



# UNITED STATES PATENT OFFICE

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## CHANGEABLE PROPELLING PENCIL

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The present invention relates to an improved changeable propelling pencil of the kind comprising a housing having a tapered end provided with a seating element having a tapered bore through which a contractible chuck protrudes, which chuck has a tapered part co-operating with said tapered bore under the action of a spring in order to effect contraction of the said chuck for gripping a lead.

The present invention has for its object to provide an improved changeable propelling pencil of this kind in which the selection of a particular lead may be effected by the action of gravity on turning the pencil about its axis, and whereby the projection of the selected lead also may be effected by the action of gravity in a simple and effective manner.

According to the present invention, in a changeable propelling pencil of the kind referred to, the contractible chuck is fixed to one end of a lead chamber slidably disposed in the housing, the other end of the said chamber being closed and protruding from the housing at the end thereof opposite to the tapered end, the said lead chamber containing a plurality of separate lead containers in each of which a lead holder is freely slidable, the arrangement being such that by turning the pencil about its axis when held substantially horizontal, one lead container moves by gravity into a position co-axial with the contractible chuck for the projection of a lead thereinto.

According to a further feature of the invention, the spring acting upon the contractible chuck acts to draw the same into the said seating element and to maintain the opposite end of the lead chamber projected beyond the end of the housing so that by pressing the projecting end of the lead chamber axially with respect to the housing, the chuck may be caused to open to receive a lead under the action of gravity when the pencil is tilted with the point downwards.

In one arrangement the lead chamber may comprise symmetrically arranged compartments for the reception of individually movable lead containers. These compartments may be constituted by radially disposed longitudinally extending slots in the lead chamber. Alternatively, the lead chamber may comprise a tube having radially extending hollow ribs adapted to provide compartments for the reception of the lead containers.

In a modification, the lead containers may be positioned in a tubular element which is laterally movable within a space in the lead chamber

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under the action of gravity so that any one of the lead containers may be positioned co-axial with the contractible chuck by turning the pencil about its axis. Thus, four lead containers in square formation may be positioned in a square tube freely movable in the lateral direction within a hollow space in the lead chamber of square but larger cross-sectional shape, the arrangement being such that when two adjacent sides of the square tube are in contact with two adjacent walls of the said hollow space, one of the lead containers is positioned co-axial with the contractible chuck.

Each lead holder may have a slot in the side of the bore therein for the reception of the lead, which slot extends beyond the end of the said bore to facilitate the removal of the butt end of the used lead. The housing may have distinguishing markings on the outside to indicate the number of lead containers in the chamber and the particular lead container which is positioned co-axial with the contractible chuck.

The invention is hereinafter described, by way of example, with reference to the accompanying diagrammatic drawing, in which:

Fig. 1 is a longitudinal section illustrating one embodiment of the improved pencil, according to the invention, all the leads being disposed in the interior of the lead chamber;

Fig. 2 is a part longitudinal section similar to Fig. 1, showing one lead fixed in the contractible chuck;

Fig. 3 is a cross-section on a larger scale taken on the line III—III of Fig. 1;

Fig. 4 is a cross-section similar to Fig. 3, illustrating a modification; and

Fig. 5 is a cross-section illustrating a further modification.

Referring to the accompanying diagrammatic drawing, the improved changeable propelling pencil comprises a housing 1 which has a tapered part 1' at one end fitted with a seating element 2 having a tapered bore. A contractible chuck 6 of known construction having multiple jaws protrudes from the seating element 2 and is formed with a tapered part adapted to co-operate with a tapered bore in the element 2, so that under the influence of a spring 7 the chuck jaws are caused to contract.

The chuck 6 is provided at its rear end with a tubular threaded part 6' which screws into the end 5 of a lead chamber 3 slidably arranged in the interior of the housing 1, and the spring 7 is arranged within the housing 1 between the element 2 and the end 5 of the chamber 3. The

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other end of the lead chamber 3 comprises a closure in the form of a knob 3' which protrudes from the end of the housing 1 opposite to the tapered part 1'.

Each lead 11 is fixed at one end in a lead holder which is slidable in a lead container 8 which is freely movable laterally in the lead chamber 3. Each lead holder consists of a cylinder 9 which has at one end an axial bore 10 to receive the end of a lead 11. At its other end the cylinder 9 has a head 9' the diameter of which substantially coincides with the internal diameter of the lead container 8, so as to guide the lead holder. The wall of the bore 10 has a longitudinal slot 10' which is prolonged beyond the end of the bore, as shown in Fig. 1.

