

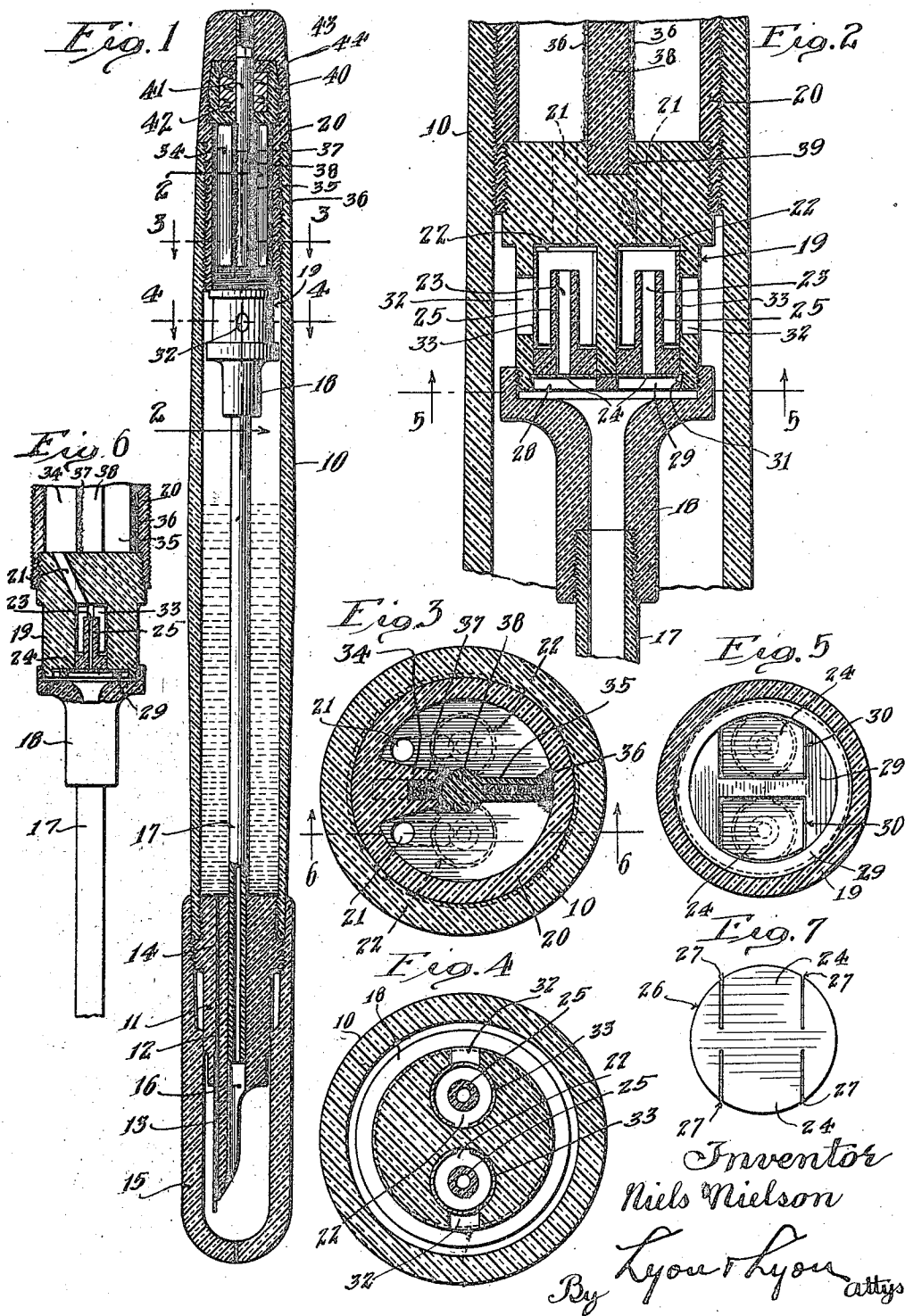
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N. NIELSON

SELF FILLING FOUNTAIN PEN

Filed May 23, 1922



UNITED STATES PATENT OFFICE.

NIELS NIELSON, OF LOS ANGELES, CALIFORNIA.

SELF-FILLING FOUNTAIN PEN.

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To all whom it may concern:

Be it known that I, NIELS NIELSON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Self-Filling Fountain Pen, of which the following is a specification.

This invention relates to fountain pens of the type designed to be supplied with ink by dipping it into a supply of ink and displacing the air from the ink reservoir so that ink will flow thereinto.

An object of the invention is to provide a pen of this description capable of holding a relatively great amount of ink for any given size of barrel.

