

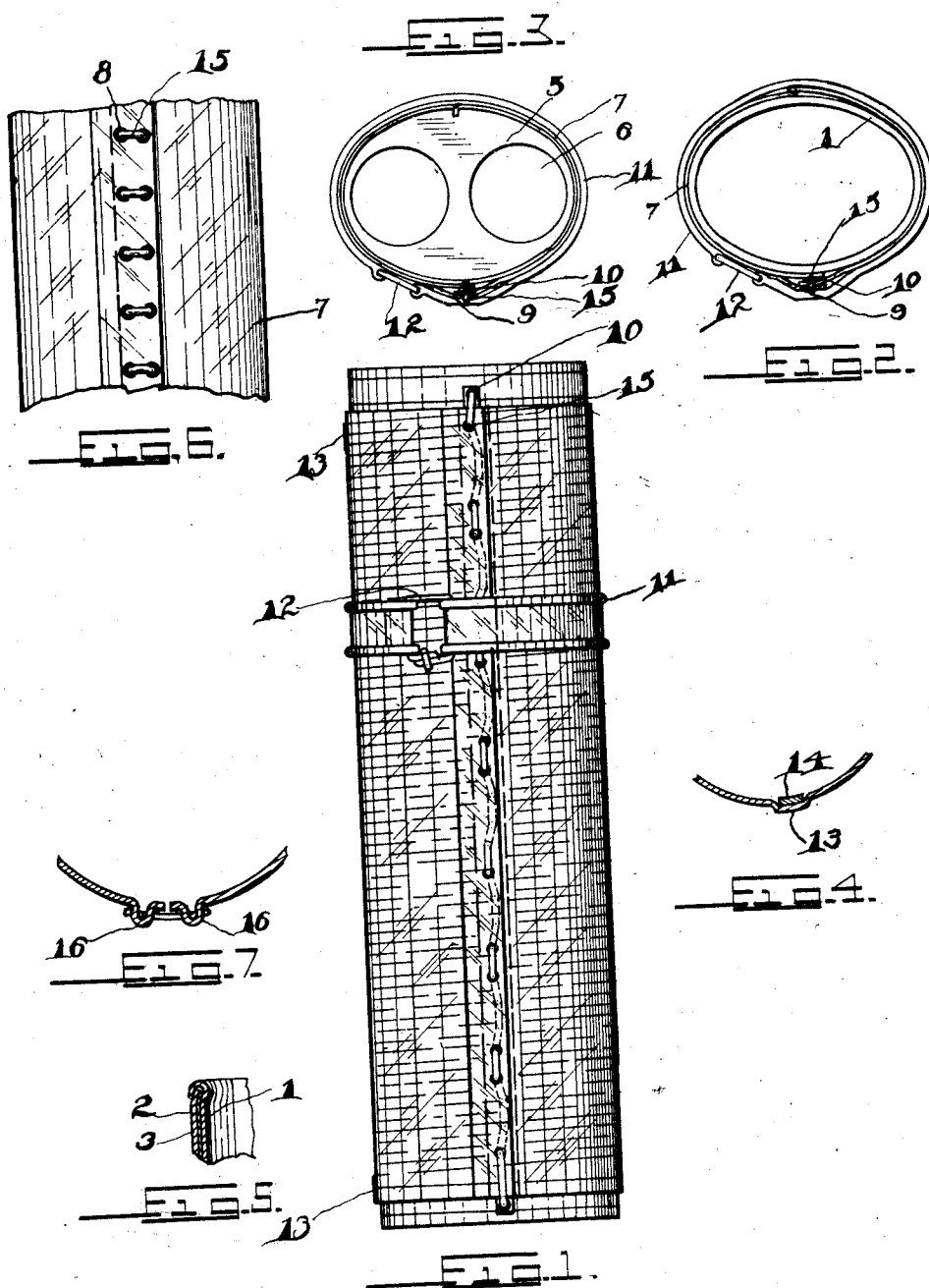
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CALCULATING APPARATUS

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CALCULATING APPARATUS.

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This invention relates to calculating apparatus of the type set forth in my co-pending application No. 757937 filed December 24th, 1924. The device set out in this prior application comprised a stationary inner member and an outer movable member or cursor, the latter being movable both circumferentially and longitudinally of the stationary member. The outer member must of necessity have a frictional engagement with the surface of the inner member, and is usually rolled up to form from a flat sheet of transparent celluloid. It is found that it is very difficult to make these outer members of exact size, and they are often either slightly oversize which permits of slipping, thus increasing the liability of error in calculation, or are slightly undersize, thus making it very difficult to move them on the inner member.

My chief object therefore is to devise a construction of outer member which will always have a sufficient frictional engagement with the inner member to avoid dangerous slipping and yet may be freely moved on the inner member whenever necessary.

I attain my object by means of the constructions hereinafter described and illustrated in the accompanying drawings in which—

Fig. 1 is a side elevation of my improved apparatus;

Fig. 2 a plan section through the same;

Fig. 3 a plan view of a modified form;

Fig. 4 a detail cross section showing the method of mounting the indicator points on the outer member or cursor;

Fig. 5 a sectional detail through the upper end of the wall of the inner member;

Fig. 6 a detail view showing a modified method of lacing the outer member; and

Fig. 7 a detail illustrating a still further method of lacing.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

My present device, like that in the prior application hereinbefore referred to, comprises two main members, the inner or stationary member and the movable outer member or cursor, the latter being adapted to be moved both circumferentially and longitudinally of the stationary member. Either one or both members may be provided with scales as desired, but the arrange-

ment of the scales forms no part of the present invention.