As shown in Fig. 3, the lead chamber 3 may comprise compartments 4 adapted for the reception of one lead container 8 each, the compartments 4 being formed by radial slots which extend longitudinally in the wall of the lead chamber. These slots are arranged symmetrically in star fashion around the axis of the lead chamber.

In the modification illustrated in Fig. 4, the symmetrical radially arranged compartments 4 are formed by constructing the lead chamber in the form of a tube which in cross-section presents three ribs arranged in star fashion to form the compartments.

The changeable propelling pencil described above operates as follows:

In the idle position (Fig. 1) the spring 7 tends to cause the knob 3' of the lead chamber to protrude from the housing 1 and draws the chuck 6 into the tapered bore in the seating element 2, so that the chuck 6 is contracted and obstructs protrusion of a lead 11.

In order to select a lead for projection through the chuck 6, the housing 1, while held with its axis substantially horizontal, is turned about its axis to a suitable position, whereupon one lead container moves under the influence of gravity into a position in which it is co-axial with the chuck 6. Thereupon, the point is inclined downwards and in order to offset the action of the spring 7, the knob 3' is pressed so that the chuck jaws can open to permit the lead which is co-axial therewith to slide out of its container and enter the chuck. When the knob 3' is released, the chamber 3 and the chuck 6 are returned to the initial position by the action of the spring 7, so that the chuck is contracted to engage the protruding lead.

The diameter of the lead containers 8 is such that the selected lead container which by gravity moves from its compartment 4 and rests upon the two remaining containers which have remained in their respective compartments, as shown in Figs. 3 and 4, will be disposed automatically in a position co-axial with the chuck 6. The lead containers which have remained in their respective compartments 4 rest on the inner wall of the housing, as shown in Fig. 3, or on the parts which form the bottoms of the respective compartments, as in Fig. 4.

The interior of the housing is preferably not of a completely circular cross-section, and the cross-section of the lead chamber corresponds with that of the interior of the housing in such manner as to maintain automatically a fixed angular relation therebetween.

Each lead container 8 has at its front end a stop device which prevents the exit of the lead piece 9' from the lead container. In the embodiment shown, this stop is formed by an in-

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ternal flange 8' at the end of the lead container 8, which allows the cylindrical part of the lead holder 9 to pass, but retains the head piece 9'. The chuck 6, when open, has a sufficiently large opening to permit of the passage of the cylindrical part 9 of the lead holder, the length of which is such that the end of the bore 10 is approximately level with the front end of the chuck 6 when the head piece 9' abuts the flange 8' at the end of the lead container 8. Therefore, when a lead 11 has been used up, the lead end can be removed from the bore 10 by the introduction of a pointed tool into the slot 10' for pressing the lead out of the bore. This arrangement therefore enables a used lead to be substituted without dismantling the pencil.

In order to cause a lead which is in the chuck 6 to return into its container, the pencil is held with the point upwards and the knob 3' simultaneously pressed to open the chuck 6.

In the modification shown in Fig. 5, the changeable propelling pencil has the same components and elements as described with reference to Figs. 1 and 2, but the lead chamber 3 is adapted to hold four lead containers. It consists of two opposite walls connected with each other by means of the end pieces 3' and 5. The hollow space between the walls of the housing and of the chamber 3 is of enlarged square cross-section to house a square tube 13 which encloses and positions four lead containers 8 arranged in square formation. Two adjacent sides of the tube 13 are always in contact with the two adjacent walls of the said hollow space. The diameter of the lead containers and the wall thickness of the tube 13 are such that, when two adjacent sides of the latter are in contact with two adjacent sides of the hollow space, one of the lead containers is disposed co-axial with the chuck 6.

The improved changeable propelling pencil according to the invention has several important advantages as compared with known propelling pencils.

Above all, it does not have any devices for operating the lead holder, which consist generally of a knob which slides in a slot along the housing, through which slot dust can enter the housing and impair the proper working of the mechanism. Furthermore, the pencil cannot be damaged by wrong handling of mechanism. Furthermore, as the contractible chuck is rigidly fixed to the lead chamber, the lead is held strongly and rigidly, and, as each lead is accommodated in a separate container, it is to a large extent protected against breakage, if the pencil is dropped.

