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(54) **DISK SLIDE RULE**

(57) **Abstract:**

(54) **CERCLE A CALCULER**

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1 This invention relates to a disk slide rule and
2 more particularly to an indicator made of cardboard or simi-
3 lar sheet material, such as plastic, and comprising a body
4 or rear sheet member with one or more rotary sheets, concen-
5 tric or otherwise, mounted on the sheet and capable of being
6 rotated relative to the body sheet and to one another. Such
7 disk slide rules have a wide variety of uses, for example,
8 in supplying information concerning different uses or differ-
9 ent varieties of a product where one rotary sheet can be
10 provided with a pointer or cut-out to expose successive por-
11 tions of informative matter printed on the body sheet or on
12 another rotary sheet; or as a disk slide rule where the
13 rotary sheets and body sheet can be provided with cooperating
14 pointers and calculated scales to permit of rapidly calcu-
15 lating particular problems.

16 The principal object of the present invention is
17 to provide a simple and inexpensive disk slide rule having
18 one disk arranged in advance of a rotary sheet or disk and
19 held stationary with reference to a rear body or backing
20 sheet so that calculations can be readily made from scales
21 or pointers imprinted on the stationary disk and rotary disk.

22 Another principal object is to provide a simple
23 and inexpensive disk slide rule having a plurality of rotary
24 sheets in which the setting of one rotary sheet does not
25 move and hence affect the setting of another rotary sheet,
26 thereby to permit of rapidly setting successive rotary sheets
27 and of obtaining an accurate answer. The accidental shifting
28 of one rotary sheet in setting another rotary sheet, of
29 course, results in an erroneous answer.

30 Another object is to provide a disk slide rule in

1 which the body sheet and rotary sheets can be made of low-
2 cost cardboard or sheet plastic and in which adequate bearing
3 surfaces are provided so that the indicator will stand up
4 under conditions of severe and constant use without getting
5 out of order and without danger of the rotary sheets cutting
6 themselves free to an extent which will interfere with the
7 operation or accuracy of the indicator.

8 Another object is to provide such a disk slide rule
9 composed of relatively rotatable slidably interfitted pieces
10 of cardboard or sheet plastic in which there is a minimum
11 frictional resistance to the rotation of the rotary sheets
12 relative to one another and to the body sheet and which are
13 easily and quickly brought into proper assembled relation
14 with one another.

15 Another object is to provide such a disk slide rule
16 in which any desired number of independently adjustable
17 rotary sheets can be provided and in which the rotary sheets
18 can be arranged eccentrically to render the rotary sheets
19 more conveniently accessible for manipulation.

20 Another aim is to provide such a disk slide rule
21 in which, by the generally concentric arrangement of two or
22 more rotary sheets, the overall dimensions of the indicator
23 can be reduced and the masking effect of the outermost rotary
24 sheet can be applied over the full diameter of the face which
25 it covers and not merely one radial side thereof.

26 Another purpose is to provide such a disk slide
27 rule, the paper or cardboard parts of which can be made on
28 commercial paper forming machinery, thereby to permit of large
29 scale production of the indicator at very low cost.

30 Another object is to provide such a disk slide rule

1 in which there is no danger of accidental derangement of the
2 rotary sheet or sheets.

3 Other objects and advantages will appear from the
4 following description and drawings in which

5 Fig. 1 is a top plan view of one form of disk
6 slide rule embodying the present invention, and showing the
7 same in the form of a calculator for calculating retail sell-
8 ing prices from different costs and with different mark-ups.
9 Only that portion of the circular scales necessary to an
10 explanation of the use of the calculator is shown.

11 Fig. 2 is a fragmentary sectional view taken on
12 line 2-2, Fig. 1, the thickness of the stationary sheets,
13 spacers and rotary sheets being exaggerated for clarity.

14 Fig. 3 is a fragmentary view similar to Fig. 2 on
15 an enlarged scale.

16 Fig. 4 is a view similar to Fig. 1 and showing a
17 modified form of the invention in which a multiplicity of
18 rotary sheets are provided and in which the rotary sheets are
19 arranged in eccentric relation to each other to facilitate
20 their manipulation.

21 Fig. 5 is a sectional view taken on line 5-5, Fig.
22 4, the thickness of the stationary sheets, spacers and rotary
23 sheets being exaggerated for clarity.

24 Fig. 6 is a fragmentary view similar to Fig. 5, on
25 an enlarged scale.

26 The form of disk slide rule illustrated in Figs.
27 1-3 is shown as including a body or rear sheet member 10 of
28 flat cardboard and which is generally pear-shaped in form,
29 this body or backing sheet having a circular edge 11 and hav-
30 ing a tab or finger piece 12 projecting outwardly from one

1 side to provide a holder by means of which the indicator can
2 be conveniently grasped. This projection 12 can be provided
3 with a grommet or eyelet 13 which permits of hanging the
4 indicator on a wall.

