

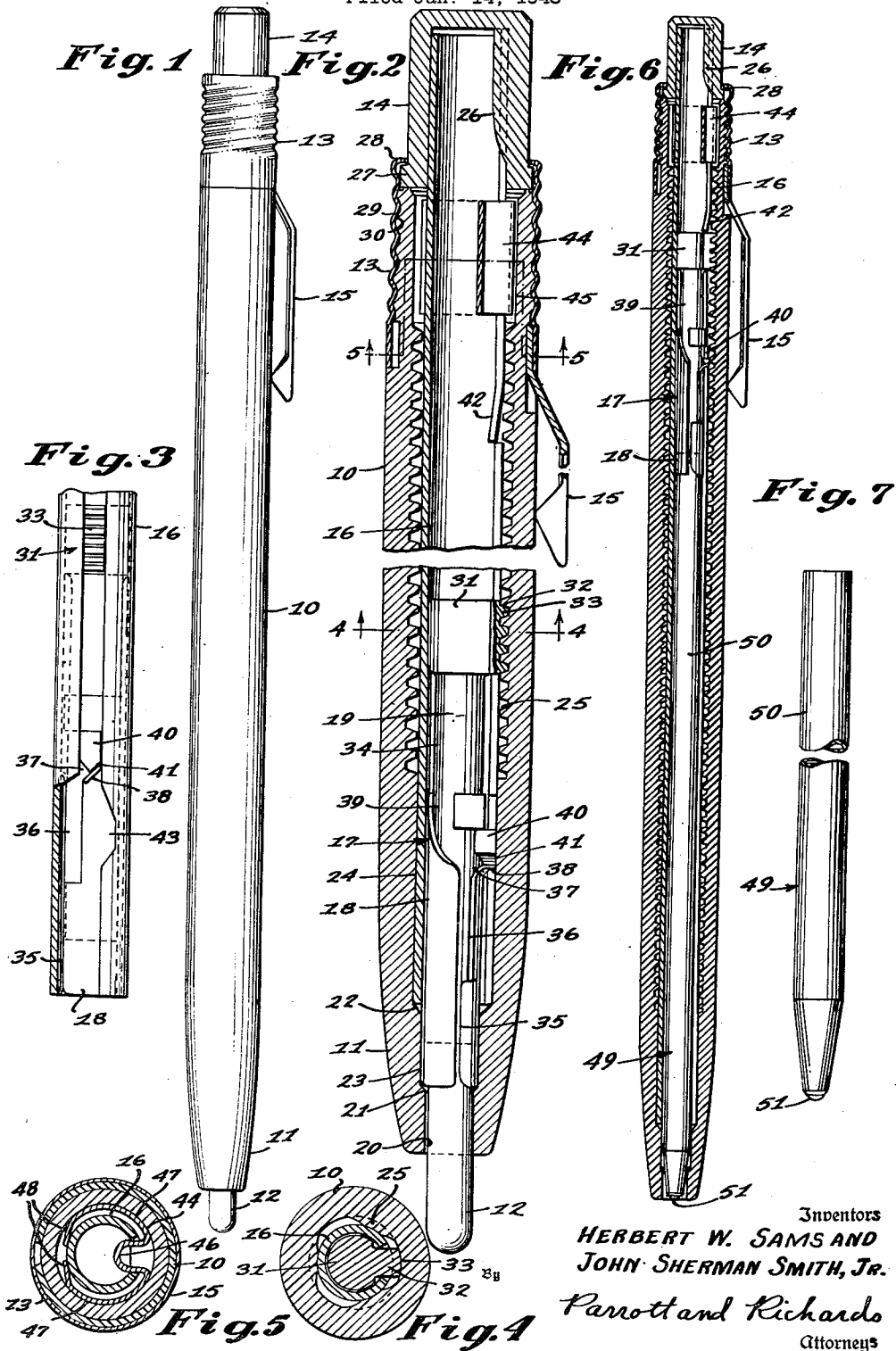
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MECHANICAL WRITING INSTRUMENT

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MECHANICAL WRITING INSTRUMENT

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This invention relates to mechanical writing instruments and more particularly to mechanical writing instruments adapted to accommodate marking elements of relatively large diameter such as crayons and the like.

