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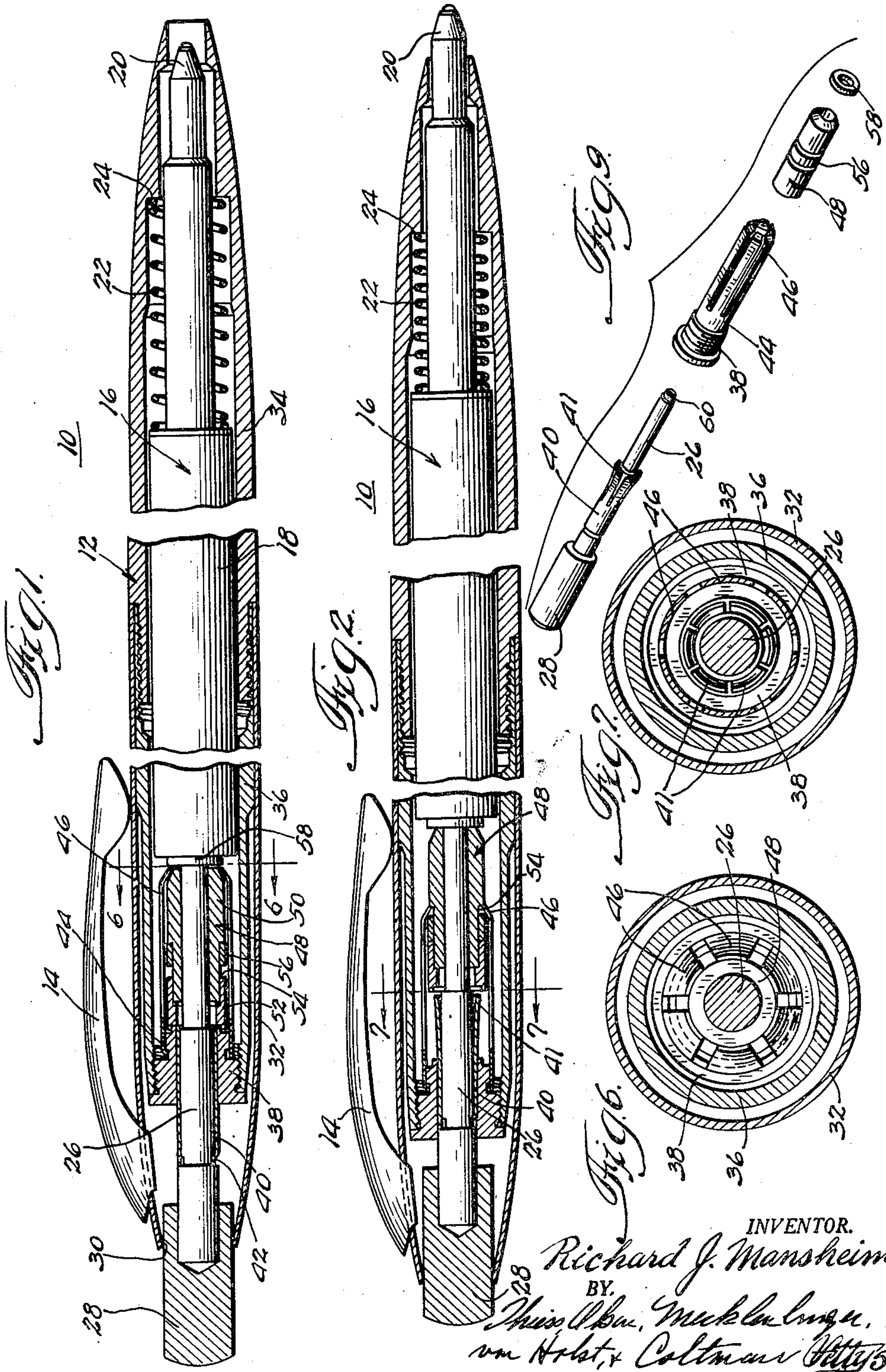
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OPERATING MECHANISM FOR A WRITING INSTRUMENT