5 A circular spacer 14 of relatively small diameter
6 is arranged against a part of the forward face of the body
7 or backing sheet 10 and preferably concentric with its cir-
8 cular edge 11. A ring-shaped or rotary sheet or disk 15 of
9 flat cardboard or sheet plastic material is also arranged
10 against the forward face of the body or backing sheet 10
11 and is provided with a concentric circular opening 16 which
12 closely fits the periphery of the circular spacer 14, the
13 bearing for the rotation of the rotary sheet 15 being provided
14 by the periphery of the circular spacer 14.

15 A second sheet or disk 18 is arranged against the
16 forward face of the circular spacer 14 and rotary sheet 15.
17 This disk is shown as having a window 19 cut therein.

18 A feature of the invention resides in connecting
19 the body sheet 10, the circular spacer 14 and the disk or
20 sheet 18 so that they are held in fixed relation to one another.
21 While this could be accomplished by means of glue, staples
22 or like fastenings, I prefer to accomplish this connection
23 by making the circular spacer 14 of a thermoplastic material
24 and by welding the forward and rearward faces of this thermo-
25 plastic spacer to the disk or sheet 18 and body or backing
26 sheet 10, respectively, by the application of heat. As indi-
27 cated, the body sheet 10 and the disk or sheet 18 are prefer-
28 ably made of low-cost cardboard and the weld, effected by the
29 application of heat, between the circular spacer 14 and the
30 body sheet 10 is indicated at 20, and the weld similarly

1 provided between the circular spacer 14 and the disk 18 is
2 indicated at 21.

3 For the illustrated use of the disk slide rule
4 shown in Figs. 1-3, it is essential to have a second rotary
5 sheet or disk indicated at 22. While this rotary sheet can
6 be in the form of a simple pointer or strip, it is shown as
7 being in the form of a transparent plastic disk 22 and held
8 in concentric relation with the first rotary sheet 15 by
9 means of a metal eyelet or grommet 23. This eyelet or grommet
10 23 extends through the rotary sheet 22, second sheet or disk
11 18, circular spacer 14 and body sheet 10 and is shown as
12 arranged concentric with all of these parts. The rear end
13 of this grommet or eyelet is upset to provide an enlarged
14 head arranged against the rearward face of the body sheet 10
15 and the forward end of this eyelet or grommet is upset to
16 provide an enlarged head arranged against the front face of
17 the rotary sheet 22, the rotary sheet 22 being capable of
18 rotation relative to the disk 18 on the reduced shank of this
19 eyelet or grommet.

20 As an example of a practical application of the
21 rotary indicator shown in Figs. 1-3 as a calculator, it is
22 shown as provided with scales and markings which permit a
23 retailer to rapidly compute his selling price of articles of
24 different costs and at different mark-ups, a mark-up being the
25 percentage of increase in the retailer's price with reference
26 to his cost. For this purpose, a circular scale 25 of prices
27 is imprinted on the rotary sheet 15 immediately beyond and
28 concentric with the periphery of the disk 18, only a portion
29 of this scale being illustrated, and this scale being cali-
30 brated in progressively increasing amounts and representing

1 the cost per dozen of the various articles which he sells,
2 A second circular scale 26 is also imprinted upon the rotary
3 sheet 15 inside of the first scale 25 and concentric there-
4 with and in position to be exposed through the window 19 of
5 the disk 18. This scale 26 is identical with the scale 25
6 except that it is calibrated in the cost per unit rather
7 than in the cost per dozen, as with the scale 25. A third
8 scale 28 is imprinted on the front face of the disk 18 near
9 its periphery and arranged concentric with its axis. This
10 scale is calibrated in progressive increments of percentage
11 of mark-up. The rotary sheet 22 is provided with a pointer
12 or indicator 29 arranged to traverse the scale 28 and is
13 preferably labeled "mark-up" and the rotary sheet 22 is pro-
14 vided on its opposite side with a second pointer 30 which is
15 preferably labeled "cost". The answer is read from a pointer
16 31 imprinted on the forward face of the disk 18 alongside the
17 window 19, this pointer jointly traversing the scales 25 and
18 26 and indicating the selling price in either units or dozen
19 lots of any particular article with a predetermined cost and
20 a predetermined mark-up.

21 In the use of the calculator, assuming that the
22 retailer, for the goods being calculated, has a mark-up of
23 30% and assuming that the cost of the goods was \$4.00 per
24 dozen, the operation of the calculator would be as follows:
25 The retailer would first turn the rotary disk 22 so as to
26 bring the "mark-up" pointer 29 in register with the 30% line
27 of the scale 28. He would then turn the rotary disk 15 so as
28 to bring the calibration "\$4.00" on the scale 25 into register
29 with the "Cost" arrow 30. Upon then noting the arrow 31 he
30 would observe that his retail selling price would be approxi-

1 mately \$5.70 per dozen at this cost and mark-up. At the
2 same time, by reference to the scale 26 and the calibration
3 thereof appearing in the window 19 opposite the pointer 31,
4 the retailer knows that the individual units so purchased
5 should be priced at about $47\frac{1}{2}\phi$.