The mechanical writing instrument of this invention is of the type comprising a barrel and a feed mechanism disposed in the barrel for feeding a marking element to the writing end thereof. An important feature of the construction employed according to the present invention is the manner in which the feed mechanism is assembled with the barrel by a sleeve member engaging the barrel at its upper end and formed to allow operating access to the feed mechanism in assembled position. A further feature of this construction is an improved form of friction element associated with the feed mechanism to restrain retracting motion of the feed mechanism under writing pressure.

As mentioned above, the mechanical writing instrument of this invention is particularly adapted for use with marking elements of relatively large diameter. A principal example of such marking elements are the soft wax base leads known as crayons, and the present invention is described below largely in relation to its embodiment for use with crayon marking elements. The writing instrument of the present invention, however, may also be used with other comparable marking elements, and in particular is well suited for use with marking elements of the class characterized by a ball-type applicator. Marking elements of this type may be inserted and removed at the writing end of the barrel in the usual manner without the necessity for disassembling the barrel when replacement is needed, and the feed mechanism as disposed in the barrel according to the present invention allows easy and convenient projection of the ball-type marking element for writing when desired and retraction for protection when not in use.

The present invention is described further in detail below in connection with the accompanying drawing, in which:

Fig. 1 is a side elevation of a mechanical writing instrument embodying the present invention;

Fig. 2 is an enlarged vertical section of the writing instrument;

Fig. 3 is an enlarged detail of the guide tube and clutch assembly as seen from the right side in Fig. 2;

Fig. 4 is a section taken substantially on the line 4—4 in Fig. 2;

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Fig. 5 is a section taken substantially on the line 5—5 in Fig. 2;

Fig. 6 is a side elevation, partly in section, showing the manner in which a marking element having a ball-type applicator may be used with the writing instrument of the present invention; and,

Fig. 7 is an enlarged detail of a marking element suitable for use as shown in Fig. 6.

Referring first to Fig. 1 of the drawing, the barrel of the mechanical writing instrument of the present invention is shown at 10. The barrel 10 is preferably formed of a suitable plastic material, and is tapered at its lower portion to form a writing tip 11 from which a marking element may be fed, such as the crayon represented at 12.

The upper end of the barrel 10 is fitted with a sleeve member 13 by which the feed mechanism is retained in assembled relation with the barrel as described more in detail below. The sleeve member 13 is formed to allow projection of an operating cap 14 at the upper end of the barrel 10 for manipulation to operate the feed mechanism. Also, this sleeve member 13 serves the further purpose of securing a pocket clip 15 in place on the barrel 10 (compare Figs. 2 and 5).

The feed mechanism referred to above is illustrated more in detail in Fig. 2 of the drawing, and as shown comprises a longitudinally slotted guide tube 16, and a clutch assembly 17 which receives and holds the marking element 12 for feeding to the writing end of the barrel 10. The clutch assembly 17 comprises a grip sleeve 18 and an associated propelling element 19 (compare Fig. 3).

The writing end portion of the barrel 10 is formed with a bore 20 adapted to accommodate the marking element 12, the bore 20 having a diameter such that the marking element 12 is closely supported for feeding from the writing tip 11 of the barrel 10. Beyond the bore 20, the barrel 10 is also formed with upwardly facing shoulders 21 and 22 providing further coaxial bores 23 and 24, and with internal screw threads 25 for the major portion of its remaining length.

The ends of the above mentioned longitudinally slotted guide tube 16 is positioned in the barrel 10 by the shoulder 22, the lower end of the guide tube 16 being received by the bore 24, and as thus arranged the guide tube 16 is free for rotation in the barrel 10. This guide tube 16 is provided in a length sufficient to project from the upper end of the barrel 10 to carry the operating cap 14. The operating cap 14 is formed with

an internal lug portion 26 which is adapted to fit the longitudinal slot in the guide tube 16 and thus is provided a keyed engagement allowing rotation of the guide tube 16, and consequent operation of the feed mechanism, from the cap 14. The operating cap 14 is generally cylindrical in shape, and is formed at its base with an enlarged shoulder portion or flange 27 adapted to rest and turn on the upper end of the barrel 10.

