housing communicating with an ink reservoir so that rotation of the ball in contact with a writing surface transfers a small quantity of ink on the surface of the ball to the writing surface and thereby makes a trace on the latter.

In the construction of ball pens, as distinct from ordinary fountain pens, it is generally desirable for the diameter of the ink reservoir to be kept at a fraction only of that usual in ordinary pens, the communication passage between the reservoir and the writing ball being similarly restricted in diameter.

The present invention has for an object to provide an improved ball pen in which, while retaining these features, the ink capacity is considerably increased.

Another object is to provide a ball pen containing a plurality of ink reservoirs capable of being substituted for each other when a reservoir becomes exhausted.

Yet another object is to provide a ball pen in which the consumption of ink can be readily checked by the position of an adjustable element.

Other objects and features will become apparent as this specification proceeds.

According to the present invention, a ball pen comprises an outer case or barrel which is fitted at one end with a housing carrying the rotatable ball, and contains a rotatable cylindrical ink reservoir unit which has a set of distinct ink reservoirs extending from end to end of the unit and seats at its end nearer the ball housing against a cover or seating in the barrel, which normally closes the outlet ends of the reservoirs in the unit and is provided with an ink duct communicating with a duct in the ball housing leading to the ball, whereby the reservoir unit may be rotated to bring the outlet end of any one of the reservoirs into registry with the ink duct in the seating, and thus position the selected reservoir for use, while the remainder of the reservoirs in the unit remain closed at their outlet ends by said seating. A seating or cover may also be provided in the barrel for normally closing the other (herein called "inlet") ends of the reservoirs in the unit, and an air inlet opening or duct to the outside atmosphere may be arranged in the barrel so as to register with the inlet end of the reservoir in use. A suitable visible indicator is provided to indicate the series of positions of the unit relatively to the barrel, in which the respective reservoirs are brought into use.

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The reservoir unit may be moulded in one piece, or in two or more parts subsequently assembled. The separate reservoirs may be formed by a set of separate bores through the cylindrical body of the reservoir unit. Alternatively, the body may be provided with a set of grooves or channels in its external surface which is a close rotatable fit in the barrel so that the latter forms a separate reservoir tube with each groove or channel. The bores, grooves or channels may extend substantially parallel to the axis of the cylindrical body. Alternatively, and more especially in the case of the external grooves or channels, the reservoirs may extend along the body helically or in any other suitable arrangement providing a length for each reservoir greater than the length of the cylindrical body. The latter may be provided at its end with shoulders shutting respectively against the above-mentioned seatings in the barrel, and with axial portions of reduced diameter forming stems or spindles located in suitable bearing apertures formed in the seating member. At the "inlet" end of the cylindrical body, the stem may extend through and project from the seating member so that the projecting portion, or another member mounted thereon, is made accessible for rotation by hand, to rotate the reservoir unit relatively to the barrel.

One embodiment of the invention and a number of modifications thereof are illustrated in the accompanying drawings.

Fig. 1 is a longitudinal section of a ball pen embodying one form of the invention,

Fig. 1*a* is an elevational view of the reservoir unit thereof.

Fig. 2 is an elevation of the pen.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a cross section of the barrel and reservoir unit showing a modification.

Fig. 5 is a fragmentary view in section illustrating a modified form of the reservoir unit and of the retaining ring.

Fig. 6 is a section on line 6—6 of Fig. 5, and

Fig. 7 is a side elevation showing another modified form of the reservoir unit.

Referring now to the drawings, and more particularly to Figs. 1 to 3, 1 is the barrel of a ball pen according to the invention which may, for example, be made of moulded synthetic-resin material.

The tip of the barrel 1 has an axial cylindrical bore 2 extending into the centre of a conical seating 3 for the outlet end of the reservoir unit 4. The ball housing 5 has a stem 6 by which the housing is permanently fixed (such as by cement-

ing), or is removably fixed (such as by screwing) in the bore 2 in order to secure the housing to the barrel tip, and which has an axial ink duct 12. The outlet end of the cylindrical body 9 of the reservoir unit 4 is formed with a conical shoulder 7 which matches and abuts against the conical seating 3 in the barrel. Extending from the conical shoulder is an axial cylindrical peg 8 which fits into the bore 2 in the barrel tip. A number of internal reservoirs are formed as longitudinal recesses 10 in the cylindrical body 9. In the orbit of the outlet ends of the reservoirs 10 the barrel tip contains an ink duct 11 extending between the conical seating 3 and the bore 2 so as to form a passage for ink flow from the conical seating, to the duct 12 in the stem of the ball housing and to the ball 13 in the tip of the housing. At its other end, the barrel is open to permit insertion of the reservoir unit, which is then retained by a ring 14 cemented, screwed or otherwise fixed in the open end of the barrel to abut against the shoulder 15 at the adjacent end of the cylindrical body 9 of the reservoir unit, the stem 16 of the unit at that end fitting into and passing through the ring. An air hole or duct 17 adapted to communicate selectively with flutes 17a of the stem 16 is suitably positioned in the barrel and/or as shown in the retaining ring 14. A cap 18 shaped externally to conform to the exterior contour of the barrel is cemented or otherwise mounted on the projecting end of the stem 16 and serves for manual operation to rotate the reservoir unit 4 in the barrel 1. For indicating the operative positions of the reservoirs in the unit, the cap and the retaining ring (or barrel) may be provided with an index mark 19 on one member cooperating with a series of marks 20 (one for each reservoir) provided around the other member, which marks may be serially numbered. For intsance, the reservoir unit may be formed with six separate ink reservoirs, and the cap marked with the numerals 1 to 6 at the appropriate intervals thereabout, cooperating with an index arrow or other mark on the retaining ring or barrel.

