

PATENT SPECIFICATION



Application Date: Dec. 15, 1923. No. 31,540/23.

230,199

Complete Left: Sept. 12, 1924.

Complete Accepted: March 12, 1925.

PROVISIONAL SPECIFICATION.

Improvements in and relating to Calculating Apparatus.

I, FREDERICK WILLIAM HENNING, of 67, Gaskell Street, Union Road, Clapham, S.W. 4, London, a British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to calculating apparatus of the cylindrical type, whereon logarithmic scales are used in a spiral form in connection with tubular cursors. My invention is characterised by the use of one cylinder only, in conjunction with a cursor composed of two separate circular tubular parts, one being opaque and contained entirely within the other which is transparent, and also by the use of two dissimilar materials, one for each part of the cursor, the object being to effect a difference in the pressure required to distort each part from the truly circular section into a slightly oval section. In order to carry my invention into effect, I take a cylindrical rod or tube and inscribe thereon a spiral line or lines, on the outside thereof. On one side or on both sides of any one or all the lines I engrave a logarithmic scale or scales and evaluate them either in logarithmic, anti-logarithmic or absolute values,—for instance British currency or weights and the like—and I arrange the figures alternatively either to be readable the right way up when the cylinder axis is vertical or horizontally positioned. I now encircle the scale with a "first steel tube" of an axial length equal approximately to its diameter, but of considerable radial thickness, and interpose between it and the cylinder scale a smooth packing such as a tube of felt, velvet or the like, affixed to the steel tube so as to be moved by and with it, and so prevent abrasion of the surface of the scale by the steel tube; in cases where the cylinder is made of metal, the packing may be

omitted. The object of the steel tube being made radially thick, is to ensure that when it is held in the grip of the thumb and finger for the purpose of moving the tube upon the cylinder the pressure necessary to overcome the friction between the smooth packing and the scale, shall not be sufficient to cause any more than a negligible degree of ovality in the said steel tube. The tube is formed with a projection shaped like the letter L positioned so that the topmost portion of the letter is the part that merges into the tube. The part of the projection which corresponds to the lower portion of the letter is made of a width equal to one or more times the pitch of the spiral line measured axially, and is formed at a slight deviation from the right angle so as to conform to the angle at which the spiral line is drawn, and thus enable this part of the projection to have the whole of each edge adjacent to spiral lines. After reducing the radial thickness of this projection to minimise the error due to parallax, I engrave across it in the same plane as the axis of the tube a fine line, and at one or both ends of that line I engrave an arrow head for the purpose of pointing to a mark on any scale. I also encircle the scale with a "second steel tube"—with or without the smooth packing—of an axial length approximately equal to a quarter of its diameter but of a radial thickness exceeding that of the first steel tube, I form on this exactly the same projection, lined and arrowed, as on the first tube. These two pieces of steel tube are positioned upon the cylinder with their projections facing each other. On the outside of the second tube—the shortest and thickest—I secure one end of a tube of transparent glass, celluloid, or other suitable material

[Price 1/-]

having an axial length equal approximately to the length of the cylinder, and having an outside diameter of such a size that it slides freely over the first steel tube without communicating any of its motion thereto. The method of operation, assuming the cylinder to be fixed, is as follows:—The transparent tube is gripped between the thumb and finger at the part which happens to be encircling the first steel tube, and the pressure of the grip causes the transparent tube to ovalise and transmit that pressure to grip effectively the first steel tube. Whereupon both move together and the arrow on the first tube can be set to any mark on the cylinder. Having done this, the

grip is released and the transparent tube is gripped at the part where it is secured to the second steel tube—the arrow on the projection of which can thereupon be set to another mark on the cylinder. Having done this the grip is again released and the transparent tube is re-gripped at the part which happens to be encircling the first steel tube and now, by moving both the tubes simultaneously either arrow can be set to a third mark whereupon the answer to the calculation will be found at the other or remaining arrow.

Dated this 15th day of December, 1923.
FREDERICK WILLIAM HENNING.

COMPLETE SPECIFICATION.

Improvements in and relating to Calculating Apparatus.

I, FREDERICK WILLIAM HENNING, of 23, Chelsham Road, Clapham, London, S.W. 4, late of 67, Gaskell Street, Union Road, Clapham, S.W. 4, London, British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to improvements in calculating apparatus of the cylindrical slide-rule type wherein scales are used in conjunction with tubular cursor members. According to my invention I provide means for temporarily interconnecting such members by distorting a resilient part carried by one of them.

With the aid of the accompanying sheet of drawings, I will now describe two forms of my said invention.

Fig. 1 is a construction of one form of the invention.

Fig. 2 illustrates another form of my invention.

