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MEASURING SPOON WITH ELECTRIC VIBRATING MEANS

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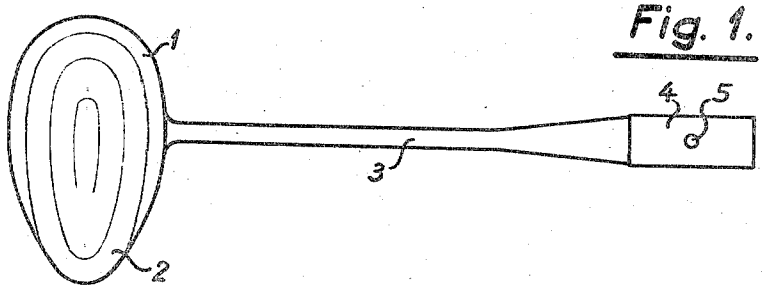


Fig. 1.

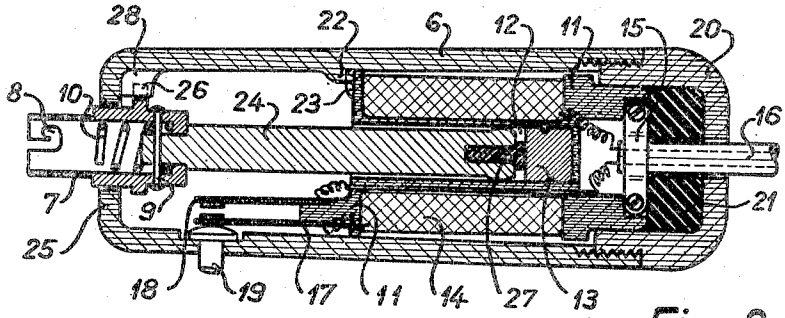


Fig. 2.

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MEASURING SPOON WITH ELECTRIC VIBRATING MEANS

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3 Claims. (Cl. 222—161)

This invention relates to a measuring spoon with handle, and more particularly to a measuring spoon for use in laboratories and in apothecaries' or chemists' shops.

One of the principal objects of the invention is the provision of means in a measuring spoon with handle, with which rapid and very accurate measuring is possible without great practice.

Another object of the invention is the provision of a set of measuring spoons having different shapes, sizes and stem lengths and of a handle having the means referred to wherein each of said measuring spoons may be detachably fastened to said means.

Other objects and advantages will be apparent from the following description in which reference is had to the accompanying drawings illustrating a preferred embodiment of the invention and in which:

Figure 1 shows the measuring spoon provided with a spoon stem and a closure piece mounted on the latter; and

Figure 2 shows the appertaining handle in which the measuring spoon illustrated in Fig. 1 can be detachably fastened, the handle and the built-in vibrator being illustrated in longitudinal section.

As shown in Figure 1, the measuring spoon **1** has at its narrow end **2** a lip formed somewhat in the shape of a channel. The stem **3** is attached to the side of the spoon and ends in a cylindrical connector **4** of a bayonet fastening. The connector **4** is accordingly provided with two retaining pins **5** situated opposite one another and projecting radially outwards. The corresponding part of the bayonet fastening is located in the handle **6** illustrated in Figure 2 and is formed by a tube **7** which has two L-shaped slots **8** situated opposite one another for the introduction of the retaining pins **5**. The connector **4** is inserted from the front into the tube **7**, the spring **10** held fast in the tube **7** by means of the pin **9** being compressed. If the measuring spoon **1** has been turned, said spoon is held fast in known manner in consequence of the action of the spring **10** and the retaining pins **5** in the L-shaped slots **8**. The interchangeability of the spoon enables measuring spoons **1** of different shapes, sizes and stem lengths to be inserted in one and the same handle **6** as required.

