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2,787,249

PRESSURIZING MEANS FOR INK DEVICES

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Fig. 1

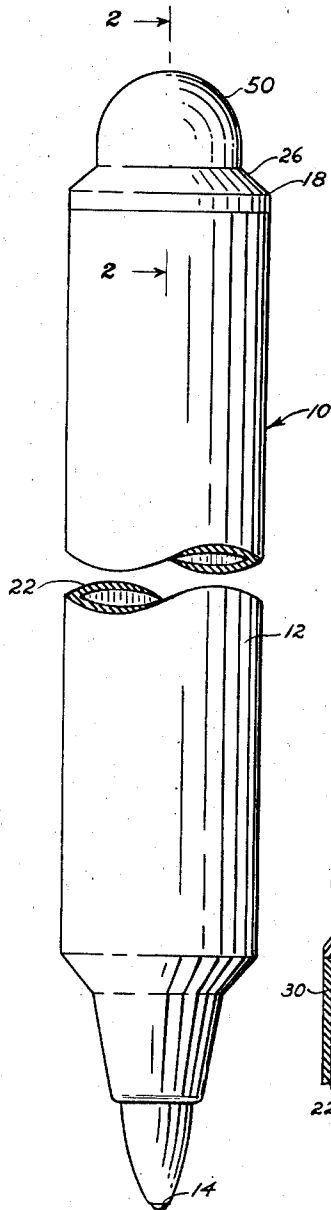


Fig. 2

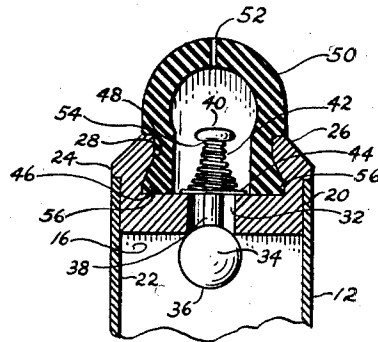


Fig. 4

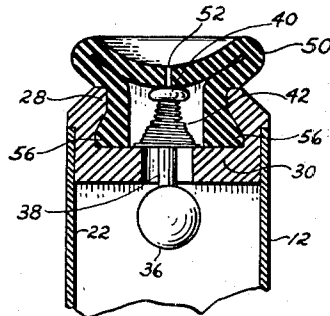


Fig. 3

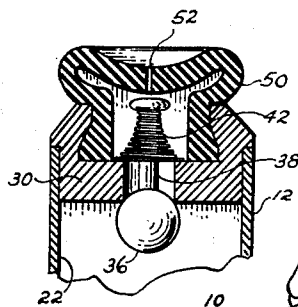
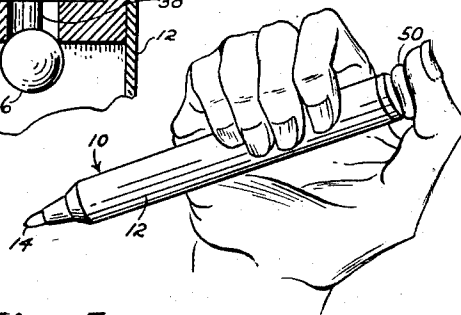


Fig. 5



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PRESSURIZING MEANS FOR INK DEVICES

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2 Claims. (Cl. 120—48)

This invention relates generally to ball point marking devices having means for creating above-atmospheric pressures within the ink retaining chamber thereof, and more particularly to an improved pressurizing means for introducing additional pressure within the ink retaining chamber. Reference is made to Patent No. 2,333,451, patented November 2, 1943, by Philip Sussman and Sidney D. Barlow, the present invention being an improvement over the structure disclosed therein.

In the prior art construction, of the type disclosed in the above patent, owing to the fact that the valve employed for retaining internal pressure above atmospheric pressure was operated by pneumatic pressure within the bulb, and not permitted to close until release of this pressure in the absence of a separate flexible container for the ink, a small amount of the same would, on occasion, leak past the valve into the bulb, and onto the fingers of the user. The modulus of the spring operating the valve must of necessity be of a relatively low order so as to permit the valve to open under small increments of pressure generated within the bulb upon compressing the same. Thus, while effective seals may be obtained, it has been necessary to provide a valve of relatively large sealing area to assure that no loss of pressure occurs upon release of the bulb. This construction has tended to increase the cost of manufacture, and has made necessary a more frequent replacement of valves than is contemplated by the present structure.

It is therefore among the principal objects of the present invention to provide simplified valve structure of the class described, in which a number of component parts heretofore necessary have been eliminated.

Another object of the invention lies in the provision of improved pressurizing means for use in conjunction with ball point marking devices in which the cost of fabrication has been materially reduced as compared with prior art devices, thereby permitting wider sale, distribution and use.

A further object of the invention lies in the provision of a manually operable valve disposed within the collapsible portion of a flexible bulb, the operation of which may be externally controlled, while simultaneously building up pressure within the collapsible bulb.

Still another object lies in the provision of a pressurizing valve of the class described which may be closed by a spring having a relatively high modulus, thereby assuring an adequate, leakproof seal.

These objects, as well as other incidental ends and advantages, will become more clearly apparent during the course of the following disclosure, and be pointed out in the appended claims.

On the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

Figure 1 is a fragmentary view in elevation showing an ink device embodying the invention.

Figure 2 is a fragmentary longitudinal central sectional

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view of the upper portion of the device, as seen from the plane 2—2 on Figure 1.

Figure 3 is a fragmentary sectional view, corresponding in most respects to that seen on Figure 2, but showing the bulb member thereof in a partially compressed condition.

