

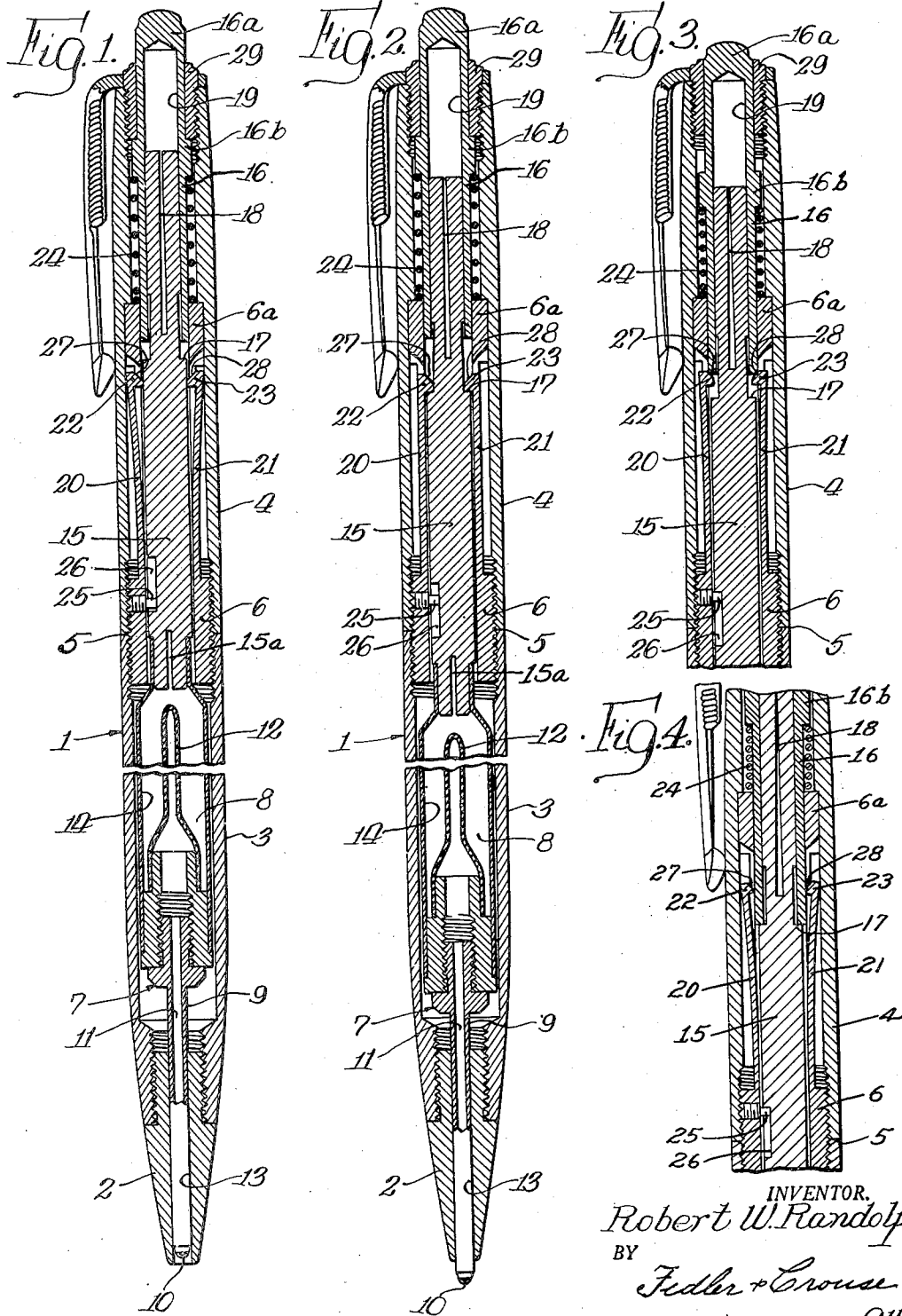
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BALL-POINT WRITING INSTRUMENT

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BALL-POINT WRITING INSTRUMENT

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This invention relates to writing instruments and more particularly ball-point writing instruments of the kind wherein the writing point is propellable out of and retractable into the holder.