6 It will be apparent that the invention can be
7 embodied in disk slide rules having an increased number of
8 rotary sheets and also that it is not necessary that all of
9 the rotary sheets be in concentric relation with one another.
10 Thus, in the form of the invention shown in Figs. 4-6, the
11 numeral 10a represents a flat cardboard body sheet of the
12 general form as the body sheet 10 of the form of the invention
13 shown in Figs. 1 and 2, the same reference numerals being
14 therefore applied. A circular spacer 14a of relatively small
15 diameter is arranged against a part of the forward face of
16 the body sheet 10a, and against the forward face of this
17 circular spacer 14a is arranged a second sheet or disk 35.
18 It will be seen that the body sheet 10a, spacer 14a and second
19 sheet or disk 35 form a rear sheet member equivalent to the
20 body or rear sheet member 10 in the form of the invention
21 shown in Figs. 1-3. A second circular spacer 14b is arranged
22 against the forward face of the second sheet or disk 35 and
23 a third sheet or disk 18a is arranged against the forward
24 face of this second circular spacer 14b. A circular rotary
25 sheet or disk 15a with an enlarged concentric opening 16a
26 forming a bearing surface is journalled on the periphery
27 of the circular spacer 14a, and a second circular rotary
28 sheet or disk 15b having the same diameter as the rotary
29 sheet 15a and having an enlarged concentric opening 16b is
30 journalled on the periphery of the circular spacer 14b. The

1 circular spacers 14a, 14b are shown as arranged in eccentric
2 relation to each other and 180° out of phase.

3 As with the form of the invention shown in Figs.
4 1-3, a rotary sheet or disk 22a is fitted against the forward
5 face of the third sheet or disk 18a and this third rotary
6 sheet is rotatably retained by the forward head of an eyelet
7 or grommet 23a which extends successively through the third
8 or front rotary sheet 22a, the second sheet or disk 18a, the
9 second circular spacer 14b, the second sheet 35, the first
10 circular spacer 14a and the body sheet 18a. As with the
11 form of the invention shown in Figs. 1-3, each of the circu-
12 lar spacers 14a and 14b has its front and rear face adhesive-
13 ly secured to the corresponding sheet of the indicator, this
14 being effected by glue, staples, or by the weldments, 20a,
15 21a, 20b and 21b shown.

16 With the disk slide rule constructed as above, it
17 will be seen that the parts 10a, 14a, 35, 14b and 18a are
18 held in fixed relation with one another by the weldments
19 20a, 21a, 20b and 21b. It will therefore be seen that any
20 one of the rotary sheets 15a, 15b or 22a can be rotated
21 independently of one another and that the rotation of any one
22 of these rotary sheets does not affect or move with the other
23 rotary sheets. Further, it will be seen that by arranging
24 the rotary sheets 15a and 15b eccentrically and 180° out of
25 phase with each other, the rotary sheet 15a can readily be
26 turned by grasping the right-hand edge thereof as viewed in
27 Fig. 4, and that, similarly, the rotary sheet 15b can readily
28 be turned by grasping the left-hand edge thereof as viewed
29 in Fig. 4. Since the present invention relates essentially
30 to the construction of the rotary indicator rather than to

1 any particular use, no scales or pointers have been applied
2 to the form of the invention shown in Figs. 4-6.

3 From the foregoing it will be seen that the pre-
4 sent invention provides an extremely simple and low-cost
5 disk slide rule which can be made principally of cardboard
6 and which will stand up under conditions of severe and con-
7 stant use without losing register of the parts; in which the
8 movement of one rotary sheet will not influence or change
9 the setting of another rotary sheet; which can have one or
10 more circular rotary sheets arranged coaxially, or not, as
11 desired; and which can be put to a wide variety of uses.

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1 I claim:

2 1. A disk slide rule, comprising a rear sheet
3 member, a circular spacer of relatively small diameter arranged
4 against a part of the forward face of said rear sheet member,
5 a second sheet member of larger area than said circular
6 spacer arranged against the forward face of said circular
7 spacer, a rotary sheet member of substantially the same
8 thickness as said circular spacer and having a circular open-
9 ing forming a bearing surface journalled on the periphery of
10 said circular spacer and interposed between the forward face
11 of said rear sheet member and the rearward face of said second
12 sheet member means securing said rear sheet member, second
13 sheet member and circular spacer in fixed relation to one
14 another, a second rotary sheet member arranged against the
15 forward face of said second sheet member and forming the
16 central front face of the indicator member and a fastener
17 extending through said rear sheet member, circular spacer,
18 second sheet member and second rotary sheet member and having
19 enlarged end heads engaging respectively the rearward face
20 of said rear sheet member the forward face of said second
21 rotary sheet member and a reduced shank on which said second
22 rotary sheet member is directly journalled.