Filed Feb. 8, 1954

2 Sheets-Sheet 1



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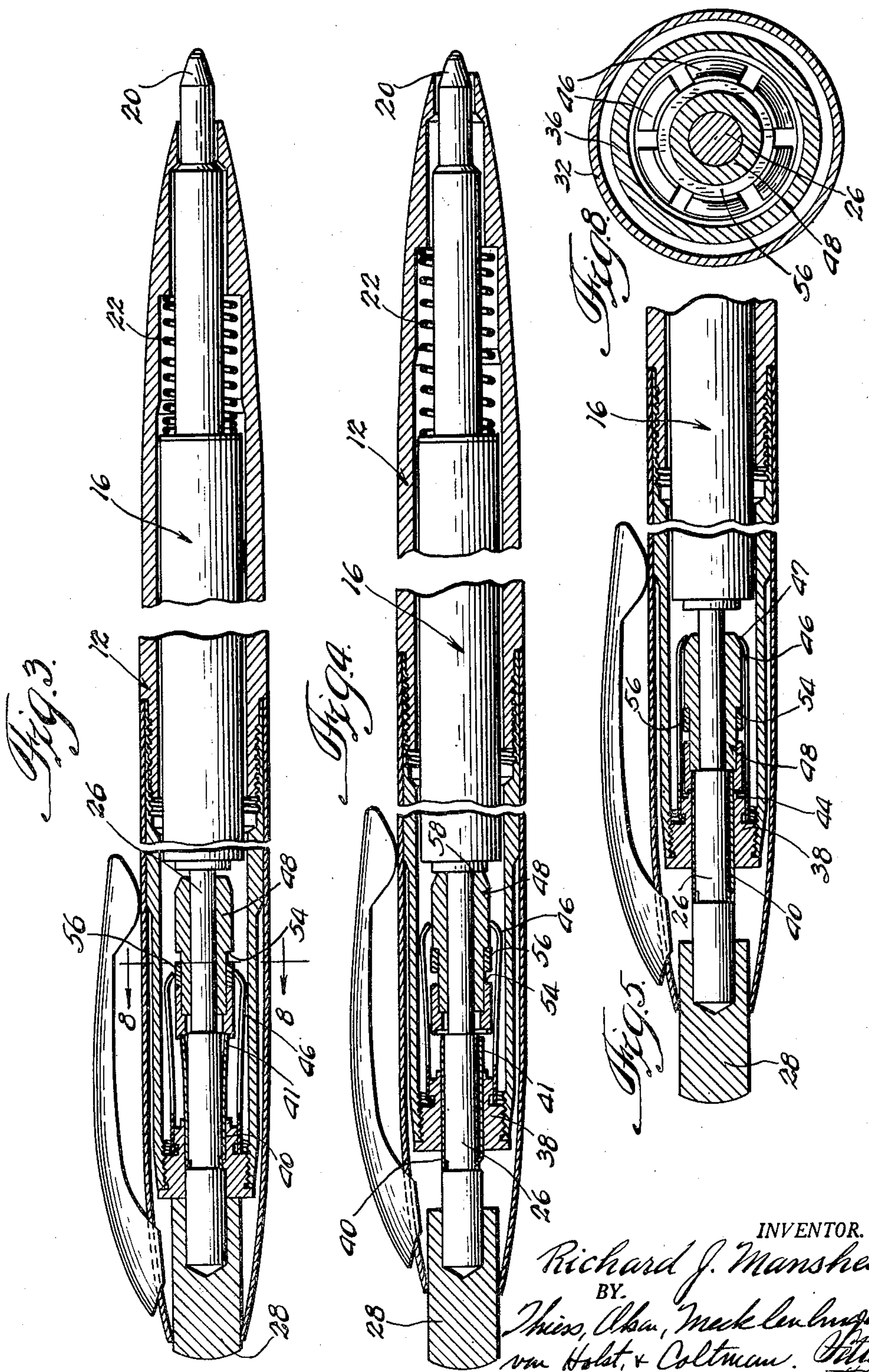
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OPERATING MECHANISM FOR A WRITING INSTRUMENT

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11 Claims. (Cl. 120—42.03)

This invention relates to an improved operating mechanism for a writing instrument and more particularly to an improved mechanism for alternately moving the writing unit of such an instrument between an extended writing position and a retracted position within the barrel of the instrument.

It is an important object of this invention to provide an improved operating mechanism for a writing instrument utilizing a single manually engageable means to effect both extension and retraction of the writing unit.

Many operating mechanisms for expelling and retracting a writing unit have heretofore been proposed. Many of the devices previously proposed have utilized a plurality of actuating buttons, one customarily functioning to extend the writing unit and a second functioning to release the writing unit for retraction into the barrel of the instrument. Such a device using a plurality of buttons is generally inconvenient and confusing to the user. Preferably a device utilizing a single push button for both extending and retracting the writing unit is employed.