The immediate object is to provide a pushbutton operated propel-repel writing instrument—more especially of the ball-point variety—which is highly dependable in operation and yet capable of being produced at low cost.

A more specific object is to provide in a ball-point writing instrument a simple, inexpensive and reliable mechanism whereby successive manipulations of a single pushbutton or the like will effectuate both propulsion and retraction of the writing point.

A more comprehensive object is to provide a simple mechanism whereby two different kinds of operations can be brought about, consecutively and alternately, through repeated identical manipulations of a single pushbutton or the like.

A further object is to provide a pushbutton operated ball-point writing instrument of the retractable point variety wherein the ball point and ink reservoir are incorporated in a self-contained unit which can easily be withdrawn from the holder and replaced.

A preferred embodiment of the invention, as applied to a ball-point writing instrument, is illustrated in the accompanying drawing, wherein:

Fig. 1 is a longitudinal sectional view showing the writing point of the instrument in retracted position;

Fig. 2 is a view similar to Fig. 1 showing the writing point in its projected position;

Fig. 3 is a fragmentary view showing how the driving member of the propel-repel mechanism releases the latch to enable retraction of the writing point; and

Fig. 4 is a fragmentary sectional view showing the parts in the positions they assume when the driving member is fully depressed.

The instrument shown comprises an elongate, hollow holder 1 including a tapered metal tip member 2 attached to the front end of a tubular barrel consisting of two parts, 3 and 4, joined end-to-end at 5 through the medium of a threaded sleeve 6.

Disposed within the forward portion of the holder is a ball-and-cartridge unit 7 comprising an ink-reservoir portion 8 to the front of which is attached a forwardly extending feed tube 9 of small diameter terminating in a ball point 10 and having an ink passageway 11 for conducting ink from the reservoir to the back of the ball point. Contained within the reservoir portion 8 is a flexible sac 12 which constitutes the ink

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holder per se. Sac 12 may be made of thin rubber or the like and is filled with a viscous paste-like ink which flows by gravity through passageway 11 to the back of ball point 10 by which the ink is, in turn, conveyed to the writing surface. The exterior of sac 12 is always subjected to atmospheric pressure so that as the ink supply is used up the pressure within the sac remains atmospheric instead of going below that pressure as would otherwise be the case. When sac 12 is filled to normal capacity it is expanded to occupy nearly all the space in reservoir 8. It is shown in a condition of partial exhaustion.

Ball-and-cartridge unit 7 is reciprocable lengthwise, as a whole, within the holder, between the position in which it is shown in Fig. 1 and that in which it is shown in Fig. 2. In Fig. 1 the ball point is shown retracted into the bore 13, in which tube 9 is a sliding fit. Fig. 2, on the other hand, shows the ball-and-cartridge unit propelled forwardly to the writing position wherein ball point 10 is disposed beyond the front end of tip member 2. Reservoir 8 includes an elongate thin metal tube 14 the diameter of which is reduced at its back end to grippingly engage the adjoining end of a plunger assembly which comprises a driven member 15 and a driving member 16.

Driven member 15 is a cylindrical rod or shaft slidable lengthwise in the bore of sleeve 6. It is slotted at 15a at its front end and expanded to grippingly engage tube 14; reduced in diameter to form an annular shoulder 17; and slotted lengthwise at 18 to form a gripping telescopic engagement with the bore 19 of driving member 16.

Integral with sleeve 6 are two or more backwardly extending spring arms 20 and 21 having at their free ends, respectively, two latch members 22, 23 which are biased inwardly by the spring arms and are thus capable of engaging shoulder 17, as shown in Fig. 2, to prevent retraction of driven member 15.

Driving member 16 is continuously urged backwardly by a coil spring 24 confined between an upper sleeve portion 6a and a flange 16b on the driving member 16. A bushing 29 screwed into the back end of the holder serves as a stop to limit the extent of backward movement of said driving member by engaging the flange 16b thereon.