As previously mentioned, the sleeve member 13 is adapted to allow projection of the operating cap 14 and the guide tube 16 at the upper end of the barrel 10, the sleeve member 13 being formed with an annular shoulder 28 allowing clearance for the main body of the operating cap 14 but fitting the enlarged shoulder portion 27 in retaining relation as shown in Fig. 2. The sleeve member 13 is further formed with screw threads 29 adapted for engagement with screw threads 30 formed externally at the upper end of barrel 10, so that when the sleeve member 13 is in place the feed mechanism is retained assembled in relation with the barrel 10 between the shoulder 22 at the writing end of the barrel 10 and the annular shoulder 28 on the sleeve member 13. According to this arrangement only a single retaining means, namely, the sleeve member 13, is required for the entire assembly of the writing instrument of the present invention, which provides important structural and manufacturing advantages.

The clutch assembly 17 associated with the guide tube 16 in the feed mechanism employed according to the present invention is disposed in the guide 16 for translation longitudinally of the barrel 10 during feeding movement. To effect this translation the propelling element 19 of the clutch assembly 17 which is formed with a cylindrical head portion 31 proportioned for a sliding fit in the bore of guide tube 16, is further formed at this head portion 31 with a projecting face portion 32 extending through the longitudinal slot of the guide tube 16 and shaped with thread segments 33 adapted for engagement with the internal screw threads 25 in the barrel 10. The internal screw threads 25 are preferably formed as multiple threads, suitably triple threads as indicated in Fig. 4, to provide desirable pitch characteristics, and the thread segments 33 may accordingly be arranged to mesh with the multiple threads provided.

The propelling element 19 also comprises a shank portion 34 which extends in reduced diameter for association with the grip sleeve 18. The grip sleeve 18 is slotted lengthwise in varying configurations. At its lower extending end portion a narrow slit 35 is formed to provide sufficient spring action for gripping the upper end of the marking element 12 to be fed. Beyond the narrow slit 35, a wider guide slot 36 is formed which extends longitudinally toward the upper end of the grip sleeve 18 to an angled continuation which is biased at about 45 degrees as shown at 37. A flange 38 is formed along the lower edge of this angled continuation 37 in a width proportioned to fit for sliding movement in the longitudinal slot of the guide tube 16. The upper end of the grip sleeve 18 is formed with a further slot 39 of sufficient width to allow assembly on the shank 34 of the propelling element 19, but displaced circumferentially with respect to the guide slot 36 and angled continuation 37 so as to prevent disengagement of the propelling element 19 from the grip sleeve 18 during operation of the feed mechanism.

The propelling element 19 is associated for operation with the grip sleeve 18 by means of a lug 40 formed on the shank portion 34 of the propelling element 19. This lug 40 is shaped to operate in the guide slot 36 and angled continuation 37 of the grip sleeve 18, having a width adapted to fit the guide slot 36 and a length accommodated in the angled continuation 37, and being formed with a pointed lower face, as shown at 41, presenting a contact surface biased in correspondence with the flange 38 formed along the lower edge of the angled continuation 37. The lug 40 extends with the flange 38 into the longitudinal slot of the guide tube 16 as shown in Fig. 2, and during normal operation of the feed mechanism the propelling element 19 and grip sleeve 18 are thus held in fixed relation, the lug 40 being contained between the flange 38 and the upper edge of the angled continuation 37 during advancement or retraction of the marking element 12 carried by the grip sleeve 18, and the disposition of the lug 40 and flange 38 in the longitudinal slot of the guide tube 16 serving to retain the lug 40 in the angled continuation 37 in contact with the flange 38 (compare Fig. 3).

