March 23, 1965 H. K. BROSS 3,174,462

WRITING INSTRUMENT

Filed Jan. 10, 1963 3 Sheets-Sheet 1

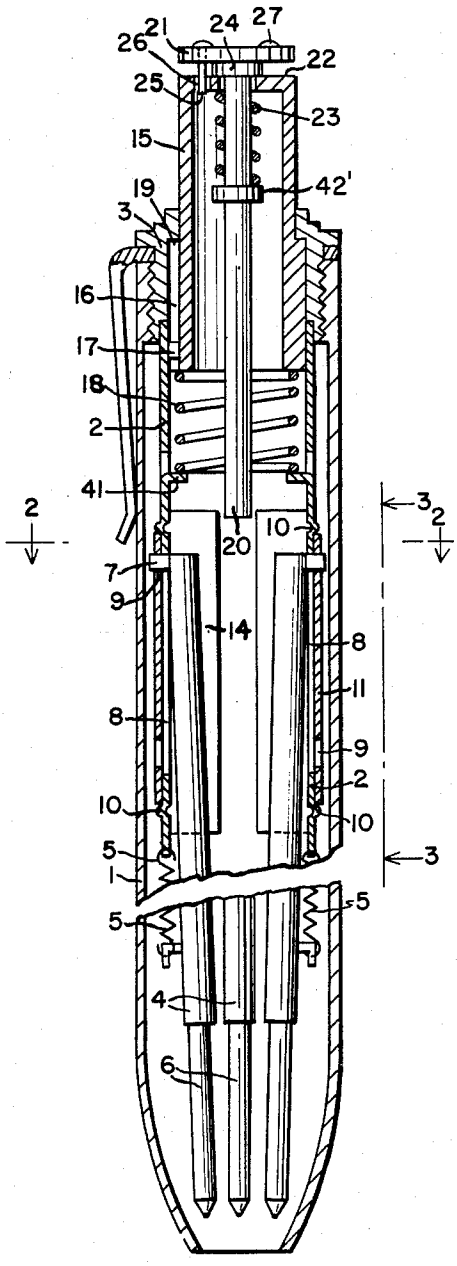


FIG. 1

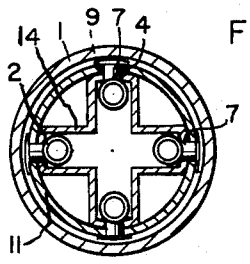


FIG. 2

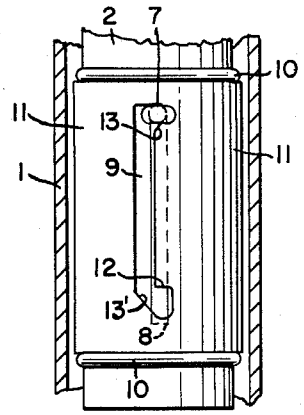


FIG. 3

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March 23, 1965 H. K. BROSS 3,174,462

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Filed Jan. 10, 1963 3 Sheets-Sheet 2