Figure 4 is a similar fragmentary sectional view showing the bulb member in a fully compressed condition.

Figure 5 is a fragmentary view in perspective showing the operation of the device by a user.

In accordance with the invention, the device, generally indicated by reference character 10, comprises broadly: an elongated hollow tube 12 having a ball point 14 of a well-known type, and an upper end opening 16 in which there is engaged a metal plug member 18. As may be seen on Figures 2, 3 and 4, the plug member 18 is provided with a cylindrical outer surface 20 at the lower portion thereof, which is force fitted to the cylindrical inner surface 22 of the tube 12 to form a leak-proof seal therebetween.

The plug member 18 is provided with a flange portion 24, which serves to position the plug member 18 with respect to the opening 16, and an upper portion 26 provided with a tapered bore 28. At the lower end of the bore 28 is a base member 30 having a small counterbore 32 of generally cylindrical configuration extending therethrough and communicating with the hollow tube 12.

Disposed within the bore 32 is a valve member 34 of generally elongated configuration, including a lower ball-shaped portion 36, a shaft portion 38 which extends through the bore 32, and an operating button 40 which extends upwardly within the bore 28. A tapered coil spring 42 surrounds the shaft member 38, the lower end 44 bearing against the upper surface 35 of the member 30, while the upper end 48 contacts the undersurface of the button 40 to resiliently urge the valve member 34 to a closed position, as seen on Figures 2 and 3 wherein the ball shaped portion 36 may contact the lower edge of the bore 32 to effect a seal.

A rubber bulb member 50 is preferably provided with a central opening 52 to permit the ingress of air, and includes a tubular portion 54, which extends downwardly within the bore 28. A lip portion 56 corresponds in configuration to the lower portion of the bore 28, wherein the bulb 50 may resiliently maintain itself in engagement with the plug member 18.

As may be seen on Figures 2, 3 and 4, the operating button 40 of the valve member 34 extends substantially inwardly of the bulb member, so that when the bulb is in a compressed condition, as seen on Figure 4, the inner surface of the bulb member may contact the upper surface of the button.

In operation, the device 12 may be grasped, as seen on Figure 5, wherein the bulb 50 may be depressed with the thumb of the user. As the thumb is placed over the bulb, the opening 52 is closed, thereby confining the air within the same. As the thumb moves in a direction to compress the bulb, as seen on Figure 3, the air trapped within the bulb becomes compressed, although owing to the relatively high modulus of the spring 42, the pressure is not sufficient to dislodge the valve member 34 from a closed position. With continued compression, the inner surface of the bulb 50 strikes the upper surface of the button member 40, and dislodges the ball-shaped portion 36 from its seat at the lower end of the bore 32. When this occurs, the pressure within the bulb, which has been built up during compression, is suddenly discharged into the interior of the tube 12, automatically pushing away any small amounts of the fluid disposed within the tube. Upon partial release of the bulb 50, the valve member 34 immediately closes so that the injected volume of air is not lost. Further release of the bulb member 50 permits

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the same to assume its original shape as shown on Figures 1 and 2. Thus, the air is injected not as a gradual seepage, as has been the case in the prior art, but as a jet of compressed air which permits the valve to automatically clear itself as soon as it is opened. Owing to the disposition of the valve member with respect to the bulb, the valve member may be opened only when the bulb has been depressed, such opening being under manual force, rather than the force of the compressed air which is insufficient to open the valve pneumatically.

It may thus be seen that we have invented novel and highly useful improvements in pressurizing means for ink devices, in which there has been provided a manually operable valve which may be opened only to admit air under pressure in a single direction, and which will automatically close upon release of such manual pressure to prevent the pressurized chamber from relieving itself. Owing to the fact that air is injected as a sudden spurt or jet, the valve is self-clearing with each operation, and does not depend in any way upon pressure differentials for its opening motion. This construction permits a valve operating spring of relatively high modulus to be employed which insures an accurate and effective closing, and permits the complete absence of resilient materials at the valve seat. The device may be made at a cost comparable with that of prior art devices, and in some cases where resort is made to low cost materials at an even lower cost.

We wish it to be understood that we do not consider the invention limited to the exact details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the present invention pertains.

We claim:

1. In a marking device including a tube, a marking tip on one end of said tube and pressurizing means on the

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other end of said tube, the improvement comprising: said pressurizing means including a plug insertible into an open end of said tube, a valve disposed within said plug communicating with the interior of said tube; a flexible bulb disposed in sealed relationship with respect to said plug and surrounding said valve; said valve having a portion thereof extending outwardly of said plug into said bulb and free of contact with said bulb when in an undeformed condition whereby upon the exertion of manual pressure upon said bulb, and the partial deformation of the same, said valve may be manually operable to allow a jet of compressed gas to flow through said valve.

2. In a marking device including a tube, a marking tip on one end of said tube and pressurizing means on the other end of said tube, the improvement comprising: said pressurizing means including a plug insertible into an open end of said tube, a valve disposed within said plug communicating with the interior of said tube; a flexible bulb disposed in hermetically sealed relationship with respect to said plug, and surrounding said valve; said plug including an inwardly facing valve seat, said valve having a seatable portion normally engageable with said valve seat, and a shaft portion extending outwardly of said plug into said bulb and free of contact with said bulb when in an undeformed condition; whereby upon the manual deformation of said bulb and the partial compression of air disposed within the same, said valve may be manually operable to allow a jet of compressed air to flow through said valve into said tube.

References Cited in the file of this patent

UNITED STATES PATENTS

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2,333,451	Sussman et al.	Nov. 2, 1943