

-1-

Writing InstrumentBACKGROUND OF THE INVENTION

The present invention relates to writing instruments and in particular to a writing instrument in which a plurality of cartridges are coupled together in series in the longitudinal direction of the instrument so that the cartridges are removable from each other.

A writing instrument of this kind was disclosed in Japanese Utility Model Publication No. 1 4633/85. In that writing instrument, a plurality of cartridges having cores at the tips of the cartridges are fitted and coupled with each other in the longitudinal direction thereof so as to be removable from each other and then the assembly is housed in a relatively long outer cylinder. The core of the foremost cartridge protrudes from the tip of the outer cylinder to enable writing characters or the like by means of the core. When the core of the foremost cartridge is worn out that cartridge is pulled out of the cylinder from the tip end thereof and inserted into the outer cylinder from the butt end thereof pushing up the remaining stack of cartridges so that the second foremost cartridge in the outer cylinder is moved to the tip thereof and the core of the second cartridge then protrudes from the tip of the outer cylinder so that it can be used for writing. Since the plurality of cartridges are sequentially moved into the operative position by being pushed upwardly, the instrument cannot be used if only a single one of the cartridges is lost. This is a problem. Moreover, since the holding pressure on the writing instrument at the time of writing cannot be withstood only by the coupled assembly of cartridges, the instrument cannot be used

without the outer cylinder. Therefore the outer cylinder is needed, and this is another problem. Besides, the cartridges having cores which are worn out can be discarded but cannot be utilised for other purposes. This is yet another problem.

SUMMARY OF THE INVENTION

The present invention was made in order to mitigate or solve some or all of the above mentioned problems.

Accordingly, it is an object of the present invention to provide a writing instrument of the type which comprises an assembly of cartridges in which the writing function can be performed without use of an outer cylinder and the cartridges of which can also be used as toy building blocks.

According to this invention in a writing instrument of the kind in which a plurality of cartridges are coupled together in series in the longitudinal direction thereof so that the cartridges are removable from each other, wherein each of the cartridges comprises a tubular body having a male formation at one end and a core unit located and held in the male formation, the body also having a female formation at its other end into which the male formation of an adjacent cartridge is fitted in the longitudinal direction of each cartridge, so that the male formation is removably held in the female formation, and the outside of the body has at least one engagement projection and at least one engagement groove, each of which can be engaged with the engagement groove or engagement projection of the tubular body of another cartridge so as to connect two cartridges in parallel

with each other in the transverse direction thereof in a manner which permits release of one cartridge from the other.

Preferably the male formation of a cartridge has an insertion hole to receive the core unit of an adjacent cartridge when the male formation of the adjacent cartridge is fitted into the female formation of the first cartridge. It is further preferred that the male formation is tubular. It is still further preferred that the tubular body and the male formation have similar cross-sections but the male formation is smaller in cross-section than the body, the body and male formations being formed integrally and coaxially with each other. Further it is preferred that the female formation of the tubular body has a cross-section similar to that of the cross-section of the male formation and is of such a size that the male formation of the adjacent cartridge can be removably held inside female formation by being fitted therein.

According to a preferred feature of the invention the engagement projection of the tubular body extends along the greater part of the total length of said body; the width of the cross-section of said projection being smaller at the root thereof than at the tip thereof; and the form of the cross-section of the engagement groove of the body corresponds to that of the cross-section of the projection. It is preferred that the engagement projection extends along substantially the entire length of the tubular body.

According to another preferred feature of the invention the core unit comprises a core holder, and a core held by the holder and projecting from one end of

the holder in the longitudinal direction of the unit; and the other end of the holder is removably held in the male formation by being fitted therein. Alternatively, the core unit may comprise only a core which is removably held at the butt thereof in the male formation by being fitted therein and projects from the male formation in the longitudinal direction of the unit.

Since the male formation of one of the cartridges is removably held in the female formation of the tubular body of the adjacent cartridge by being fitted therein and the core unit of the first cartridge is housed in the insertion hole of the male portion of the second (adjacent) cartridge so that the cartridges are removably coupled to each other in the longitudinal direction thereof, the writing instrument does not need an outer cylinder as does the known writing instrument. If the core of the foremost cartridge becomes worn out, that cartridge can be easily removed from the second foremost cartridge and coupled to the rearmost cartridge so that writing can then be performed using the core unit of the second foremost cartridge. Even if one of the cartridges is lost, the writing instrument can be properly used although the length thereof is decreased. Therefore, it does not become impossible to use the instrument for writing as is the case with the known writing instrument. Since the engagement projections and engagement grooves of the outsides of the tubular bodies of some cartridges can be engaged with the engagement grooves and engagement projections of the outsides of other cartridges to removably couple the cartridges in parallel with each other in the transverse direction thereof, the cartridges can be used as toy building blocks. In particular, when the cores of the core units of the cartridges are all worn out, the cartridges can still be used as toy blocks

producing a form of waste recycling. If the writing instrument has a plurality of cartridges coupled in parallel with each other in the transverse direction thereof, a plurality of lines can be drawn simultaneously with the instrument.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of a writing instrument forming an embodiment of the present invention,