Devices heretofore proposed utilizing a single push button have generally employed various mechanical elements such as toggles or levers, some of which rely upon the gravitational effect for operation. Such devices utilizing pivotal parts, gravitational force and the like have generally proven unreliable and expensive to manufacture.

Still other devices heretofore known have employed a spring constructed from sheet material and having a formed portion engageable with a recess in a sliding element. This engagement maintains the writing unit in an extended position against the force of a helical spring, and a latch or sleeve is provided to effect removal of the flat spring from the recess to permit retraction of the writing unit into the body of the instrument under the influence of the compressed helical spring. The fundamental objection to such devices has been the requirement of a controlled application of force to the push button to insure the desired alternate operation between the extended and retracted positions. A partial depression of the push button extends the unit while a full depression thereof releases the writing unit for retraction into the barrel of the instrument. If the push button is alternately depressed partially and fully, the writing unit will alternately extend and retract. Failure to properly depress the button will cause erratic operation.

It is therefore a further object of this invention to provide an improved operating mechanism for a writing instrument utilizing a single push button for both extension and retraction of a writing unit.

It is another object of this invention to provide an improved mechanism for writing instruments in which a single push button may be fully depressed to effect alternate extensions and retractions of an associated writing unit.

It is still another object of this invention to provide an improved mechanism for writing instruments having

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no pivoted or rotatably mounted parts subject to wear but utilizing only flat spring members and sliding parts.

It is still another object of this invention to provide an improved operating mechanism for alternately moving an element between two predetermined positions, said mechanism being completely self-contained permitting utilization with any associated instrument irrespective of the nature thereof.

Further and additional objects of this invention will become manifest from a consideration of this specification, the accompanying drawings and the appended claims.

In one form of this invention a ball point type writing instrument is provided having a barrel and a writing unit, said writing unit including a ball type writing fluid applicator, a reservoir communicating therewith, and a plunger mechanism having a manually engageable rearwardly extending free end for effecting movement of the writing unit within the barrel. The plunger element has an operating mechanism associated therewith which includes a sleeve slidable on a reduced portion of the plunger and having an annular recess thereabout engageable by a flat spring means secured in the barrel of the instrument. The spring means engages the recessed portion of the sleeve to maintain the writing unit in an extended writing position against the force of a retracting spring. A collar is mounted on the recessed portion of the sleeve and axially slidable therealong whereby a full depression of the plunger will cause the spring means to engage the collar, thus removing said spring means from the annular recess and permitting retraction of the writing unit into the barrel of the instrument. A unique means is provided by this invention whereby full motion of the plunger is prevented on alternate depressions thereof and the flat spring means can engage the collar only during the remaining alternate depressions. Various expedients may be employed to attain this result according to the teaching of this invention. The means particularly described in this disclosure is a furcated spring device substantially parallel with the plunger and secured thereto at the rearward end. The forward end of said spring is slightly flared and engageable with the slidable sleeve mentioned above. Thus, as will be hereinafter more fully explained, when the flared end of the spring engages the sleeve the rearward motion thereof will be limited and the flat spring means will engage the collar permitting retraction of the writing unit. On a subsequent depression of the plunger the flared end of the spring will be forced inwardly to conform with the plunger, thus permitting free motion of the sleeve on the plunger whereby the spring means will not engage the collar but will maintain the writing unit in an extended position by engaging the recess in the sleeve.

For a more complete understanding of this invention reference will now be made to the accompanying drawings wherein:

Fig. 1 is an illustration in longitudinal section of one embodiment of this invention with the writing unit in the retracted position;

Fig. 2 illustrates the embodiment of Fig. 1 with the writing unit in the extended or writing position;

Fig. 3 illustrates the embodiment of Fig. 1 with the writing unit overextended to effect retraction of the writing unit.

Fig. 4 illustrates the embodiment of Fig. 1 with the writing unit in a partially retracted position;

Fig. 5 illustrates the embodiment of Fig. 1 at the beginning of an expelling or extending motion of the writing unit.

Fig. 6 is a transverse sectional view taken along the line 6—6 of Fig. 1;

Fig. 7 is a transverse sectional view taken along the line 7—7 of Fig. 2;

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Fig. 8 is a transverse sectional view taken along the line 8—8 of Fig. 3; and

Fig. 9 is an exploded isometric view of all of the elements necessary for the operating mechanism of this invention.