Another object is to provide a fountain pen devoid of the commonly employed soft rubber reservoir, which deteriorates rapidly and must therefore be frequently renewed.

Another object is to make provision for expelling air from the ink reservoir through the ink feed so as to avoid all danger of leaking of ink, when the feed end is turned uppermost.

Another object is to make provision for expelling air from the ink reservoir by a comparatively simple plunger and valve construction.

Another object is to provide a form of valve that is especially useful in fountain pens.

The accompanying drawings illustrate the invention:

Figure 1 is a longitudinal mid-section of a self-filling fountain pen constructed in accordance with the provisions of this invention.

Fig. 2 is an enlarged fragmental longitudinal section on the line indicated by 2—2, Figure 1.

Fig. 3 is an enlarged cross section on the line indicated by 3—3, Figure 1.

Fig. 4 is an enlarged cross section on the line indicated by 4—4, Figure 1.

Fig. 5 is a reduced cross section on the line indicated by 5—5, Figure 2.

Fig. 6 is a fragmental longitudinal section on the line indicated by 6—6, Figure 3.

Fig. 7 is a plan view of the flap valve disk.

There is provided a tube or barrel 10 which constitutes the ink reservoir. The barrel 10 may be made of any suitable material and is preferably transparent.

Screw-threaded or otherwise secured to one end of the barrel 10 is an ink feed 11 which

is provided with a slot 12 at its outer end to receive the pen indicated at 13. This construction is well understood by those skilled in this art and, therefore, need not be described in further detail.

Throughout the length of the ink feed 11 runs the usual duct 14 for conveying ink from the barrel to the inner face of the pen. The usual detachable cap 15 is shown in place on the barrel 10 to protect the point of the pen and the clothing.

The ink feed 11 is provided with a second longitudinally extending duct 16 with which communicates an air exhaust tube 17 that, in this instance, has one end inserted in said duct 16. The other end of the tube 17 is enlarged, as at 18, and is screw-threaded or otherwise secured to a valve housing 19 which is mounted in any desired manner within the barrel 10. In this particular instance the housing 19 is screw-threaded to the lower end of a cylinder 20 which is screw-threaded in the upper end of the barrel 10. The housing 19 constitutes a head which closes the lower end of the cylinder excepting for ports 21 that extend lengthwise of the housing from the cylinder to valve chambers 22, respectively.

The valve chambers 22 are adapted to communicate through ports 23 with the enlarged tube portion 18 when flap valves 24, controlling said ports, are open. In this instance, the ports 23 are formed in plugs 25 which tightly fit in one end of the valve chambers 22. The valves 24 are formed by portions of a flexible disk 26 of rubber or other suitable material, said disk having slits 27 which define two of the margins of each valve, another margin of each valve corresponding with the periphery of the disk. It will be understood that the flap valves 24 are thus constructed for convenience in manufacture. The disk 26 is inserted in a recess 28 formed in one end of the housing 19, and also inserted in said recess is a valve retaining member 29 having openings 30 which register with the valves 24, so that said valves can open. The valve retainer 29 covers all portions of the disk 26 excepting the valves 24. The wall of the recess 28 is tapered as indicated at 31 so that the valve retainer 29 can be sprung into place and will be held by friction.

Each valve chamber 22 is provided in its side wall with a port 32 and inside of each valve chamber is a valve formed by a flexi-

ble split sleeve 33 made of soft sheet rubber or other suitable material and normally covering the port 32. The ports 32 communicate with the interior of the barrel 10.

5 The ports 21 communicate with the cylinder 20 on opposite sides of a partition 34 which extends part way across the bore of the cylinder. Rotatively fitting the inner edge of the partition 34 is an oscillatory
10 plunger 35 which extends from said partition to the wall of the cylinder. The piston is provided at its outer end with packing 36 so as to make the plunger air tight where it engages the cylinder. Preferably packing
15 37 will be employed between the shaft 38 of the plunger and the partition 34. The shaft of the plunger is circular so that when the plunger is turned into different positions it will closely fit the partition.

20 It will now be clear that when the plunger 35 is turned there will be a tendency to compress air on one side thereof and to create a partial vacuum on the other side, consequently air will be forced out of one
25 of the valve chambers through its port 23 and air will flow into the other valve chamber through its port 32. The plunger 35 has its inner end journaled in the housing 19 as indicated at 39. The housing 19 as stated
30 above constitutes one of the heads of the cylinder 20, and the other head is indicated at 40. The head 40 is screw-threaded into the upper end of the cylinder 20. The plunger shaft 38 is provided with a projecting
35 end 41 which passes through the head 40, there being packing 42 inside of the head 40 surrounding the shaft portion 41 to prevent leakage of fluid past said portion. Secured to the outer end of the shaft portion 41 is a
40 knob 43 whereby the shaft may be turned. The knob 43 is recessed at 44 to fit over the head 40.