With the writing point and plunger assembly retracted as per Fig. 1, the back end 16a of driving member 16 projects out of the holder to form a manually operable pushbutton. When this pushbutton is depressed driving member 16 is,

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of course, propelled forwardly against the opposition of spring 24, carrying with it driven member 15 and ball-and-cartridge unit 7. This is due to the frictional coupling between driven member 15 and driving member 16 effected by the close fitting telescopic interengagement of those two members.

When driven member 15 together with the ball-and-cartridge unit has been propelled forwardly to the extent shown in Fig. 2, latch members 22 and 23 are forced inwardly by their respective spring arms to positions behind shoulder 17 and, if pushbutton 16a is not then further depressed, said driven member and said ball-and-cartridge unit will remain locked in their forward positions, in which the instrument is ready for use. Assuming that the pushbutton is then released, driving member 15 will retract under the pressure of spring 24 notwithstanding the frictional adhesion between it and driven member 15. This is due to the fact that spring 24 is strong enough to overcome the restraining force of the frictional coupling.

The maximum possible forward movement of driven member 15 is limited by a stopscrew 25, the inner end of which engages the back end of a longitudinal slot 26 in said member. If, then, with the instrument in the adjustment of Fig. 2, pushbutton 16a is depressed as far as it will go, driven member 15 will be propelled forwardly to the limit permitted by stopscrew 25, and driving member 16 will continue moving forwardly until its front end contacts shoulder 17, whereupon member 16 can travel forwardly no farther. But during this additional forward movement of driving member 16 its front end engages the acutely angular surfaces 27 and 28 of latch members 22 and 23, respectively, as shown in Fig. 3, and forces said latch members outwardly beyond the path of shoulder 17. If, thereupon, the pushbutton is released, the entire plunger assembly together with the ball-and-cartridge unit will quickly move back to the retracted position of Fig. 1. During the latter movement latch members 22 and 23 cannot move into the path of shoulder 17 because the front end of driving member 16 remains in contact with said shoulder and there is no space therebetween to permit entry of the latch members.

By disconnecting the two parts of the barrel at joint 5, the ball-and-cartridge unit can easily be withdrawn from the front portion of the holder, whereupon it can be pulled off the end of driven member 15, and replaced by another unit. Replacements are thus made whenever the ink supply needs replenishing; and a new ball point is incidentally provided at the same time, since that constitutes an integral part of the replacement unit.

Manifestly, the novel propelling and retracting mechanism illustrated and described is capable of many uses outside the environment in which it is here shown.

I claim:

1. A mechanism comprising a driving member and a driven member, both movable along a given path, said members being frictionally connected together, the frictional coupling therebetween being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, a latch operative to engage said driven member when the latter has been moved to a predetermined extent in one direction along said path

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by said driving member, said latch being effective when so engaged to prevent movement of said driven member in the opposite direction, means for limiting the extent of movement of said driven member along said path in said one direction, said driving member being forcibly movable in said opposite direction notwithstanding the latching of said driven member, said driving member being operative upon movement in said one direction to release said latch and further operative, conjointly with said driven member, following such release and a continuing movement of said members in said one direction to the fullest extent permitted by said limiting means, to hold said latch released, thereby enabling said driven member thereafter to follow said driving member in said opposite direction to the full extent of its travel in said opposite direction.

2. A mechanism comprising a driving member and a driven member movable together along a given path and frictionally connected together, the frictional coupling between said members being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, a spring continuously urging said driving member in one direction along said path and communicating its force to said driven member only through said driving member and said frictional coupling, a latch operative to engage said driven member when said driven member is moved in one direction along said path to a predetermined position, said latch being effective to restrain said driven member against movement in the opposite direction, said spring being strong enough to overcome said frictional coupling and thus to move said driving member to a limited extent in said opposite direction independently of said driven member while said driven member continues restrained by said latch, means for limiting the movement of said driven member in said one direction, said driving member being operative upon movement in said one direction to release said latch and thereby enable said driven member to follow said driving member to the full extent of the latter's subsequent movement in said opposite direction.

