

Creative Design Study of Special Function Pens

Rui-Lin Lin

Department of Commercial Design
Chienkuo Technology University
Changhua, Taiwan
linrl2002@gmail.com

Abstract—Pens are closely associated with human needs. Regardless of the advancement in science and technology, the function of a pen cannot be completely replaced. The rapid changes in science and technology have brought forth pens with special features for everyone's scrutiny. This paper proposes a creative design and research on special pens that function as lighting warning pen, lighting laser pointer, and bookmark pen.

Keywords—creative design, special function pens, lighting warning pen, lighting laser pointer, bookmark pen.

I. INTRODUCTION

Pens are closely associated with human needs. Regardless of the advancement in science and technology, the function of a pen cannot be completely replaced. The rapid changes in science and technology have brought forth pens with special features for everyone's scrutiny. This paper proposes a creative design and research on special pens that function as lighting warning pen, lighting laser pointer, and bookmark pen.

At night or when lighting is poor, the content of what one is reading is not easily visible. Lighting tools made in the form of a portable pen would be beneficial for reading. Equipped with a timer, it can improve reading efficiency or be capable of reminding the user to rest and avoid eye strain.

The idea for this design was to combine the concepts of a laser pointer, night reading, and timer, along with a flashing warning light to remind users of time, in hopes of helping them give a more precise presentation, have a better reading experience, and improve their working efficiencies.

Ordinarily, the bookmark pen can be used as a bookmark. When texts need to be highlighted, users can slide the pen out via the side track, then use the pen for highlighting.

II. LITERATURE REVIEW

Some scholars conducted experimental tests on battery-powered LED lighting technology that can precisely control lighting time and power. Long-term use showed no indications of malfunction. This lighting technology possesses longer life-cycle and shows satisfactory results [1]. Zdravkovska considers that laser pointers are low-cost and low-tech, but comparable in increasing student engagement [5].

Experiments with patterns and colors for laser projection were also conducted in order to obtain the energy for different spectral projection [3], as well as experiments on amount of paint coating for special pens or light intensity [8] [7].

Medically, marking pens are used during surgery to mark where incisions are to be made [6] [2]. During fabrication, an instrument is used to control the ink flow of the marker in order to devise the most affordable method of production [4]. Pens have unlimited functions, but their purpose is to bring more convenience, safety, and affordability to mankind.

III. CREATION DESIGN

Reading at night with a light on may influence others in the same room. Furthermore, reading for a long time may lead to eye strain. This pen for night reading can timely remind users to take a break. The lighting function triggered by touching the pen allows users to read in a dark place. This product is designed based the theories of a touch pen and a lighting pen, with LED light integrated inside. It provides users an illuminating function for reading and a timer function to remind them and help them concentrate on reading. When the user touches his book with the tip of the pen so that some force is applied on it, the light inside the tip is turned on, allowing the user to read at night with his hand leading the light. On the end of the pen is a timer which the user can set to the desired time. When time is up, the pen would flash automatically as a reminder to rest.

When the lighting warning pen is placed perpendicularly on a book, the pressure on the tip compresses the spring, connecting the positive and negative electrodes on the circuit board to the LED light to provide illumination to the reader. The timing function is activated by rotating the dial gauge to start the countdown. When time is up, the warning device will flash to give notification. The lighting warning pen has a pen head connected to the barrel and a transparent tip. Inside the pen head is a spring which is placed against the positive and negative electrodes of the circuit board. The positive and negative electrodes are placed on the lamp holder, and the lamp holder is connected to the LED light and timer. The top part of the timer has a warning light. When pressure is put on the tip, the spring compresses the turn-on circuit connected to the LED light, thus, providing light for reading. In addition, the timer function can also be used, so that when pressure is applied to the tip, the user can be reminded to rest or concentrate on reading.

The lighting laser pointer has an illuminator inside the pen head and a press switch on its surface. The head has a transparent casing and illuminating tip that enable light to pass through. The cap surface has a display screen, warning light, adjustment device, and a clip. The rotatable shaft of the clip is connected to the cap. The barrel is a hollow tube used to connect the head and the cap. The barrel surface has LED lights. Inside the barrel are mercury batteries. The illuminator is controlled by pressing the switch, then the illuminating tip emits a bright illuminating ray. The clip may be used to fix this lighting laser pointer on a book. Time can be set on the display screen to start countdown, enabling the LED light to automatically light up until countdown is completed. Then, the warning device will notify that the pre-set time is up through flashes.