Figure 2 is an enlarged perspective view of a single cartridge of the writing instrument shown in Figure 1,

Figure 3 is an enlarged exploded perspective view of the cartridge,

Figure 4 is a longitudinal sectional view of the cartridge,

Figure 5 is a plan view of the cartridge,

Figure 6 is a bottom view of the cartridge,

Figures 7(A), 7(B), 7(C), 7(D), 7(E) and 7(F) are plan views of different modifications of the cartridges,

Figure 8 is a front view of one way in which the cartridges can be coupled to each other in the transverse direction thereof, and

Figure 9 is a front view of the cartridges coupled to each other in the transverse direction thereof in another manner.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENT

A first embodiment of the present invention is hereafter described in detail with reference to Figures 1, 2, 3, 4, 5 and 6.

Figure 1 shows a writing instrument 1 which constitutes the embodiment. A number of cartridges 2 are releasably fitted and coupled in series with each other in the longitudinal direction thereof, so that the instrument is shown in a state wherein it is capable of being used as a writing instrument.

As shown in Figures 2, 3, 4, 5 and 6, each of the cartridges 2 itself comprises a tubular body 4 having a male formation which takes the form of a tubular projection 3, there being a step 4a at one end of the body, and a core unit 6. The cross-sections of both the tubular body 4 and the tubular projection 3 are square so that in that respect they are similar to each other. The cross-section of the tubular body 4 is however larger than that of the tubular projection 3. The tubular body 4 and the tubular projection 3 extend coaxially with each other. The tubular projection 3 has an insertion hole 5 open at one end of the projection. The tubular body 4 has a female formation in the form of an insertion hole 9 open at the other end of the body. The insertion holes 5 and 9 are coaxial and continuous with each other. A pair of end stops 10 project inwardly towards each other from the inside surface of each cartridge 2 at the junction of the insertion holes 5 and 9. The number of the stops 10 is not limited to two, but may be one or more. The insertion hole 5 of the projection 3 is of circular cross-section. The cross-section of the insertion hole 9 of the body 4 is square similar to the cross-section of

the tubular projection 3 and has such a size that the tubular projection 3 of the adjacent cartridge 2 is a push-fit therein.

Engagement projections 7 are provided on two opposite sides of the tubular body 4 at the centres of the widths of the sides, and these projections extend in the longitudinal direction of the body along substantially the total length thereof. Engagement grooves 8 are provided in the other two opposite sides of the tubular body 4 at the centres of the widths of the sides, and these grooves extend in the longitudinal direction of the body along the total length thereof. The cross-section of each of the engagement projections 7 has such a trapezoidal form that the width of the projection is smaller at the root thereof than at the top thereof i.e. it is of dovetail cross-section. The cross-section of each of the engagement grooves 8 has such a trapezoidal form that the cross-section corresponds to that of each of the engagement projections 7 and the width of the groove is larger at the root thereof than at the top thereof.

The core unit 6 comprises a core holder 12 shaped nearly cylindrically, and a core 13 such as pencil lead. The core 13 is fixedly fitted at the butt end thereof in the core holder 12. The core 13 projects by a predetermined length from the tip of the core holder 12 in the longitudinal direction thereof. A projection (not shown in the drawings) is provided on the inside circumferential surface of the core holder 12 and supports the core 13 so that the core is prevented from moving towards the butt of the core holder in the longitudinal direction thereof. The inside diameter of the core holder 12 is slightly larger at the portion of

the holder between the projection and the butt of the holder than at the other portion thereof so that the core 13 of an adjacent cartridge can be inserted into the former portion. A number of small ribs or projections 11 is
5 provided on the outside circumferential surface of the portion of the core holder 12 at the butt end thereof (see Figure 3) the projections being located at equal intervals around the circumference of the holder and extending in the longitudinal direction thereof. The other portion of the
10 core holder 12 at the tip thereof is tapered towards the tip to improve the appearance of the core holder. This tapering is however optional. the projections 11 may not be required if the core holder 12, without the projections, can be fitted in the insertion hole 5 of the tubular
15 projection 3 of the adjacent cartridge 2 with appropriate tightness or friction as described hereinafter.