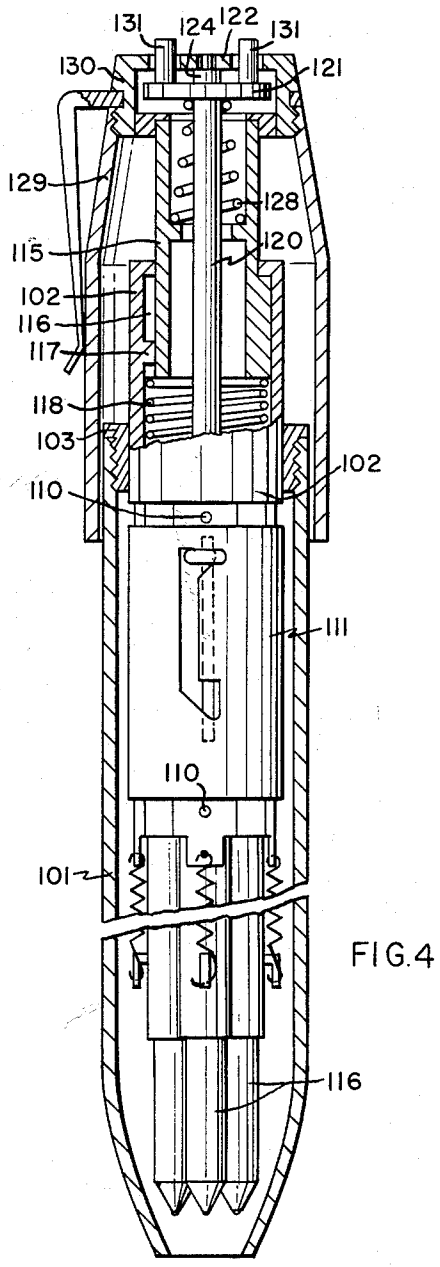


FIG.4

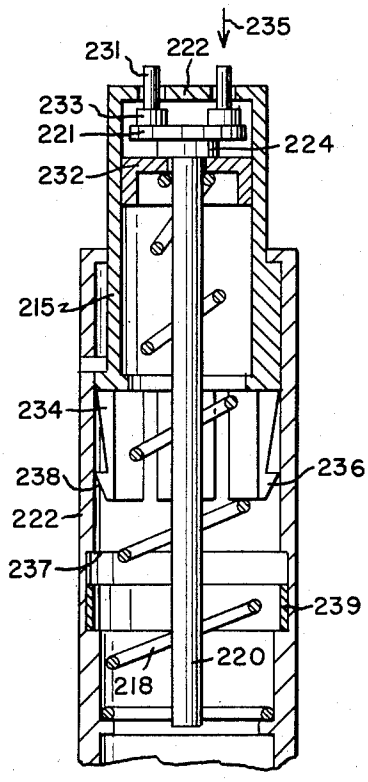


FIG.5

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March 23, 1965 H. K. BROSS 3,174,462

WRITING INSTRUMENT

Filed Jan. 10, 1963 3 Sheets-Sheet 3

FIG. 6

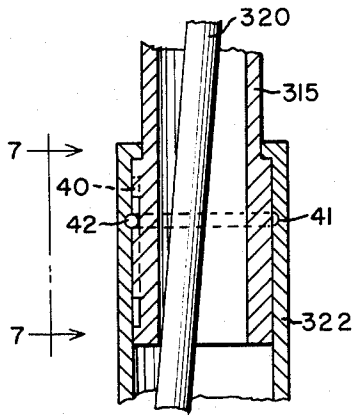
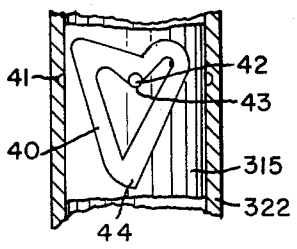


FIG. 7



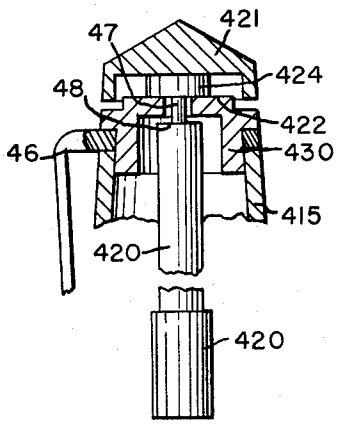


FIG. 8

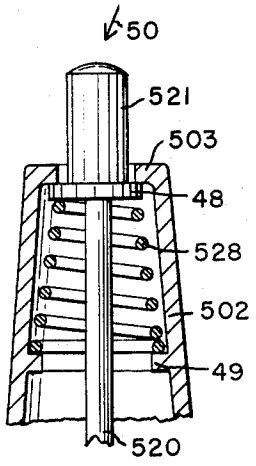


FIG. 9

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United States Patent Office 3,174,462 Patented Mar. 23, 1965

3,174,462
WRITING INSTRUMENT

Helmut Karl Bross, Altenberg uber Nurnberg, Germany, assignor of thirty-three and one-third percent to Frank T. Johmann, Berkeley Heights, N.J.

Filed Jan. 10, 1963, Ser. No. 250,588
Claims priority, application Germany, Jan. 11, 1962, B 65,481; Mar. 1, 1962, B 66,160
9 Claims. (Cl. 120—42.13)

This invention relates to writing instruments. Particularly, the invention relates to an exchange writing instrument having a plurality of retractable writing units, such as ballpoint cartridges, within the instrument casing and pushbutton means for selectively projecting one of said writing units, wherein the selection and projection can be a one-handed operation.

Various one-handed exchange pens are known. In one prior type of exchange pen, each writing unit has its separate pushbutton for retraction or projection of each unit. However, the pushbuttons are usually very small and difficult to operate. Another type exchange pen has a single pushbutton which cooperates with gravity operated selection means. This latter type of pen depends partly upon the skill and comprehension of the user and is subject to errors if the pen is not properly positioned during operation.