3. A mechanism comprising a driving member and a driven member telescopically connected together end-to-end and frictionally coupled through their mutual telescopic engagement, said members being movable along a given path, the frictional coupling therebetween being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, means for limiting the movement in one direction of said driven member, a latch operative to engage said driven member when the latter has been moved in said one direction to a predetermined extent, which is less than the maximum movement in said one direction permitted by said limiting means, said latch being effective, when so engaged, to restrain said driven member against movement in the opposite direction, said driving member being forcibly movable in the opposite direction notwithstanding the latching of said driven member, said driving member being operative when moved in said one direction to the full extent permitted by said limiting means to release said latch and hold the same released throughout a subsequent movement of said members in said opposite direction, which subsequent movement is of sufficient extent

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to carry said driven member beyond the point where it can be engaged by said latch.

4. A mechanism comprising a driving member and a driven member telescopically connected together end-to-end and frictionally coupled through their mutual telescopic engagement, said members being movable along a given path, the frictional coupling therebetween being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, means for limiting the movement of said driven member in one direction along said path, a spring continuously urging said driving member in the opposite direction along said path, a latch operative to engage said driven member when the latter has been moved in said one direction to a predetermined extent which is less than the maximum movement in said one direction permitted by said limiting means, said latch being effective, when so engaged, to restrain said driven member against movement in the opposite direction, said driving member being forcibly movable in the opposite direction by said spring notwithstanding the latching of said driven member, said latch having a surface disposed at an acute angle to said path, said driving member being operative when moved in said one direction to the full extent permitted by said limiting means to engage and act upon said surface as a cam and thereby force said latch into a position wherein it is ineffective to restrain said driven member, and further operative to hold said latch in said ineffective position during a subsequent movement of said members in said opposite direction, which subsequent movement is of sufficient extent to carry said driven member beyond the point where it can be engaged by said latch.

5. In a writing instrument, an elongate, hollow holder having a bore opening at its front end, a ball-and-cartridge unit mounted within and reciprocable lengthwise of said holder, said unit comprising an ink reservoir and a writing ball connected to the front end thereof, said ball being retractable into said bore by a backward movement of said unit and propellable out of the front end of said bore into writing position by a forward movement of said unit, a plunger disposed in the bore of said holder at the rear of said unit and connected to said unit for propelling and retracting the same, the back end of said plunger projecting out of said holder to form a manually operable pushbutton, said plunger comprising a driving member and a driven member, both movable along a given path lengthwise of said holder, said members being frictionally connected together, the frictional coupling therebetween being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, a latch operative to engage said driven member when the latter has been moved to a predetermined extent in the forward direction along said path by said driving member, said latch being effective when so engaged to prevent movement of said driven member in the backward direction, means for limiting the forward movement of said driven member, said driving member being forcibly movable in the backward direction notwithstanding the latching of said driven member, said driving member being operative upon forward movement to release said latch and further operative, con-

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jointly with said driven member, following such release and additional forward movement to the extent permitted by said limiting means, to hold said latch released, thereby enabling said driven member thereafter to follow said driving member to the full extent of its backward travel.

6. In a writing instrument, an elongate, hollow holder having a bore opening at its front end and having a chamber adapted to receive a ball-and-cartridge unit which is reciprocable lengthwise therein, said unit comprising an ink reservoir and a writing ball connected to the front end thereof, said ball being retractable into said bore by a backward movement of said unit and propellable out of the front end of said bore into writing position by a forward movement of said unit, a plunger disposed in the bore of said holder and adapted for connection to the rear end of said unit for propelling and retracting the same, the back end of said plunger projecting out of said holder to form a manually operable pushbutton, said plunger comprising a driving member and a driven member telescopically connected together end-to-end and frictionally coupled through their mutual telescopic engagement, said driving member being situated to the rear of said driven member, said members being movable along a path lengthwise of said holder, the frictional coupling therebetween being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, means for limiting the forward movement of said driven member along said path, a spring continuously urging said driving member backwardly along said path, a latch operative to engage said driven member when the latter has been moved forwardly to a predetermined extent which is less than the maximum forward movement permitted by said limiting means, said latch being effective, when so engaged, to restrain said driven member against backward movement, said driving member being movable backwardly by said spring notwithstanding the latching of said driven member and notwithstanding the frictional adhesion between said members, said latch having a surface disposed at an acute angle to said path, said driving member being operative when moved forwardly to the full extent permitted by said limiting means to engage and act upon said surface as a cam and thereby force said latch into a position wherein it is ineffective to restrain said driven member, and further operative to hold said latch in said ineffective position during a subsequent backward movement of said members, which subsequent movement is of sufficient extent to carry said driven member beyond the point where it can be engaged by said latch.