The core holder 12 of the core unit 6 of each cartridge 2 is removably held in the insertion hole 5 of
20 the tubular projection 3 of the tubular body 4 thereof by being fitted into the hole from the tip of the projection, and the butt of the holder is put in contact with the end stops 10, so that the cartridge is assembled as shown in Figure 4. In that state, the tubular projection 3 extends
25 from the step 4a of the tubular body 4, the half portion of the core holder 12 at the tip thereof projects from the tubular projection, and the core 13 projects from the core holder, so that the cartridge 2 having the core at the centre of the cartridge is constituted as if the cartridge
30 is made of coaxially telescoped cylinders. The tubular portion 3 of one of the cartridges 2 each assembled as described above, is removably held in the insertion hole 9 of the tubular body 4 of another of the cartridges by being fitted into the hole, so that the core holder 12 and core

13 of the former cartridge are housed in the insertion hole of the latter cartridge and the half portion of the core holder of the latter cartridge at the butt end of the core holder thereof. At that time, the step 4a of the tubular body 4 of the former cartridge 2 is put in contact with the butt of the tubular body 4 of the latter cartridge 2 so that the cartridges are positioned in contiguous relation to each other in the longitudinal direction thereof and a gap is set between the cores 13 of the successive cartridges to prevent the cores from being damaged by engagement with each other. This operation is repeated to couple a desired number of the cartridges 2 in series with each other in the longitudinal direction thereof by fitting the cartridges on each other, as shown in Figure 1, to assemble the writing instrument 1 of such a length that it is easy to perform writing with the core 13 of the foremost cartridge.

The engagement projections 7 provided on the outside of the tubular body 4 of another of the cartridges 2 can be engaged in the engagement groove 8 of the tubular body 4 of the foremost cartridge 2 of the assembled writing instrument 1 on at least one side of the foremost cartridge so that both the cartridges are removably coupled in parallel with each other in the transverse direction thereof as shown in Figure 8. If such coupling is performed, two or more lines, which are straight lines or curved or irregular lines, can be easily, accurately and simultaneously drawn in parallel with each other by a single movement of the writing instrument 1 without using parallel rulers. For that reason, the writing instrument 1 can be conveniently used to draw or write a pattern, an advertising picture, a block character, musical staves or the like.

When the core 13 of the foremost cartridge 2 of the writing instrument 1 is worn to an extent that it is unusable, the foremost cartridge is removed from the second foremost cartridge 2 and coupled to the rearmost cartridge 2, so that the core of the second foremost cartridge is then available for writing or drawing.

As shown in Figure 9, the cartridges 2 can be optionally coupled to each other as toy building blocks, in the longitudinal direction and/or transverse direction thereof, to constitute a model cathedral, aircraft, animal, house, bridge or the like to develop the imagination ability of a child, whether the cores 13 of the cartridges are worn out or not. If the cores 13 are worn out, the cartridges 2 can still be used as toy building blocks as a means of waste recycling for economy.

Since the core units 6 are removably inserted into the tubular projections 3 of the tubular bodies of the cartridges 2, the cores 13 of the core units can be made of mutually different materials such as coloured lead, charcoal, crayon, chalk, a ballpoint pen ink and holder, a felt tip pen ink and holder, an eyebrow pencil and a lipstick which are identical with each other or different from each other in colour and/or quality and herein regarded as writing materials in a broad sense.

It may be arranged that the core 13 of at least one of the cartridges 2 is made of an eraser and the cores of the others are made of pencil lead or the like.

If the core 13 of each cartridge 2 is made of crayon, an eyebrow pencil, a lipstick or the like which has a relatively large diameter, the unit 6 may not have

the core holder 12 and the core itself may be directly fitted into the insertion hole 5 of the tubular projection 3 of the tubular body 4 so that the core is removably or irremovably held (as required) in the hole. In that case, 5 the length of each core 13 is predetermined or the length of each insertion hole 5 is increased in advance so that the tip of the core of the posterior cartridge 2 is prevented from coming into contact with the butt of the core of the anterior adjacent cartridge 2.

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The outline of the cross-section of each core unit 6 may be shaped as a circle, an irregular figure, an ellipse or the like to correspond to that of the cross-section of each tubular projection 3.