Furthermore, as the lead is contained in a lead container 8 and its rear end is fixed in a lead holder, the unit consisting of the lead container, lead holder and lead has a considerable weight, which is many times the weight of a lead. The selection of a particular lead is therefore readily accomplished, when the axis of the housing is approximately at an angle of 40° from the vertical, a positive sliding of the selected lead being assured, even when the lead is almost completely used up, due to the weight of the lead holder 9 to which it is affixed. Obviously, the selection is effected with greater certainty the more the angle formed by the axis of the housing to the vertical approaches 90°. The device described permits of an automatic and absolutely reliable selection of leads of the smallest calibre, which is an important advantage.

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As shown in the drawing, distinguishing marks 12 can be applied to the housing 1 to indicate the number of the leads contained in the chamber and the colour and hardness of the lead which is co-axial with the chuck 6.

It will be understood that the invention is not limited to the particular embodiments described. For example, in a further modification the lead chamber 3 may comprise only two radial compartments 4. These can be arranged diametrically or in radial planes at an angle to each other.

I claim:

1. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of lead containers movable laterally in said chamber by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, and in each of said containers a lead holder provided with means for engaging a lead end freely slidable axially in the said container.

2. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of separate lead containers positioned in compartments in said chamber and independently movable laterally by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container.

3. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck, an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of compartments symmetrically arranged about the axis thereof, a lead container in each of said compartments, said containers being independently movable laterally by the action of gravity on turning the said housing about its axis to posi-

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tion a selected lead container co-axial with the said chuck, and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container.

4. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck, an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and longitudinally extending radial slots forming communicating compartments, and a plurality of lead containers positioned in said compartments in said chamber and independently movable laterally by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container.

5. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck, an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck and a longitudinally ribbed tube between the said end parts forming radial compartments, and a plurality of lead containers positioned in said compartments in said chamber and independently movable laterally by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container.

6. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, said lead chamber and said housing being shaped in cross-section to maintain a definite angular relation therebetween, and a plurality of lead containers movable laterally in said chamber by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, and in each of said containers a lead holder provided with means for

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engaging a lead and freely slidable axially in the said container.

7. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck, an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and longitudinally extending radial compartments, said lead chamber and said housing being shaped in cross-section to maintain a definite angular relation therebetween, and a plurality of lead containers positioned in said compartments in said chamber and independently movable laterally by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container.

8. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of lead containers mounted in a tubular casing movable laterally in said chamber by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container.

9. A changeable propelling pencil comprising a housing having a bore with two opposite parallel side walls and a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and comprising two opposite parallel side walls extending between end parts, one end part being connected to said chuck and an opposite closed end part projecting beyond the respective end of said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, said parallel side walls of said chamber being at right angles to the parallel side walls of said bore in said housing to provide a hollow space of square cross-section, and four tubular lead containers mounted in a casing of square cross-section, said casing being movable laterally in said housing by the action of gravity on turning the said housing about its axis to bring any two adjacent walls of said casing into contact with two adjacent walls of said hollow space and thereby

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to position a selected lead container co-axial with the said chuck and in each of said containers a lead holder provided with means for engaging a lead and freely slidable axially in the said container or square tube.

10. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of tubular lead containers movable laterally in said housing by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, each of said tubular containers having an intumed flange at the end adjacent the said chuck, and a lead holder in each of said containers provided with means for engaging a lead and freely slidable axially in the said container, said lead holder having a head engageable with said intumed flange to retain said lead holder in its respective container.

11. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of lead containers movable laterally in said housing by the action of gravity on turning the said housing about its axis to position a selected lead container co-axial with the said chuck, and in each of said containers a lead holder freely slidable axially in the said container and provided at one end with a bore for receiving a lead, a slot in the wall of said bore extending beyond the end of said bore, and at the other end with a head for guiding and retaining said holder in its container, said holder being of a length to be capable of extending through the chuck with said slot exposed beyond said chuck.

12. A changeable propelling pencil comprising a housing having a tapered end, a seating element fitted to said tapered end and having a tapered bore, a contractible chuck device having a flared part co-operating with said tapered bore, a spring acting to engage said flared part in said tapered bore to effect contraction of the chuck, a lead chamber slidable axially in the said housing and having one end part connected to said chuck and an opposite closed end part projecting beyond the respective end of the said housing to enable the said chamber and the said chuck to be moved axially against the action of the spring to effect opening of the said chuck, and a plurality of lead containers movable laterally in said housing by the action of gravity on turning the said housing about its axis to position a selected lead

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container co-axial with the said chuck, a lead holder in each of said containers, said lead holder being provided with means for engaging a lead and being freely slidable axially in the said container, and means on the exterior of said housing for indicating the number of lead containers and the particular lead positioned co-axial with the said chuck.

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