The present invention represents an improvement over said prior devices by providing a pen with a single pushbutton, which both selects and projects the desired writing unit, is simple to operate, requires no skill and does not depend upon gravity. In this improved pen, the selection is made by positioning the finger on the marked end of the pushbutton so as to exert a greater force on one side of the pushbutton to thereby tilt the pushbutton from its longitudinal axis to align the inner end of the pushbutton with the selected writing unit. The pushbutton is then depressed and released to project the selected writing unit. A subsequent depression and release of the pushbutton can retract the projected cartridge, and depending upon the latching mechanism, can even simultaneously project another cartridge.

The invention will be further understood by reference to the following description an drawings, which include a preferred embodiment of the invention, and wherein:

FIGURE 1 is a longitudinal view, partly in section, of one embodiment of the invention.

FIGURE 2 is a cross-sectional view taken along the lines 2—2 of FIGURE 1.

FIGURE 3 is a sectional view taken along the lines 3—3 of FIGURE 1.

FIGURE 4 is a longitudinal view, partly in section, of another embodiment of the invention.

FIGURE 5 is a fragmentary longitudinal view, partly in section illustrating another locking device that can be used in the pens of FIGURES 1 to 4.

FIGURE 6 is a fragmentary longitudinal sectional view, illustrating another locking device that can be used in the pens of FIGURES 1 to 4.

FIGURE 7 is a sectional view taken along the lines 7—7 of FIGURE 6.

FIGURE 8 is a fragmentary sectional view illustrating another form of the pushbutton assembly that can be used in the pens of FIGURES 1 to 7.

FIGURE 9 is a fragmentary sectional view illustrating still another form of the pushbutton assembly that can be used with the pens of FIGURES 1 to 7.

Reference is now made in detail to the embodiment of FIGURES 1 to 3. Here, the main outer tubular barrel 1 is connected to the inner concentric sleeve 2 by means of the threaded connector 3. Writing cartridges, e.g. ballpoint pen cartridges 6 are frictionally held within the cartridge carrying sleeves 4 which are urged upwardly by the tension springs 5. The longitudinally movable cartridge carrying sleeves 4 have lugs 7 transversely extending through circumferentially spaced longitudinal slots 8 formed in the inner sleeve 2 and the matching slots 8' formed in guide sleeve 14, and also extending through the cam openings 9 defined by the locking sleeve 11. Locking sleeve 11 is freely rotatable on the sleeve 2, but is restrained against longitudinal movement relative said sleeve by the stops or annular flanges 10. The locking edge 12, of each cam opening 9, in cooperation with the unlocking slant edges 13, has the effect that a first projected cartridge is automatically unlocked from its projected position by the partial rotation of the locking sleeve 11 as a second different cartridge is projected, whereby the now unlocked first projected cartridge is retracted by contraction of its extended torsion spring 5. Thus, downward movement of a selected cartridge, against pressure of its spring 5, will cause sleeve 11 to first shift by partly rotating in a counter-clockwise direction when viewed from the top, as the lug 7 bears against slant edge 13. Upon the lug 7 hitting the lower slant edge 13', the locking sleeve 11 then shifts by partly rotating in a clockwise direction when viewed from the top. Now upon release of downwardly directed pressure on the cartridge, the lug 7 now abuts the edge 12 and the cartridge is held projected against the retractive force of its spring 5. It will be apparent that upon projecting a newly selected cartridge, that as the lug of said newly selected cartridge hits edge 13 to cause said counter-clockwise shift, the edge 12 is shifted from locking engagement with the projected cartridge so that the projected cartridge automatically retracts. If the downward pressure on the newly selected cartridge is now released, it also will be retracted with the result that no cartridge at all is projected. On the other hand, if downward pressure is maintained on the newly selected cartridge until the aforesaid clockwise shift is obtained, then the newly selected cartridge is held projected. A locking sleeve mechanism of this type is known and is used in multicolored ballpoint cartridge pens.

Separating the carrying tubes 6, are the ribs 14.