The upward extent of movement of the clutch assembly 17 in the guide tube 16 is determined by ears 42 struck inwardly adjacent the longitudinal slot of the guide tube 16 near the upper end thereof to engage the cylindrical head portion 31 of the propelling element 19 and act as a stop against further upward movement of the clutch assembly 17 (compare Fig. 6). The ears 42 are located in the guide tube 16 so as to provide for proper accommodation in relation to the writing tip 11 of the barrel 10 of the original length of a marking element 12 to be used in the writing instrument, and with the clutch assembly 17 in position against the ears 42, the writing instrument may be charged with a marking element 12 in a length extending for a major portion of the length of the barrel 10.

With the clutch assembly 17 thus in position against the ears 42 and charged with a marking element 12, feeding of the marking element 12 from the writing end of the barrel 10 may be effected from the operating cap 14, rotation of the operating cap 14 in one direction resulting in corresponding rotation of the guide tube 16 and consequent feeding movement of the clutch assembly 17 by virtue of the engagement of the projecting face portion 32 with the internal screw threads 25 in the barrel 10, and rotation of the operating cap 14 in the opposite direction resulting in retraction of the marking element 12.

The downward extent of movement of the clutch assembly 17 is determined by the shoulder configuration 21 formed in the writing end of the barrel 10. In full downward position, which corresponds as shown in Fig. 2 with substantial exhaustion of a marking element 12 functioning by attrition such as a crayon, the grip sleeve 18 is received in the bore 23 to bottom on the shoulder configuration 21 so that further feeding movement is arrested. When this position is reached, the propelling element 19 is disposed in relation to the internal screw threads 25 in the barrel 10 so that it still has a remaining extent of downward travel. The clutch assembly 17 is arranged for operation to expel the spent marking element 12 during this remaining extent of downward travel of the propelling element 19.

For this purpose the longitudinal slot in the guide tube 16 is relieved or notched as shown at 43 in Fig. 3 to provide clearance for the flange

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38 so that the grip sleeve 18 may be rotated. With the grip sleeve 18 freed for rotation in this manner, further downward movement of the propelling element 19 causes such rotation due to the fact that the pointed lower face 41 of the lug 40 acts in the nature of a cam to push the flange 38 to one side, and thus transfers the lug 40 from the angled continuation 37 into alignment with the guide slot 36. The propelling element 19 may accordingly continue for its full extent of downward movement in the guide slot 36, and as the grip sleeve 18 is bottomed on the shoulder configuration 21, the extending end of the shank portion 34 of the propelling element 19 will strip the marking element 12 from the grip sleeve 18 and eject it from the bore 20 at the writing end of the barrel 10 during this continued downward movement. Upon retraction of the propelling element 19 following ejection of the marking element 12, the lug 40 makes contact with the upper edge of the angled continuation 37 causing retraction of the grip sleeve 18 as well, so that the flange 38 is returned from the notch 43 to the longitudinal slot in the guide tube 16 and the clutch assembly 17 is again disposed for normal operation.

As previously mentioned, a further important feature of the arrangement of the feed mechanism according to the present invention is an improved form of friction element 44 associated with the feed mechanism to restrain retracting motion under writing pressure. The friction element 44 is adapted for assembly with the guide tube 16, and is disposed inside the upper end portion of the barrel 10 beyond the screw threads 25, the barrel 10 being formed with a bore 45 at this point to receive the friction element 44. For assembly with the guide tube 16 the friction element 44 is formed with a grooved portion 46 shaped for keyed engagement in the longitudinal slot of the guide tube 16 (see Fig. 5). The friction element 44 further comprises arcuate arm portions 47 extending from the grooved portion 46 for frictional engagement in the bore 45 with the barrel 10. These extending arm portions 47 terminate in flat portions 48 formed inwardly to engage the back of the guide tube 16 and thereby position the grooved portion 46 in the longitudinal slot of the guide tube 16 and support the extending arm portions 47 in frictional engagement with the barrel 10. This form of frictional element 44 is easily associated with the feed mechanism, and while it provides particularly effective braking action for the feed mechanism, it offers no interference whatever in taking down and assembling the feed mechanism in the barrel 10.