In order to carry my invention into effect, I take a cylindrical rod or tube (*a*) with suitable inscriptions (*b*) thereon. I now encircle the rod or tube (*a*) with a "first steel tube" (*c*) of an axial length approximately equal to half its diameter, but of considerable radial thickness, and interpose between it and the cylinder scale (*b*) a smooth packing of felt, velvet or the like, affixed in the steel tube so as to be moved by and with it, and so prevent abrasion of the surface of the scale (*b*) by the steel tube (*c*). In cases where the cylinder (*a*) is made of metal, the packing may be omitted. The object of the steel tube (*c*) being made radially thick, is to ensure that when it is held in the grip of the thumb and finger for the

purpose of moving the tube (*c*) upon the cylinder (*a*), the pressure necessary to overcome the friction between the smooth packing and the cylinder, shall not be sufficient to cause any more than a negligible degree or distortion or ovality in the said steel tube (*c*). The tube is formed with a projection (*d*), which, if developed flat would be shaped like a right angled triangle, the hypotenuse of which is shaped to lie in a helical sense on the cylinder. The radial thickness of this projection (*d*) is reduced to minimise the error due to parallax. It is also suitably inscribed or engraved, as with an arrow head (*e*) for example. I also encircle the scale with a "second steel tube" (*f*) with or without the smooth packing of an axial length approximately equal to a quarter of its diameter but of a radial thickness exceeding that of the first steel tube, I form on this another projection (*d*) graduated and arrowed (*e*), for example, as on the first tube (*c*), in any suitable way. These two pieces of steel tube are positioned upon the cylinder with their projections (*d*) (*d*) facing each other. On the outside of the second tube—the shortest and thickest—I secure one end of a tube (*g*) of transparent glass, celluloid, or other suitable material having an axial length equal approximately to the length of the cylinder, and having an outside diameter of such size that it slides freely over the first steel tube (*c*) without communicating any of its motion thereto. The method of operation, assuming the cylinder (*a*) to be fixed, is as follows:—The transparent tube (*g*) is gripped between the thumb and finger at the part which happens to

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be encircling the first steel tube (*c*), and the pressure of the grip causes the transparent tube to ovalize and transmit that pressure to grip effectively the first steel tube (*c*) whereupon both move together, and the arrow (*e*) on the first tube can be set to any mark on the cylinder (*a*). Having done this, the grip is released and the transparent tube (*g*) is gripped at the part where it is secured to the second steel tube (*f*), the arrow on the projection of which can thereupon be set to another mark on the cylinder. Having done this, the grip is again released, and the transparent tube is re-gripped at the part which happens to be encircling the first tube (*c*), and now, by moving both the tubes (*c*) and (*f*) simultaneously either arrow can be set to a third mark. In another form of my invention shewn in Figure 2 the cylindrical tube (*a*) whereon suitable markings (*b*) are inscribed, is encased by a tube of glass or celluloid (*g*), the outside of which I encircle with the first steel tube (*c*), and the second steel tube (*f*), the motion being transmitted from the first steel tube to the second steel tube by flat bars of metal or other suitable material (*k*), which are permanently fixed to the second steel tube (*f*). The first and second steel tubes may now be moved upon the celluloid thereby protecting the scales from becoming obliterated.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is

to be performed, I declare that what I claim is:—

1. A cylindrical calculating apparatus of the kind referred to having a plurality of cursor members slidably and rotatably carried, and means for interconnecting such members at will by temporarily distorting a resilient part carried by one of them.

2. A cylindrical calculating apparatus of the kind referred to having two tubular cursor members capable of rotating and sliding on the cylinder and resilient means positively attached to one member and capable of being distorted or nipped so as frictionally to engage the other member.

3. A device as claimed in Claim 1 or 2 wherein the resilient member comprises a transparent tube.

4. A device as claimed in Claim 1 or 2 wherein the resilient member comprises bars of metal or other suitable material positively attached to one cursor member and extending along the cylinder so as to be engageable at will with the other cursor member.

5. A cylindrical calculating apparatus substantially as described, with reference to the accompanying sheet of drawings.

Dated this 12th day of September, 1924.

For the Applicant,
STANLEY, POPPLEWELL & Co.,
Chartered Patent Agents,
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[This Drawing is a reproduction of the Original on a reduced scale]

FIG: 1.

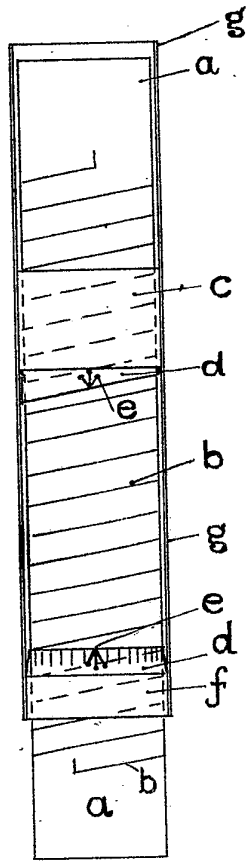


FIG: 2.