The hollow pushbutton body 15 is longitudinally movable in the sleeve 2 and connector 3, but is not rotatable thereto due to the lug 17, of sleeve 2, extending into the longitudinal slot 16 formed in the sleeve 15. The coil compression spring 18 seating atop lugs 41 urges pushbutton body 15 upwardly so that its lug 17 seats against the stop edge 19. Within the tubular pushbutton body 15 is the actuating arm 20 fixed to the plate lever 21 above the top wall 22 of the pushbutton body 15. The plate lever 21 is pulled downwardly by coil compression spring 23 abutting the collar 42' and the inner side of top wall 22. The collar 24 supports plate lever 21 above wall 22, so that plate lever 21 can pivot. The lug 25, fixed to plate lever 21, and extending into the aperture 26. prevents relative rotation of plate lever 21 and the pushbutton body 15. By pressing directly down on a selected color mark 27 on lever 21, the actuating arm 20 is pivoted and swings over the carrying sleeve 4 carrying a cartridge with ink of the same color as the selected color mark 27. The lower end of arm 20 is guided by the ribs of guide sleeve 14 to achieve exact alignment of the lower end of arm 20 with the selected cartridge. Upon pressing downwardly on the selected color mark 27, the pushbutton body 15 now begins to move downwardly against the pressure of spring 18, thereby carrying actuating arm 20 downwardly so as to force the selected cartridge downwardly to a projected position while said cartridge carrying sleeve 4 actuates the locking sleeve 11 in a manner previously described. Upon release of pressure on the color mark 27, the pushbutton body 15 moves upwardly

under action of spring 18 to its original position, ready for a new actuation.

In FIGURE 4, the barrel 101 is fixed to the inner sleeve 102 by tubular connection 103, whose outer periphery carries latching sleeve 111 between stop pins 110 fixed to sleeve 102. Sleeve 102 defines lug 117 projecting into slot 116 to prevent relative rotation of the inner pushbutton body sleeve 115. Spring 128 urges the plate lever 121 upwardly so that its collar 124 abuts the outer pushbutton assembly wall 122. The outer pushbutton sleeve 129 is fixed to inner sleeve 115 by the tubular collar 130. The plate lever 121 has four upwardly projecting buttons 131 fixed to it, each button 131 being of a different color and projecting through a corresponding aperture in end wall 122. Each button 131 represents a different cartridge 116 and pressure exerted on a selected button 131 will pivot actuating arm 120 to a position above the desired cartridge, while additional pressure will force the entire pushbutton assembly downwardly against pressure of compression spring 118 to project the selected cartridge and actuate locking sleeve 111.

The embodiment of FIGURE 5 involves an exchange pen wherein the latching sleeve 11 or 111 has been replaced by another known locking device known as a drag-sleeve mechanism. Here, the plate lever 221, having the color selection buttons 231 projecting through the end wall 222 of pushbutton sleeve 215, has collars 233, and the collar 224 seating on the apertured support 232 fixed to sleeve 215. Fixed to the lower end of sleeve 215, are the spring-like hooks 234 whose lower ends 238 are biased outwardly from the axis of the pen. Upon exerting downwardly directed pressure on a button 231 in the direction of arrow 235, the plate 221 pivots on collar 224 to thereby swing arm 220 over the corresponding cartridge. Further pressure on button 231 moves sleeve 215 down against the pressure of spring 218 until the lower portions 238 of hooks 234 snap or spring outwardly so that upon release of pressure on button 233, the underside 236 of said hooks will come into abutting engagement with the annular shoulder 237 defined in sleeve 222. The selected cartridge is now held projected against the action of its retraction spring due to abutment of its carrier with the end of rod 220 which is maintained in its slanted actuating position by means of said abutment. To retract the projected cartridge, the sleeve 215 is moved further downwardly, whereupon the slant edges 238 of member 234 now abut and enter into the loose sleeve 239 and become frictionally engaged therewith. Upon release of downwardly directed pressure, the pushbutton sleeve 215 moves upwardly carrying the spring latches 234 upwardly which now drag sleeve 239 upwardly until the sleeve 239 abuts the shoulder 237 whereupon elements 234 slide off sleeve 239 and onto engagement with sleeve wall 222. The entire assembly then reverts to its original position of FIGURE 5.

In FIGURES 6 and 7, a heart-shaped cam groove 40 is formed on the periphery of sleeve 315 which carries the locking ball or pawl 42 which is also carried in the annular groove 41 defined in sleeve 322. Heart-shaped cam mechanisms are well known in ballpoint retractable pens. When the ball 42 is in the notch 43 the sleeve 315 is held in a projected position so that its pivotally connected actuating arm 320 is held in a slanted position against a projected cartridge. When the ball 42 is in the notch 44, the sleeve 315 is in a retracted position and arm 320 is free of contact with the cartridge units so that all cartridge units are retracted.

In FIGURE 8, the actuating plate lever 421 has pivoting collar 424 seating on the end wall 422 of connector 430. Connector 430 is fixed to pushbutton sleeve 415 and seats the clip 46. The plate lever 421 is fixed to arm 420 by the neck 47 extending through an aperture in wall 422 to connect to the actuating arm 420. This

embodiment provides a neat streamline appearance at the upper end of the pencil, while collar 424 and shoulder 48 pivotally fixes arm 420 and pressure plate 421 to end wall 422 and avoids the use of a spring, e.g., the spring 23 and collar 42 of FIGURE 1.