It is to be understood that but one valve chamber and one set of valves may be employed and that I have provided the two
45 sets in order that the ink reservoir may be more quickly filled than with one set alone.

To fill the fountain pen described above, the cap 15 having first been removed, the
50 projecting end of the feed 11 will be immersed in the ink supply, and then the knob 43 will be oscillated between the thumb and finger to cause oscillation of the plunger 35. The plunger turning in one direction will
55 create a partial vacuum behind it, thereby drawing one of the valves 33 inwardly so as to permit air to flow from the barrel through one of the ports 32 thus opened and into the corresponding valve chamber thence
60 through the appropriate port 21 to the cylinder, the air being displaced from the reservoir by ink flowing into said reservoir through the duct 14. The next stroke of the plunger will reverse the action forcing the
65 air thus drawn in back through the port 21,

thus increasing the air pressure in the valve chamber so as to hold the valve 33 closed and open the flap valve 24 to permit the air to be discharged into the tube 17, whence the air escapes by way of the duct 16.

70 It will be clear that the fountain pen constructed as above described is of comparatively simple construction and quite durable. If the valves should deteriorate they can be readily renewed.

75 The self-filling fountain pens that are today largely in use are those having soft rubber reservoirs from which the air is expelled and the ink allowed to flow in to take the place of the air. In order that such pens
80 may be of neat construction, full compression of the reservoir cannot be effected, consequently but a comparatively small amount of ink is drawn into the reservoir. Owing to this the pen must be refilled after a comparatively short period of writing with it. With
85 this invention the reservoir can be entirely filled and, consequently, there is no wasted space in the reservoir.

If the barrel 10 is made of transparent
90 material, the quantity of ink in the pen can be observed at any time, thus avoiding the liability of having the reservoir become empty unexpectedly.

I claim:

95 1. In a self-filling fountain pen, the combination of a barrel, an ink feed at one end of the barrel having an ink duct, a cylinder, a plunger in the cylinder, means to operate the plunger, means forming a valve chamber communicating with the cylinder and provided with ports, an inwardly opening valve to control one of the ports, an outwardly opening valve to control the other port, and a tube communicating with the
100 last port when its valve is open, said tube also communicating with the atmosphere.

2. In a self-filling fountain pen, the combination of a barrel, an ink feed at one end of the barrel having an ink duct, a cylinder,
110 a plunger in the cylinder, means to operate the plunger, means forming a pair of valve chambers communicating with the cylinder on opposite sides respectively of the plunger and each provided with ports, inwardly opening valves to control one of the ports of each valve chamber, outwardly opening valves to control the other ports respectively, and a tube communicating with the
115 last named ports when their valves are open, said tube also communicating with the atmosphere.

3. In a self-filling fountain pen, the combination of a barrel, an ink feed at one end of the barrel having an ink duct, a cylinder,
120 a partition extending part way across the bore of the cylinder, a plunger rotatably fitting the inner edge of the partition and extending to the cylinder walls, means to oscillate the plunger, means forming a valve
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chamber communicating with the cylinder and provided with ports, an inwardly opening valve to control one of the ports, an outwardly opening valve to control the other port, and a tube communicating with the last port when its valve is open, said tube also communicating with the atmosphere.

4. In a self-filling fountain pen, the combination of a barrel, an ink feed at one end of the barrel having an ink duct, a cylinder, a partition extending part way across the bore of the cylinder, a plunger rotatably fitting the inner edge of the partition and extending to the cylinder walls, means to oscillate the plunger, means forming a pair of valve chambers communicating with the cylinder on opposite sides respectively of the partition and each provided with ports, inwardly opening valves to control one of the ports of each valve chamber, outwardly opening valves to control the other ports respectively, and a tube communicating with

the last named ports when their valves are open, said tube also communicating with the atmosphere.

5. In a valve construction, the combination of means forming a cylindrical valve chamber having a port at one end and a second port in its side, and a flexible sleeve in the valve chamber forming a valve to close the second port.

6. In a valve construction, the combination of means forming a cylindrical valve chamber having ports at its opposite ends and a third port in its side, a flexible sleeve in the valve chamber forming a valve to close the third port, and an outwardly opening valve for one of the end ports.

Signed at Los Angeles, California, this 17th day of May, 1922.

NIELS NIELSON.

Witnesses:

GEORGE H. HILES,
KATE McKEE.