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Although the engagement projection 7 and the engagement grooves 8 are alternately provided on the four sides of each tubular body of square cross-section in the above described embodiment, the present invention is not 20 confined thereto, but may be otherwise arranged, so that the engagement projections are provided say on two mutually adjacent sides of each tubular body and the engagement grooves are provided in the other two mutually adjacent sides of the tubular body. The present invention 25 may be still otherwise embodied so that at least one engagement projection 7 and at least one engagement groove 8 are provided on optional sides of each tubular body 4 to couple the cartridges 2 to each other in the transverse direction thereof without hindrance. Besides, a single 30 engagement projection 7 and a plurality of engagement grooves 8 may be provided on the sides of each tubular body 4. Although the cross-section of each of the engagement projections 7 and the engagement grooves 8 are trapezoidally shaped in the above described embodiment,

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the present invention is not confined thereto but may otherwise be embodied so that the cross-section is shaped as a T or otherwise. It is preferred however that the cross-section of the projection is undercut so that coupling and decoupling of the cartridges by use of the engagement projections can only be effected by endwise sliding of the two cartridges relatively to each other.

Although the cross-sections of the tubular body 4 and the tubular projections 3 of each cartridge 2 are squarely shaped in the above described embodiment, the present invention is not confined thereto, but may be otherwise embodied so that the cross-sections are shaped as triangles, polygons such as hexagons, ellipses, circles or others, as exemplified in Figures 7(A), 7(B), 7(C), 7(D), 7(E) and 7(F), to increase the variety of the forms of the cross-sections and the number of combinations of designs thereof.

It is preferable that the parts of each cartridge 2 except the core 13 are mass-produced from a thermoplastic resin by injection moulding.

Although the engagement projections 7 and the engagement grooves 8 extend in the longitudinal direction of each tubular body 4 in the above described embodiment, the present invention is not confined thereto, but may be otherwise embodied so that the engagement projections and the engagement grooves extend in the transverse direction of the tubular body.



CLAIMS

1. A writing instrument in which a plurality of cartridges are coupled together in series in the longitudinal direction thereof so that the cartridges are removable from each other, wherein each of the cartridges comprises a tubular body having a male formation at one end and a core unit located and held in the male formation, the body also having a female formation at its other end into which the male formation of an adjacent cartridge is fitted in the longitudinal direction of each cartridge, so that the male formation is removably held in the female formation, and the outside of the body has at least one engagement projection and at least one engagement groove, each of which can be engaged with the engagement groove or engagement projection of the tubular body of another cartridge so as to connect two cartridges in parallel with each other in the transverse direction thereof in a manner which permits release of one cartridge from the other.

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2. A writing instrument as claimed in Claim 1, in which the male formation of a cartridge has an insertion hole to receive the core unit of an adjacent cartridge when the male formation of the adjacent cartridge is fitted into the female formation of the first cartridge.

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3. A writing instrument as claimed in Claim 1 or Claim 2, in which the male formation is tubular.

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4. A writing instrument as claimed in any one of Claims 1 to 3, wherein the tubular body and the male formation have similar cross-sections but the male formation is smaller in cross-section than the body, the body and male formation being formed integrally and

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coaxially with each other.

5. A writing instrument as claimed in any one of Claims 1 to 4, wherein the female formation of the tubular body has a cross-section similar to that of the cross-section of the male formation and is of such a size that the male formation of the adjacent cartridge can be removably held in said female formation by being fitted therein.

6. A writing instrument according to any one of Claims 1 to 5, wherein the engagement projection of the tubular body extends along the greater part of the total length of said body; the width of the cross-section of said projection being smaller at the root thereof than at the top thereof; and the form of the cross-section of the engagement groove of the body corresponds to that of the cross-section of the projection.

7. A writing instrument as claimed in Claim 6, in which the engagement projection extends along substantially the entire length of the tubular body.

8. A writing instrument as claimed in any one of Claims 1 to 7, wherein the core unit comprises a core holder, and a core held by the holder and projecting from one end of the holder in the longitudinal direction of the unit; and the other end of the holder is removably held in the male formation by being fitted therein.

9. A writing instrument as claimed in any one of Claims 1 to 7, wherein the core unit comprises only a core which is removably held at the butt thereof in the male formation by being fitted therein and projects from the male formation in the longitudinal direction of the



-15-

unit.

10. A writing instrument constructed and arranged substantially as herein described with reference to Figures 1 to 4 and Figures 5 and 6 or Figures 1 to 4 and any one of Figures 7(A), 7(B), 7(C), 7(D), 7(E) and 7(F) of the accompanying drawings.