The handle **6** illustrated in section in Figure 2 is constructed as a tubular housing of insulating material and encloses the parts of a built-in electromagnetic vibrator. The part of the vibrator mounted stationary in relation to the handle **6** contains an insulating piece **11** of generally spool form, in the central bore **12** of which an iron member **13** is cast. The insulating piece **11** serves directly as coil body and supports the exciter winding **14** of the vibrator coaxially of the tubular handle **6**. On the right-hand portion of the insulating piece **11** the electrical power supply cable **16** is fastened by means of a screwed-on clamping strip **15**, said cable being furnished at the free end (not shown) with the customary connecting plug. The left-hand end of the insulating piece **11** carries two riveted-on contact springs **17**, **18**, of a

hand switch, the push-button **19** of which is guided in the handle **6** to be readily displaceable. As can be seen in Figure 2, one supply wire of the connecting cable **16** runs directly to the contact spring **18** and the other contact spring **17** is connected to the outer end of the exciter winding **14**, while the inner end of the exciter winding **14** is connected to the other supply wire of the connecting cable **16**. The handle **6** is further provided with a cap-shaped end piece **20** which is adapted to be screwed on and which is used for guiding the insulating piece **11**. An inserted rubber ring **21** presses the insulating piece **11** to the left against a stop **22** mounted inside the handle **6**. By means of a guide cam **23** mounted on the insulating piece **11** and engaging in a slot (not shown) in the stop **22**, the insulating piece **11** is held fast in an accurately predetermined position in the handle **6**.

The portion of the electromagnetic vibrator which is movable in relation to the handle **6** consists of the tube **7** and a bar-shaped magnet armature **24** made of iron and rigidly secured on the tube **7**. The magnet armature **24** is preferably constructed as an immersion armature and correspondingly projects partly into the bore of the spool-like insulating piece **11** which carries the exciter coil **14**. This movable part **7**, **24** is mounted on the one hand in the end wall **25** of the handle **6** and on the other hand in the bore **12** of the insulating piece **11**, in such manner as to be easily movable in the longitudinal direction of the handle **6**. A flange-shaped extension **26** on the tube **7** prevents the movable part **7**, **24** from being drawn out of the handle **6** to the left. A rubber cushion **27** inserted in the right-hand end of the immersion armature **24** limits the movement of the part **7**, **24** in the direction of the iron core **13**. In addition, the flange-shaped extension **26** has a slot in which a guide piece **28** provided inside the handle **6** engages with clearance and hence makes it impossible for the part **7**, **24** to rotate about its longitudinal axis. By simply unscrewing the end piece **20**, it is possible for all parts of the vibrator to be drawn out of the handle **6** to the right. The vibrator is re-inserted in the handle **6** by the reverse sequence of operations.

The aforedescribed vibrator is intended for operation with alternating current. If therefore the connecting cable **16** is connected to a source of alternating current and the push-button **19** of the hand switch is depressed, the immersion armature **24** together with the tube **7** is drawn to the right into the coil **14** until the rubber cushion **27** bears against the iron core **13**. In addition, the movable part **7**, **24** will perform a vibrating movement in the longitudinal direction of the handle **6**, whereby the rubber cushion **27** is periodically stressed. The frequency of this vibrating movement of the part **7**, **24** is obviously equal to twice the frequency of the alternating current supply and the amplitude of the vibrating movement is adjusted by suitably dimensioning the rubber cushion **27** to an order of magnitude of about one-tenth of a millimetre. For the operation of the vibrator, an alternating current input of about one to two watts will then generally be sufficient, irrespectively of whether a larger or smaller measuring spoon **1** is fastened to the front of the tube **7**.

The aforedescribed measuring spoon with handle is now used in practice as follows:

A spoon **1** which can easily be introduced into the neck of the bottle containing the pulverulent substance is first selected. This measuring spoon is fastened in the tube **7** by means of its bayonet fastening **5**, **8** and the connecting cable **16** is connected to an alternating current supply system. Without first depressing the push-button **19**, the spoon **1** is introduced into the bottle and the spoon is filled only to such an extent that the heaped pulverulent substance does not, or does not substantially, project over the edge of the spoon. The spoon **1** is then

brought above the bowl into which the pulverulent substance is to be poured. If the spoon 1 is now held horizontal and the vibrator is operated by depressing the button 19, the substance hitherto still heaped in the spoon 1 will be distributed in the spoon 1 and kept continuously in slight motion. If the lip end 2 of the spoon 1 is now inclined downwards, the pulverulent substance will flow in a uniform stream into the bowl or container. By reducing the inclination of the measuring spoon 1, it is possible without much practice to obtain so fine a flow of the pulverulent substance poured out that it is hardly visible to the naked eye. If the bowl or container is placed upon a sensitive direct indication balance it is merely necessary to release the push-button 19 when the desired weight is reached. When the vibrator is switched off, the fine stream flowing off from the spoon 1 is interrupted without it being necessary to reduce the inclination of the spoon, and the measuring is thus completed. It is found that in this way with a pulverulent substance ground to a suitable degree of fineness, it is possible to carry out the measuring with an accuracy of one-tenth of a milligram.