In FIGURE 9, the barrel 502 has the annular ring 49 seating spring 528 whose upper end abuts collar 48 of arm 520 to thereby force collar 48 into abutment with end wall 503. Fixed to collar 48 is the lever 521, which also serves as a pushbutton. By directing force on pushbutton 521 in the direction of arrow 50, the arm 520 is pivoted to an operating position, and simultaneously moved inwardly into the barrel 502, which contains the writing units and latching device.

The exchange pens of the invention can be made in the form of 2, 3 or 4 color pens, or can use fluid lead, or mechanical pencil writing units as well as colored ballpoint pen ink cartridges, or cartridges all of the same color.

I claim:

1. A writing instrument comprising a casing; a plurality of writing units longitudinally movable within said casing between a retracted and projected position; a retraction spring urging each of said units to a retracted position; a releasable latch means for holding a selected writing unit projected against the urging of its retraction spring; and a pushbutton assembly carried at the upper end of said casing including a pushbutton having an outer end defining an actuating surface engageable with a finger or thumb and an inner actuating portion selectively engageable with one of said writing units, said pushbutton being pivotally mounted on said instrument whereby a first pressure exerted on said actuating surface offset from the longitudinal axis of said pushbutton will pivot said inner portion to bring it into alignment with one of said writing units, and a second pressure, larger than said first pressure will longitudinally depress said pushbutton relative to said writing units to thereby project the writing unit aligned with said inner portion.

2. A writing instrument according to claim 1, wherein said latch means includes a shifting sleeve defining a plurality of cam slots, a lug carried by each of said units and projecting into one of said cam slots, each of said slots defining an upper cam surface and a lower cam surface whereby longitudinal movement of a selected unit downwardly relative said sleeve causes its lug to first engage said upper cam surface to circumferentially shift said sleeve to an unlocked position whereby any projected writing unit is released from locking engagement with said sleeve and is retracted by its retraction spring, while continuation of downward longitudinal movement of said selected unit will cause its lug to engage said lower cam surface to circumferentially shift said sleeve to a locking position so as to lock said selected unit in a projected position against the retraction action of its retraction spring.

3. A writing instrument according to claim 1, wherein said instrument defines an annular slot and a shoulder, and said latch means includes a drag sleeve longitudinally slidable within said annular slot, and a spring latch carried by said pushbutton, said spring latch defining a hook engageable with said shoulder upon initial downward movement of said pushbutton, said spring latch entering said drag sleeve and becoming frictionally engaged therewith upon further downward movement of said pushbutton whereby upon upward movement of said pushbutton said sleeve is dragged upwardly into limiting abutment with said shoulder whereupon said hook slides off said drag sleeve to permit said pushbutton to return to its original position.

4. A writing instrument according to claim 1, wherein said latch means comprises a pawl member and a cam member in engagement therewith, one of said members being carried by said pushbutton and the other of said

members being carried by said casing, said cam defining a point-retracted position and a point projected position, said pawl when engaged with said cam in said point-retracted position being operable to hold a selected writing unit in a projected position, said pawl when engaged with said cam in said point retracted position being operable to allow a projected writing unit to be retracted to its retracted position, said pawl being shifted back and forth between said positions upon successive sequences of depression and release of said pushbutton.

5. A writing instrument according to claim 4, wherein said cam member is said pushbutton which has a heart-shaped groove defining a cam, wherein said pawl is a ball, and said casing defines an internal annular groove which carries said ball.

6. A writing instrument according to claim 1, wherein said pushbutton includes a member longitudinally movable within said casing and defining a substantially flat outer end wall, and a disk defining said actuating surface, said disk having a collar seating on said end wall whereby said disk can be pivoted about said collar, and a rod fixed to said disk at right angles thereto which defines said inner portion of said pushbutton.

7. A writing instrument according to claim 6, wherein

said disk is above said outer end wall and is marked with directing marks keyed to said writing units.

8. A writing instrument according to claim 7, wherein said outer end wall defines an aperture, and a lug projects downwardly from said disk into said aperture to prevent relative rotation of said disk and said end wall.

9. A writing instrument according to claim 6, wherein said disk is below said outer end wall, wherein said end wall defines a plurality of apertures and a series of lugs fixed to said disk extends upwardly through said apertures, each of said lugs being keyed to one of said writing units whereby application of pressure to one of said lugs will pivot said disk to align said rod with the inner end of one of said writing units.

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