Referring now to the drawings and more particularly to Fig. 1 a writing instrument 10 is illustrated comprising generally a barrel 12 having a pocket clip 14 secured thereto in the customary manner and containing an axially movable writing unit 16 therein. The barrel includes a forward reservoir receiver 34, a cylinder 36 containing the operating mechanism, and a cap 32, all coaxially assembled. The writing unit 16 includes a reservoir 18 and an applicator or writing element such as ball dispenser 20 extending from the forward end thereof. The reservoir and dispenser are continuously urged rearwardly within the barrel by a helical spring 22 compressed between an abutment 24 formed in the inner surface of the barrel 12 and the forward end of the reservoir 18.

A plunger 26 is mounted rearwardly of the reservoir 18 and in free abutting engagement therewith. A push button 28 is secured to the rearward end of plunger 26 and extends through an axial opening 30 in the rearward end of cap 32. The operating mechanism for the instrument is an integral unit contained within the cylinder 36 between the reservoir 18 and the push button 28. The operating mechanism includes a plug 38 threadably engaging the cylinder 36 and having an inner diameter such that it fits closely over a furcated cylindrical spring 40 which is secured to the plunger 26. The spring 40 is secured to the plunger 26 at the rearward end thereof as by staking 42 and the forward furcate portion thereof is formed to flare away slightly from the plunger 26 when unstressed.

A cylindrical spring element 44 is secured to the outer surface of plug 38 and is slotted to form a plurality of forwardly extending fingers 46 having forward end portions turned inwardly toward the axis of plunger 26. Contained within the cylindrical spring 44 and slidably mounted on plunger 26 is a sleeve 48 having a body portion 50 and a tightly fitting retainer portion 52. A recess 54 is formed between the two portions of the sleeve 48 and a small annular collar 56 is mounted in this recess and axially slidable therein. The forward end of the body portion 50 is tapered to cooperate with the shaped fingers 46 of spring 44 in a manner which will be clear from the description of operation which follows.

All of the parts above described appear in Figs. 1 through 5 and these various figures will clearly illustrate the steps in the operation of the mechanism. Upon depressing the push button 28 the entire writing unit including plunger 26, reservoir 18 and the ball point 20 is extended from the retracted position of Fig. 1 toward the writing position of Fig. 2. This forces the fingers 46 of the cylindrical spring element 44 to ride upwardly on the tapered surface 47 of the sleeve 48 and to yieldably maintain the sleeve 48 in a fixed position relative to the barrel and consequently to move rearwardly relative to the plunger 26. This condition is best illustrated in Fig. 5 where it can be seen that the tapered end 47 of sleeve 48 is engaged by the fingers 46. The free flared portions of spring 40 are maintained against the surface of plunger 26 by the plug 38 whereby the sleeve 48 may slide thereover and move rearwardly to the limit of motion. At said limit the rearward edge of sleeve 48 abuts the forward edge of plug 38. When this condition exists the sleeve 48 will be forced through the fingers 46, forcing them outwardly until the flared ends thereof engage the recess 54 in the sleeve. At this point the forward end of push button 28 will also abut against the plug 38, limiting the forward motion of the writing unit.

At this time release of the axial pressure on push button 28 will permit the spring fingers 46 to engage the forward edge of the recess 54 and thus maintain the writing unit 16 in the extended writing position as shown in Fig. 2.

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To effect retraction of the writing unit 16 into the barrel 12 the push button 28 is again depressed whereby the writing unit is extended beyond the normal writing position. As will be apparent from Fig. 2 which illustrates the writing instrument in condition for use, the sleeve 48 has been forced forwardly on the plunger 26 whereby the free furcate portion 41 of the spring 40 is released and permitted to flare outwardly. Upon a second depression of the push button 28, the fingers 46 urge the sleeve 48 rearwardly on the plunger 26 as in the first motion described above. However, the sleeve 48 is restrained from such rearward motion relative to plunger 26 by engagement with the flared free ends 41 of the cylindrical spring 40 as shown in Fig. 3. Thus, the spring fingers 46 are forced out of the recess 54 in the sleeve 50 and radially extended to engage the collar 56.