The inner member may be made up in various forms. A cheap form is shown in Fig. 2 in which the member 1 is formed from a tube 1, usually of tin or other cheap metal, about which a paper 2, on which the scale is printed is placed, and over the paper is placed a protective covering 3 of transparent celluloid. The protective covering 3 will be rolled up from a flat sheet with the ends overlapping and secured together.

In Fig. 3 the scale is engraved in the surface of a metal sheet, and the sheet rolled up and mounted on a block 5. For the purpose of reducing the weight, holes 6 may be formed through the block. The holes 6 are also useful in that the fingers may be inserted therein to hold the device.

The outer member 7 will in each case be formed from a sheet of transparent material, the edges being secured together by resilient means which tends to hold the member in frictional engagement with the outer surface of the stationary member, but which gives sufficiently to allow the outer member to be easily moved. In the preferred form a row of holes 8 is formed adjacent each edge of the sheet. The sheet is then rolled up with the holes in one end in alinement with the holes in the other, and a resilient lace is threaded through the holes as indicated in Fig. 1. Preferably, however, a narrow strip or fly 9 of material similar to that of the sheet is secured adjacent each edge of the sheet, so that the overlapping parts of the sheets are double, the lacing holes 8 being formed in the adjacent plies, the inner ply of the under part preventing the rough lace from engaging the surface of the inner member, and the outer ply of the outer part protecting the lace.

In Fig. 7 I show a modification in which the lacing is held out of contact with the inner member without the use of strips 9. In this form ribs 16 are formed on the outer member and the lace holes are formed in the ribs.

The outer member 7 will in use often extend beyond the ends of the stationary member, and as the sheet from which it is formed is of comparatively light material there is a tendency for it to buckle under the action of the resilient lace when so extended. I therefore provide between the

overlapping ends a bar or rod 10 of metal or other stiff material and the upper and lower ends of the lace are secured to the respective ends of this bar.

5 In Fig. 6 a modification of the lacing is shown. Two rows of holes are provided adjacent each edge of the sheet and separate resilient members 15 are provided as shown. In this case, there is no tendency of the outer member to buckle when it is extended beyond the end of the inner member, and the rod 10 may therefore be omitted.

10 In the prior patent the outer surface of the outer member was adapted to take pencil marks. In the present form, however, the outer member will be perfectly clear and instead of marking by pencil, I provide a second movable member 11 on which a setting mark or indicator appears, the indicator on the member 11 being set at the point where the pencil mark would have been made with the earlier construction. This movable member will preferably be made from a strip of transparent material, its ends being provided with loops, the loops being connected by a resilient member 12. The edges of this band will preferably be provided with a small bead.

As in the previous case, the movable member 7 will be provided with indication or setting marks, and in order that these may have the desired permanency, I preferably provide pockets or recesses 13 in the inner surface of the member as indicated in Fig. 4 in which an indication 14 of distinctive color may be placed. By forming the recesses 13, no projections are formed on the inner face of the outer member which would interfere with its operation, and yet the indication marks 14 are protected from dislodgement in use.

As will be seen from Fig. 2, due to the method of forming the inner and outer members by lapping the joints, there is a projection or shoulder on the outer surface of the inner member and a projection on the inner surface of the outer member. In order that these projections may not interfere with the circumferential movement of the outer member, it is necessary that the laps on the adjacent surfaces extend in the same direction. If the laps be so arranged, the projections or shoulders will not engage with one another to interfere with the circumferential movement of the parts relative to one another.

As in the prior application, the station-

ary member will preferably be substantially oval in form, that is, its diameter in one direction will be greater than its diameter in a direction at right angles thereto, and the outer or movable member will therefore require to be made of flexible material.

From the above description it will be seen that I have devised a construction which will satisfactorily attain the object of my invention as set out in the preamble of this specification.

What I claim is:

1. In calculating apparatus, the combination of a pair of members sleeved on and movable longitudinally and circumferentially relative to one another, each of said members being formed of a sheet of flat material rolled to tubular form with overlapping ends, the laps on the adjacent surfaces of said members when in sleeved position being directed in the same direction.

2. In calculating apparatus, the combination of a pair of members sleeved on and movable longitudinally and circumferentially relative to one another, the outer member being formed of transparent material, said outer member having a recess formed in its inner surface; and an indication sign mounted in said recess.

3. In indicating apparatus, the combination of an under member and a transparent outer member, having their faces contacting with one another, the contacting face of the outer member being provided with a recess; and an indicator in said recess.

4. In calculating apparatus, the combination of a pair of members sleeved on and movable longitudinally and circumferentially relative to one another, each of said members being formed of a sheet of flat material rolled to tubular form with overlapping ends, the laps on the adjacent surfaces of said members when in sleeved position being directed in the same direction, the outer member being formed of transparent material, said outer member having a recess formed in its inner surface; and an indication sign mounted in said recess.

5. In indicating apparatus, the combination of an under member and a transparent outer member, having their faces contacting with one another, the contacting face of one of said members being provided with a recess; and an indicator in said recess.

Signed at Toronto, Canada, this 25th day of June 1925.

JOHN E. C. BUTTERFIELD.