The laser from the tip of the pointer can be used in presentations to highlight specific information. The flashing lights of two contrasting colors can be used to remind the user of time left for the presentation. The pointer is small and easy to carry, with an electronic timer installed at the rear end. This pointer comes with a pen clip, making it easy to fasten to a book. The range of illumination on a book can be maximized if the pointer is placed on its center. This way, the user can read the book under the best lighting condition. The power is supplied by at least one mercury battery inside the pointer. There are several LED electricity generation devices on both sides of the pointer. The LED electricity generation devices are connected to at least one mercury battery inside the pointer through circuits to recharge the battery/batteries.

Another design is the bookmark pen. When one reads a book, he usually needs a bookmark to help him find the place in the book where he left off last time. However, when he needs to highlight something, he needs to find a pen to do so, which is inconvenient; therefore, this bookmark pen was designed. Ordinarily, the bookmark pen can be used as a bookmark. In case texts need to be highlighted, the user can slide the pen out via the side track and use the pen for highlighting. This design helps improve user reading efficiency.

IV. DESIGN RESULTS

The structure and usage scenarios of the lighting warning pen, lighting laser pointer, and bookmark pen are shown in figures 1 to 3. The lighting warning pen and lighting laser pointer were able to successfully obtain new patent registrations (figure 4 and figure 5). They were respectively presented at the 2013, 2014 Korea Cyber International Genius Inventor Fair and won silver medals (figure 6 and 7). The bookmark pen was presented at the 2013 Korea Cyber International Genius Inventor Fair and obtained the gold medal (figure 8).

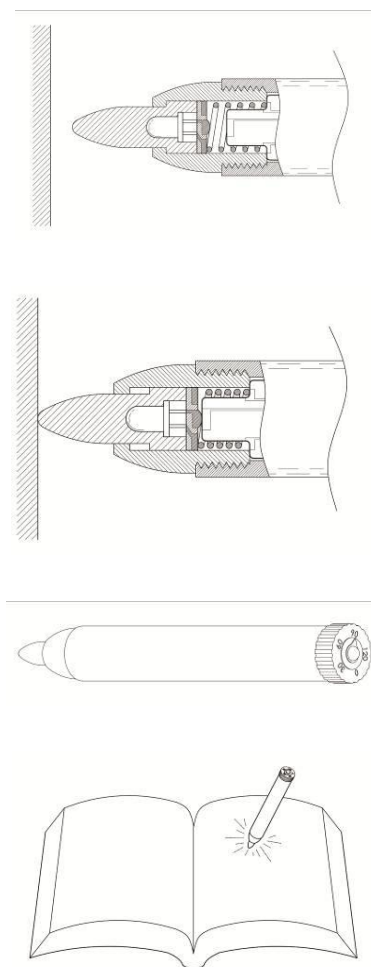


Fig. 1. Lighting warning pen





Fig. 2. Lighting laser pointer for reading

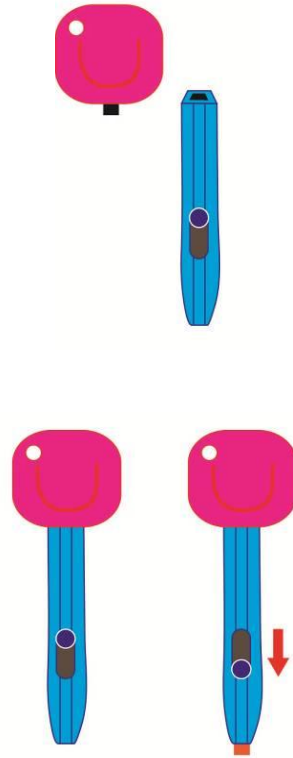
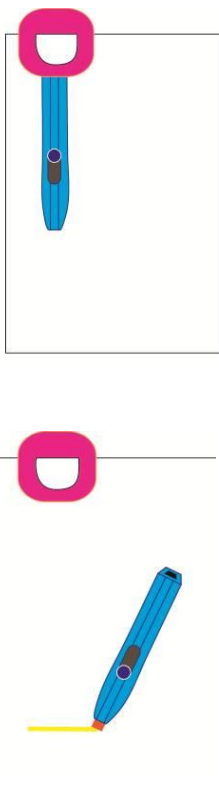