Using a measuring spoon of conventional design without a built-in vibrator the accuracy obtainable is far less. When the desired amount or the desired weight of the substance poured into the bowl has almost been reached by tipping or inclining the filled spoon in the usual manner, the stem of the spoon is tapped with one finger of the free hand, so that the pulverulent substance falls in small amounts from the measuring spoon each time it is tapped. It is however almost impossible in practice to obtain accurate measuring in this manner, since the amount falling off from the measuring spoon each time it is tapped is fundamentally subject to staticstical fluctuations, even if the stem of the spoon could always be tapped in exactly the same manner. In addition, the correct handling of a measuring spoon of the type hitherto known requires a certain amount of practice, care and skill, and the working with a measuring spoon without a built-in vibrator consumes a relatively great amount of time.

It should further be mentioned that the vibrating movement which is imparted to the measuring spoon according to the present invention by means of the vibrator incorporated in the handle 6, can per se also take place in a different direction from the longitudinal direction of the handle 6. It is found, however, that vibrating movements of the spoon 1, which move the spoon 1 up and down when handle 6 is held horizontal, are less favourable for obtaining the desired mode of operation. In addition, it must be borne in mind that the spoon stems 3 of the various insertable spoons 1 may have very different lengths, depending on the use to which the latter are to be put. The amplitude of the vibrating movement of the spoon 1 should, however, not be substantially dependent on the length of the spoon stems 3, and it is therefore advantageous for the vibrating movement of the spoon 1, and hence also that of the movable part 7, 24 of the vibrator, to take place in the longitudinal direction of the handle 6. It is furthermore convenient, if it is possible to adjust the inclination of the pouring lip 2 of the spoon 1 by simple turn of the wrist of the person

holding the handle 6, without having to change the longitudinal direction of the handle 6. The direction of the pouring lip 2 of the spoon 1 must accordingly form an angle, and preferably a right-angle, with the longitudinal direction of the handle 6.

The most diverse actuating systems may be used for the vibrator incorporated in the handle 6. A limiting condition is imposed by the fact that the handle 6 should not have too great a diameter and should still be capable of being held easily by one hand, since otherwise the easy and steady handling of the measuring spoon would be impaired. The embodiment illustrated can be regarded as favourable in this respect. For the direct current operation of an electromagnetic vibrator, the movable part 7, 24 of the latter can moreover be combined with a vibrating contact which periodically interrupts the direct current flowing through the exciter coil 14. This and other modifications which may occur to those familiar with the art wall within the spirit and scope of the invention as set forth in the following claims.

We claim:

1. Measuring apparatus comprising a measuring spoon having a stem and a lip at substantially right angles to said stem for the lateral discharge of material from said spoon, a tubular handle, an electromagnetic vibrator comprising an exciter coil and an elongated armature movable axially of said exciter coil, means securing said exciter coil within and coaxially of said tubular handle, means preventing rotation of said armature about its axis, cooperating means on said armature and on the stem of said spoon for supporting said spoon on said armature, and an energizing circuit for said vibrator supported on said handle and including a manually operable switch.

2. Measuring apparatus as recited in claim 1, wherein said exciter coil is wound on a spool-like insulating piece which constitutes said securing means, and said armature projects into the bore of said spool-like insulating piece, in combination with a cushion of elastic material between said armature and said spool-like insulating piece.

3. The combination with a measuring spoon having a stem terminating in one element of a detachable coupling, a tubular handle, an electromagnetic vibrator comprising an exciter coil fixedly mounted within said handle and an elongated armature movable axially of said coil and handle, means preventing rotation of said armature with respect to the axis of said handle, said armature having an end projecting axially from said tubular handle, and a coupling element complementary to said one element of the spoon stem at the projecting end of said armature, whereby said spoon may be demountably supported on said armature.

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