The reservoir unit may if desired be moulded in two separate identical halves. Fig. 4 shows a cross section of a reservoir which is likewise equipped with six ink reservoir units 21, which are arranged symmetrically to a dividing line 22.

According to another modification illustrated in Figs. 5 and 6, the reservoirs are formed as bores 23 in the cylindrical portion 39 of the reservoir unit. In this embodiment also the retaining ring 34 is provided with an axial passage 35 which communicates with the air duct 37 and is adapted, at each operative position of the reservoir unit, to register with the inlet opening of the reservoir 23 the outlet opening of which communicates with the duct 11. This feature avoids the necessity of providing air ducts in the upper stem 36 of the reservoir unit corresponding to the ducts 16 shown in Fig. 1.

Fig. 7 shows a further modified form of the reservoir unit, in which the individual reservoirs are constituted by grooves 28 which are helically wound round the cylindrical portion 29 thus increasing the length of the reservoirs for a given length of the cylindrical body.

I claim:

1. A ball pen, comprising a barrel having a longitudinal bore, a housing connected to the barrel to close one end of said bore, a writing ball rotatably carried in said housing, said housing being formed with a duct communicating with said bore and leading to the ball, a cylindrical ink reservoir unit rotatably mounted in said bore of the barrel, said unit being formed with a set of ink reservoirs extending side by side from one end of the unit to the other, the barrel being formed adjacent to the ball housing with a seating co-operating with the adjacent end of the reservoir unit to normally close in an ink-proof manner one end of each reservoir and having an ink duct communicating with said duct of the housing, and means connected with the reservoir unit and extending outside the barrel for turning said unit in the bore of the barrel to selectively bring the said end of the individual said reservoirs into registry with the ink duct in the seating to selectively position one of said reservoirs for use, the barrel being composed of two parts detachably connected to each other, one part being formed with said seating and the other part being formed with a further seating for co-operation with the other end of the reservoir unit to normally close the other end of each reservoir, the part containing said further seating having an air-inlet duct communicating with the atmosphere and forming a port in said seating so disposed relative to the ink duct as to be in registry with the other end of any one of the reservoirs of the unit when one end of such reservoir is in registry with the ink duct.

2. A ball pen as claimed in claim 1, in which the reservoir unit is provided at its two ends with shoulders abutting respectively against said seating and against said further seating and with axial portions of reduced diameter forming stem spindles, each said part having a bearing aperture respectively extending through said seating and further seating, and said stem spindles being respectively located in said bearing aperture.

3. A ball pen as claimed in claim 2, in which the stem spindle at one end of the reservoir unit is formed integral with said unit and projects through said further seating to transmit rotation to the reservoir unit.

4. A ball pen as claimed in claim 1, in which the reservoir unit is formed as a cylindrical body and the individual reservoirs are formed as tubular passages which are substantially parallel to the axis of said body and extend through said body from one to the other end thereof.

5. A ball pen as claimed in claim 4, in which each said passage has an end portion of reduced cross-section for co-operation with said further seating to selectively connect each said reservoir with said air-inlet duct.

6. A ball pen as claimed in claim 1, in which the reservoirs are formed as grooves in the cylindrical surface of the reservoir unit, said surface having a sealing fit in the bore of the barrel.

7. A ball pen as claimed in claim 6, in which said reservoir unit is symmetrical to a diametrical plane, said grooves at each side of said plane being divided from each other by partitions disposed substantially perpendicularly of said plane.

8. A ball pen as claimed in claim 7, in which said reservoir unit is constituted of two separately moulded parts, said parts being in contact with each other along said diametrical plane.

9. A ball pen comprising a barrel which is fitted at one end with a housing and formed with a cylindrical bore extending longitudinally within said barrel, a cylindrical member rotatably mounted in said bore to form with said barrel a pair of co-operating members having sealingly co-operating complementary cylinder surfaces, means external of the barrel operable for pro-

ducing relative rotation of said members, and a writing ball rotatably carried by said housing, one of said members having grooves extending longitudinally in said cylindrical surface thereof constituting ink reservoirs, said grooves ending short of said housing so as to be normally cut off from communication therewith by the other of said members, the ball housing having a duct leading to the surface of the ball, and an ink-control duct communicating with said duct being provided in said other member, said ink control duct having an opening in the complementary cylindrical surface of said other member for selective communication with the adjacent outlet end of any one of said reservoirs, said other member being further provided with a vent control passage which is open to the atmosphere and has a port opening disposed in said complementary cylindrical surface for selective communication with one of said reservoirs near their inlet ends as the outlet end of each reservoir is placed into communication with the ink control duct.

10. A ball pen as claimed in claim 9, including means for indicating which of the reservoirs is in communication with the ink-control duct.

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