Fig. 3. Bookmark pen

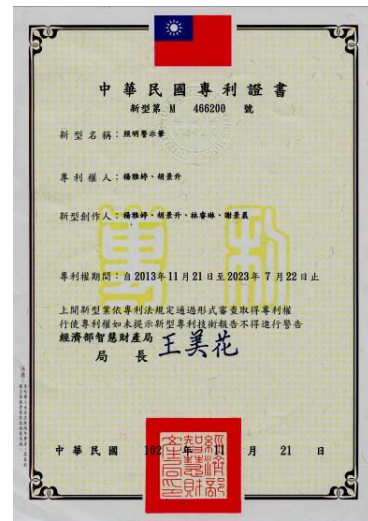


Fig. 4. Utility patent



Fig. 5. Utility patent



Fig. 8. Gold medal



Fig. 6. Silver medal



Fig. 7. Silver medal

V. CONCLUSIONS

In general, the results for the innovative research and development of this study are summarized and illustrated below:

(1) The lighting warning pen has both timing and illuminating functions so that readers can concentrate on reading without disturbing other people in places with insufficient lighting.

(2) The lighting laser pointer possesses timing, illuminating, and presentation prompting functions that enable the user to keep time during presentation, as well as provide help during night-time reading.

(3) The bookmark pen has the functions of a bookmark and those of a pen. Ordinarily, the bookmark pen can help find the place in a book where one left off last time. When necessary, it can be used to highlight key points, improving reading efficiency.

(4) These products are worthy of related manufacturers' attention and their assistance in the technical aspect for follow-up mass production.

REFERENCES

[1] B. J. Huang, C. W. Chen, P. C. Hsu, W. M. Tseng, and M. S. Wu, Direct battery-driven solar LED lighting using constant-power control, *Solar Energy*, 86(11), 2012, 3250-3259.

[2] G. Dellatorre, and F. B. Cerci, Syringe pen: An alternative skin-marking tool in dermatologic surgery, *Journal of the American Academy of Dermatology*, 73(5), 2015, e179-e180.

[3] M. Štofík, A. Semerádová, J. Malý, Z. Kolská, O. Neděla, D. Wrobel, and P. Slepíčka, Direct immobilization of biotin on the micro-patterned PEN foil treated by excimer laser, *Colloids and Surfaces B: Biointerfaces*, 128(1), 2015, 363-369.

[4] N. Nuchtavorn, and M. Macka, A novel highly flexible, simple, rapid and low-cost fabrication tool for paper-based microfluidic devices (μPADs) using technical drawing pens and in-house formulated aqueous inks, *Analytica Chimica Acta*, 919(5), 2016, 70-77.

[5] N. Zdravkovska, M. Cech, P. Beygo, and B. Kackley, Laser Pointers: Low-cost, Low-tech Innovative, Interactive Instruction Tool, *The Journal of Academic Librarianship*, 36(5), 2010, 440-444.

[6] S. Kikuchi, R. D. Kenagy, L. Gao, T. N. Wight, N. Azuma, M. Sobel, and A. W. Clowes, Surgical marking pen dye inhibits saphenous vein cell proliferation and migration in saphenous vein graft tissue, *Journal of Vascular Surgery*, 63(4), 2016, 1044-1050. 7. Y. Wu, C. X. Zhou, J. Yu, H. L. Liu, and M. X. Xie, Differentiation and dating of gel pen ink

entries on paper by laser desorption ionization-and quadruple-time of flight mass spectrometry, *Dyes and Pigments*, 94(3), 2012, 525-532.

[7] Z. X. Cai, X. Y. Zeng, and J. Duan, Fabrication of platinum microheater on alumina substrate by micro-pen and laser sintering, *Thin Solid Films*, 519(11), 2011, 3893-3896.