7. In a ball-point writing instrument, an elongate, hollow holder having a bore opening at its front end, a ball-and-cartridge unit mounted within and reciprocable lengthwise of said holder, said unit comprising an ink reservoir and a ball point connected to the front end thereof, said ball being retractable into said bore by a backward movement of said unit and propellable out of the front end of said bore into writing position by a forward movement of said unit, a plunger disposed in the bore of said holder at the rear of said unit and connected to said unit for propelling and retracting the same, the back end of said plunger projecting out of said holder to form a manually operable pushbutton, said plunger comprising a driving member and a

driven member movable together along a path lengthwise of said holder and frictionally connected together, the frictional coupling between said members being of such strength as to cause said driven member to follow the movements of said driving member along said path except when said driven member is restrained as hereinafter prescribed, said driving member being situated to the rear of said driven member in end-to-end relation thereto, a spring continuously urging said driving member backwardly along said path and communicating its force to said driven member only through said driving member and said frictional coupling, a latch operative to engage said driven member when said driven member is moved forwardly along said path to a predetermined position, said latch being effective to restrain said driven member against backward movement, said spring being strong enough to overcome the frictional adhesion between said members and thus to move said driving member backwardly to a limited extent independently of said driven member while the latter continues restrained by said latch, means for limiting the forward movement of said driven member, said driving member being operative upon a full forward movement to release said latch and to hold the same released, thereby enabling said driven member to follow said driving member to the full extent of the latter's subsequent backward movement.

8. A ball-point writing instrument comprising a casing having readily detachable front and rear sections which when joined together provide a continuous elongated casing, a writing unit mounted wholly within said forward casing section and including a ball-writing point and a coupling element, said unit being self-contained and mounted in said forward section for sliding movement forwardly to project the ball point from said forward casing section and rearwardly to retract it within said forward casing section, and a self-contained projecting and retracting unit mounted wholly within said rear section and including a coupling element adapted to operably connect with said first-named coupling element, and means for moving said writing unit forwardly to project said ball point, for holding said writing unit in its forward position, for releasing said writing unit from its forward and held position, and for returning it to its retracted position to retract said ball point within its casing section, said projecting and retracting unit being wholly self-contained with said rear casing section and being constructed and arranged to operably engage its said coupling element with the said

coupling element of the writing unit upon connection of said casing sections and to expose said writing unit for removal thereof by disengagement of said coupling elements after separation of said casing sections.

9. A ball-point writing instrument comprising a casing having readily detachable front and rear sections which when joined together provide a continuous elongated casing, an ink feed and writing unit mounted wholly within said forward casing section and including an ink reservoir, a ball-writing point, ink feed means connecting said ink reservoir with said ball point, and a coupling element, said unit being self-contained and mounted in said forward section for sliding movement forwardly to project the ball point from said forward casing section and rearwardly to retract it within said forward casing section, and a self-contained projecting and retracting unit mounted wholly within said rear section and including a coupling element adapted to operably connect with said first-named coupling element, means for moving said ink feed and writing unit forwardly to project said ball point, means for locking said ink feed and writing unit in its forward position, means for releasing said ink feed and writing unit from its forward and locked position, and means for returning said ink feed and writing unit to its retracted position to retract said ball point within its casing section, said projecting and retracting unit being wholly self-contained with said rear casing section and being constructed and arranged to operably engage its said coupling element with the said coupling element of the ink feed and writing unit upon connection of said casing sections and to expose said writing unit for removal thereof by disengagement of said coupling elements after separation of said casing sections.

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