Upon release of the axial pressure on push button 28 the entire writing unit 16 moves rearwardly as shown in Fig. 4. This rearward motion of the writing unit causes relative movement between the sleeve 48 and the collar 56 which is slidably mounted in the recess 54. The engagement of spring fingers 46 with the collar 56 will tend to restrain rearward movement of said collar until the collar engages the forward end of the recess 54. When the collar is moved forwardly to this position engagement of the spring fingers 46 in the annular recess 54 is prevented and the entire writing unit will move to the retracted position under the influence of coil spring 22 to assume the initial position shown in Fig. 1 and described above. During this retracting motion the plug 38 forces the flared ends 41 of the cylindrical spring 40 inwardly into juxtaposition with the plunger 26 whereby a subsequent depression of the push button 28 will cause the sleeve 48 to move into engagement with the plug 38 during an extended operation as described with respect to Fig. 5.

Thus, the cycle of operation has been explained in detail showing the manner in which subsequent depressions of the push button 28 will cause alternate extensions and retractions of the writing unit. This motion is insured by the flared spring 41 which alternately engages and releases the slidable sleeve 48 to limit the motion thereof relative to the plunger 26.

All of the essential elements of this embodiment are shown in Fig. 9 in an exploded and diagrammatic form. Therein it can be seen that the plunger 26 with the push button 28 fixed to one end thereof extends throughout the entire mechanism and has furcate cylindrical spring 40, plug 38, slotted spring 44, sleeve 48 and collar 56 all coaxially mounted thereon. A washer 58 is staked to a reduced portion 60 at the forward end of plunger 26 to maintain the entire assembly in integral but slidable relationship. It will be understood that in the exploded view the sleeve 48 and collar 56 are shown removed from the cylindrical spring 44 but that in assembly these parts are contained within the slotted portion thereof.

As explained above, the flared fingers 41 are maintained collapsed against the plunger 26 by the plug 38 when the plunger 26 is retracted to the extreme rearward position within the barrel 12. On alternate forward movements of plunger 26 the flared fingers spread to engage the sleeve 48 and limit rearward movement thereof whereby the spring fingers 46 will engage the collar 56 permitting retraction of the writing unit. During the remaining alternate movements, the flared fingers are restrained, permitting full movement of the sleeve, and consequent engagement of fingers 46 with recess 54 preventing retraction of the writing unit.

While one particular embodiment of this invention has herein been described in detail it is believed manifest that various modifications will appear to one skilled in the art. Basically this invention contemplates a device utilizing a single manually engageable means for alternately extending and retracting the writing unit of a writing instrument.

This invention further contemplates a mechanism uti-

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lizing a recess formed in a slidable member engageable by a resilient transversely movable element fixed in the body of such a writing instrument and a means to determine the limits of motion of the slidable element and to vary these limits on alternate operations of the device whereby the desired alternate actuation of the device is insured.

Without further elaboration, the foregoing will so fully explain the character of my invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, while retaining certain features which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to me by the following claims.

I claim:

1. Apparatus for alternately maintaining an elongated axially movable element in each of two predetermined positions relative to a surrounding body, said apparatus comprising resilient means urging said element to the first of said positions, transversely movable resilient means in said body, axially slidable means carried by said element movable thereon between two predetermined limits and having a recessed area to receive said transversely movable resilient means to maintain said element in the second of said positions against the force of said resilient means, a second slidable means partially filling said recess and movable therein to engage said transverse resilient means and effect removal of said transverse resilient means from said recess, and means limiting the motion of said slidable means upon alternate movements to the second of said positions to prevent engagement of said second slidable means by said transverse resilient means.

2. Apparatus for alternately maintaining an elongated axially movable element in each of two predetermined positions relative to a surrounding body, said apparatus comprising resilient means urging said element to the first of said positions, transversely movable resilient means in said body, axially slidable means carried by said element movable thereon between two predetermined limits and having a recessed area to receive said transversely movable resilient means to maintain said element in the second of said positions against the force of said resilient means, a second slidable means partially filling said recess and movable therein to engage said transverse resilient means and effect removal of said transverse resilient means from said recess, limiting means mounted on said axially movable element and engageable with said axially slidable means to limit the motion of said slidable means, and means mounted in the body to render said limiting means ineffective upon alternate movements of said element to the second of said positions.

3. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, transversely movable resilient means secured in said barrel portion, slidable means carried by said unit and having a recessed area adapted to receive said resilient means when the writing unit is in the writing position, a second slidable means partially filling said recess and movable therein to engage said transverse resilient means and effect retraction thereof from said recess, and means limiting the motion of the slidable means on alternate reciprocations of said writing unit to prevent engagement of said transverse resilient means by said second slidable means.

4. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, transversely movable resilient means secured in said barrel portion, slidable means carried by

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said unit and having a recessed area adapted to receive said resilient means when the writing unit is in the writing position, a second slidable means partially filling said recess and movable therein to engage said transverse resilient means and effect retraction thereof from said recess, stop means limiting the motion of the slidable means to prevent engagement of said transverse resilient means by said second slidable means, and means to render said stop means ineffective on alternate reciprocations of said writing unit.

5. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, transversely movable resilient means secured in said barrel portion, slidable means carried by said unit and having a recessed area adapted to receive said resilient means when the writing unit is in the writing position, a second slidable means partially filling said recess and movable therein to engage said transverse resilient means and effect retraction thereof from said recess, stop means mounted on said unit engageable with said slidable means to limit the motion thereof and prevent engagement of said transverse resilient means by said second slidable means, and means in said barrel to engage said stop means on alternate reciprocations of said unit to render said stop means ineffective.

6. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, said unit including a fluid dispenser, reservoir, and plunger axially aligned, said plunger and said reservoir being in free abutting relationship, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, transversely movable resilient means secured in said barrel portion, slidable means carried by said plunger and having a recessed area adapted to receive said resilient means when said unit is in the writing position, a second slidable means partially filling said recess and movable therein to engage said transverse resilient means and effect retraction thereof from said recess, and means limiting the motion of the slidable means on alternate reciprocations of said writing unit to prevent engagement of said transverse resilient means by said second slidable means.

7. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, said unit including a fluid dispenser, reservoir, and plunger axially aligned, said plunger and said reservoir being in free abutting relationship, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, a furcated cylindrical spring secured in said barrel portion, a slidable sleeve carried by said plunger and having an annular recessed area adapted to receive said furcated spring when said unit is in the writing position, a slidable collar freely mounted on said sleeve and slidable in the recess to engage said furcated spring and effect retraction thereof from said recess, and means limiting the motion of said sleeve on the plunger during alternate reciprocations of said writing unit to prevent engagement of said furcated spring by said collar.

8. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, said unit including a fluid dispenser, reservoir, and plunger axially aligned, said plunger and said reservoir being in free abutting relationship, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, a furcated cylindrical spring secured in said barrel portion, a slidable sleeve carried by said plunger and having

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an annular recessed area adapted to receive said furcated spring when said unit is in the writing position, a slidable collar freely mounted on said sleeve and slidable in the recess to engage said furcated spring and effect retraction thereof from said recess, stop means limiting the motion of said sleeve on said plunger to prevent engagement of said furcated spring by said collar, and means to render said stop means ineffective on alternate reciprocations of said writing unit.

9. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, said unit including a fluid dispenser, reservoir, and plunger axially aligned, said plunger and said reservoir being in free abutting relationship, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, a furcated cylindrical spring secured in said barrel portion, a slidable sleeve carried by said plunger and having an annular recessed area adapted to receive said furcated spring when said unit is in the writing position, a slidable collar freely mounted on said sleeve and slidable in the recess to engage said furcated spring and effect retraction thereof from said recess, stop means mounted on said plunger and engageable with said sleeve to limit the motion thereof and prevent engagement of said furcated spring by said collar, and means in said barrel to engage said stop means on alternate reciprocations of said unit to render said stop means ineffective.

10. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, said unit including a fluid dispenser, reservoir, and plunger axially aligned, said plunger and said reservoir being in free abutting relationship, means for alternately maintaining said unit in each of said positions comprising

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resilient means urging said unit to the retracted position, a furcated cylindrical spring secured in said barrel portion, a slidable sleeve carried by said plunger and having an annular recessed area adapted to receive said furcated spring when said unit is in the writing position, a slidable collar freely mounted on said sleeve and slidable in the recess to engage said furcated spring and effect retraction thereof from said recess, stop means secured to said plunger and having a resilient flared portion engageable with said sleeve to limit the rearward motion thereof on said plunger and to prevent engagement of said furcated spring by said collar, and means in said barrel engageable with said flared portion to render said stop means ineffective during forward motion of said unit from the retracted position.

11. In a writing instrument having a barrel portion and a writing unit therein axially movable between a forward writing position and a retracted position, means for alternately maintaining said unit in each of said positions comprising resilient means urging said unit to the retracted position, a sleeve carried by said unit and slidable in a recess thereof, lock means engageable with the forward edge of said recess to maintain said unit in the forward position, a collar slidable in said recess to engage said lock means and effect removal thereof from the recess, and means engaging said sleeve to limit the rearward motion thereof relative to said unit when said unit is moved forwardly from the writing position whereby engagement of said lock means by said collar is prevented.

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