In Fig. 6 of the drawing, the adaption of the writing instrument of the present invention for use with marking elements of the class characterized by a ball-type applicator is illustrated. Marking elements of this sort are constructed for use with a so-called dense ink and are well known and commonly available so that no detailed description is needed here. A suitable ball-type marking element 49 for use according to the present invention is shown in Fig. 7. Briefly described, this marking element comprises a tubular body portion 50 forming an ink reservoir and a ball-type applicator 51 carried at the forward end of the body portion 50. The marking element 49 is provided in a length proportioned so that the ball-type applicator 51 will be disposed just inside the forward end of the bore 20 at the writing end of the barrel 10 with the rear end of

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the body portion 50 inserted in the grip sleeve 18 and the clutch assembly 17 in full upward position against the ears 42 formed in guide tube 16 (compare Fig. 6). In this position, the marking element 49 is protected when not in use, and the writing instrument may be carried in a pocket or other receptacle without danger of soiling with ink any material with which it may come in contact. For use in writing, however, the marking element is easily and quickly projected at the writing end of the barrel 10 by manipulation of the operating cap 14 in the usual manner. Moreover, the marking element 49 may be replaced when its ink supply has been expended just as an ordinary lead or crayon marking element would be, so that a refill supply of the marking elements 49 may be provided for use with a writing instrument constructed according to the present invention in the same manner that has long been common with lead and crayon marking elements.

We claim:

1. A mechanical writing instrument comprising a barrel, a feed mechanism including a rotatable, longitudinally slotted, guide tube disposed in said barrel for feeding a marking element to the writing end of said barrel, and a friction element having a key portion formed for engagement in the longitudinal slot in said guide tube and arcuate arm portions extending from said key portion for frictional engagement interiorly with said barrel for restraining rotation of said guide tube under writing pressure.

2. A mechanical writing instrument as defined in claim 1 and further characterized in that the extending arcuate arm portions of said friction element terminate in flat portions formed inwardly to engage said guide tube and thereby position said key portion of said friction element in the longitudinal slot in said guide tube and support said extending arm portions in frictional engagement with said barrel.

3. A mechanical writing instrument comprising a barrel, a feed mechanism including a rotatable, longitudinally slotted, guide tube removably bottomed in said barrel for feeding a marking element to the writing end thereof, the guide tube of said feed mechanism projecting for operation from the upper end of said barrel, an operating cap detachably assembled on the projecting portion of said guide tube by keyed engagement with the longitudinal slot thereof and adapted to rest for rotation on the upper end of said barrel, and a sleeve member detachably engaging said barrel and said operating cap and constituting the sole assembly means by which said feed mechanism and operating cap are retained in assembled relation and in operating position with respect to said barrel.

4. A mechanical writing instrument comprising a barrel having a bore of sufficient size at the writing end portion thereof to receive marking elements of relatively large diameter such as crayons and ball-type applicators, said barrel being formed with a further coaxial bore of still larger size for the major portion of its remaining length and with at least one circumferential shoulder between said first and second mentioned bores, a feed mechanism including a rotatable, longitudinally slotted, guide tube removably disposed in the second mentioned bore of said barrel for feeding a marking element through said first mentioned bore, said guide tube being bottomed in said barrel on said circumferential shoulder and projecting for operation from the upper end

of said barrel, an operating cap detachably keyed on the projecting portion of said guide tube by engagement with the longitudinal slot thereof and formed at its base with an outwardly directed flange portion adapted to rest for rotation on the upper end of said barrel, and a sleeve member detachably engaging said barrel adjacent said upper end, said sleeve member being formed with an inwardly directed flange portion adapted to fit over the flange portion of said operating cap and thereby detachably engage said cap also as the sole assembly means by which said feed mechanism and cap are retained in assembled relation and in operating position with respect to said barrel while allowing access to said operating cap for manipulation to operate said feed mechanism.

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