23 2. A disk slide rule, comprising a rear sheet
24 member, a circular spacer of relatively small diameter arranged
25 against a part of the forward face of said rear sheet member,
26 a second sheet member of larger area than said circular spacer
27 arranged against the forward face of said circular spacer, a
28 circular rotary sheet member of substantially the same thick-
29 ness as said circular spacer and having a concentric circular
30 opening forming a bearing surface journalled on the periphery

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1 of said circular spacer and interposed between the forward
2 face of said rear sheet member and the rearward face of said
3 second sheet member, means securing said rear sheet member,
4 second sheet member and circular spacer in fixed relation
5 to one another, a fastener secured to project forwardly from
6 the forward face of said second sheet member in eccentric
7 relation to the axis of rotation of said circular sheet mem-
8 ber, and a second circular sheet member arranged against the
9 forward face of said second sheet member in concentric rela-
10 tion to said fastener and journalled thereon.

11 3. A disk slide rule comprising a rear sheet mem-
12 ber of cardboard, a circular spacer of relatively small dia-
13 meter arranged against a part of the forward face of said rear
14 sheet member, a second sheet member of cardboard of larger
15 area than said circular spacer arranged against the forward
16 face of said circular spacer, a circular rotary cardboard
17 sheet member of substantially the same thickness as said
18 circular spacer and having a concentric circular opening form-
19 ing a bearing surface journalled on the periphery of said
20 circular spacer and interposed between the forward face of
21 said rear sheet member and the rearward face of said second
22 sheet member, means securing said rear sheet member, second
23 sheet member and circular spacer in fixed relation to one
24 another, a second circular rotary sheet member arranged against
25 the forward face of said second sheet member and a fastener
26 extending through said rear sheet member, circular spacer,
27 second sheet member and second rotary sheet member in eccentric
28 relation to said circular spacer and having enlarged end heads
29 and a reduced shank on which said second circular sheet mem-
30 ber is journalled.

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1 4. A disk slide rule, comprising a rear sheet
2 member, a circular spacer of relatively small diameter arranged
3 against a part of the forward face of said rear sheet mem-
4 ber, a second sheet member of larger diameter than said cir-
5 cular spacer arranged against the forward face of said cir-
6 cular spacer, a circular rotary sheet member of substantially
7 the same thickness as said circular spacer and having a con-
8 centric circular opening forming a bearing surface journalled
9 on the periphery of said circular spacer and interposed be-
10 tween the forward face of said rear sheet member and the rear-
11 ward face of said second sheet member, a second circular
12 spacer of relatively small diameter arranged against a part
13 of said second sheet member, a third sheet member of larger
14 area than said second circular spacer arranged against the
15 forward face of said second circular spacer, a second circu-
16 lar rotary sheet member of substantially the same thickness
17 as said second circular spacer and having a concentric cir-
18 cular opening forming a bearing surface journalled on the
19 periphery of said second circular spacer and interposed be-
20 tween the forward face of said second sheet member and the
21 rearward face of said third sheet member, and means securing
22 said rear sheet member, first circular spacer, second sheet
23 member, second circular spacer and third sheet member in
24 fixed relation to one another and with said circular spacers
25 in eccentric relation to each other.

26 5. A disk slide rule comprising a rear sheet
27 member, a circular spacer of relatively small diameter arranged
28 against a part of the forward face of said rear sheet member,
29 a second sheet member of larger area than said circular
30 spacer arranged against the forward face of said circular

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1 spacer and provided with a circular scale concentric there-
2 with, a rotary sheet member of substantially the same thick-
3 ness as said circular spacer and having a circular opening
4 forming a bearing surface journalled on the periphery of said
5 circular spacer and interposed between the forward face of
6 said rear sheet member and the rearward face of said second
7 sheet member, means securing said rear sheet member, second
8 sheet member and circular spacer in fixed relation to one
9 another, a second rotary sheet member made of transparent
10 material arranged against the forward face of said second
11 sheet member and forming the central front face of the indi-
12 cator and through which the face of said second sheet member
13 is visible, and a fastener extending through said rear sheet
14 member, circular spacer, second sheet member and second rotary
15 sheet member and having enlarged end heads engaging, respec-
16 tively the rearward face of said rear sheet member and the
17 forward face of said second rotary sheet member and also
18 having a reduced shank on which said second sheet member is
19 directly journalled.

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Fig. 1.

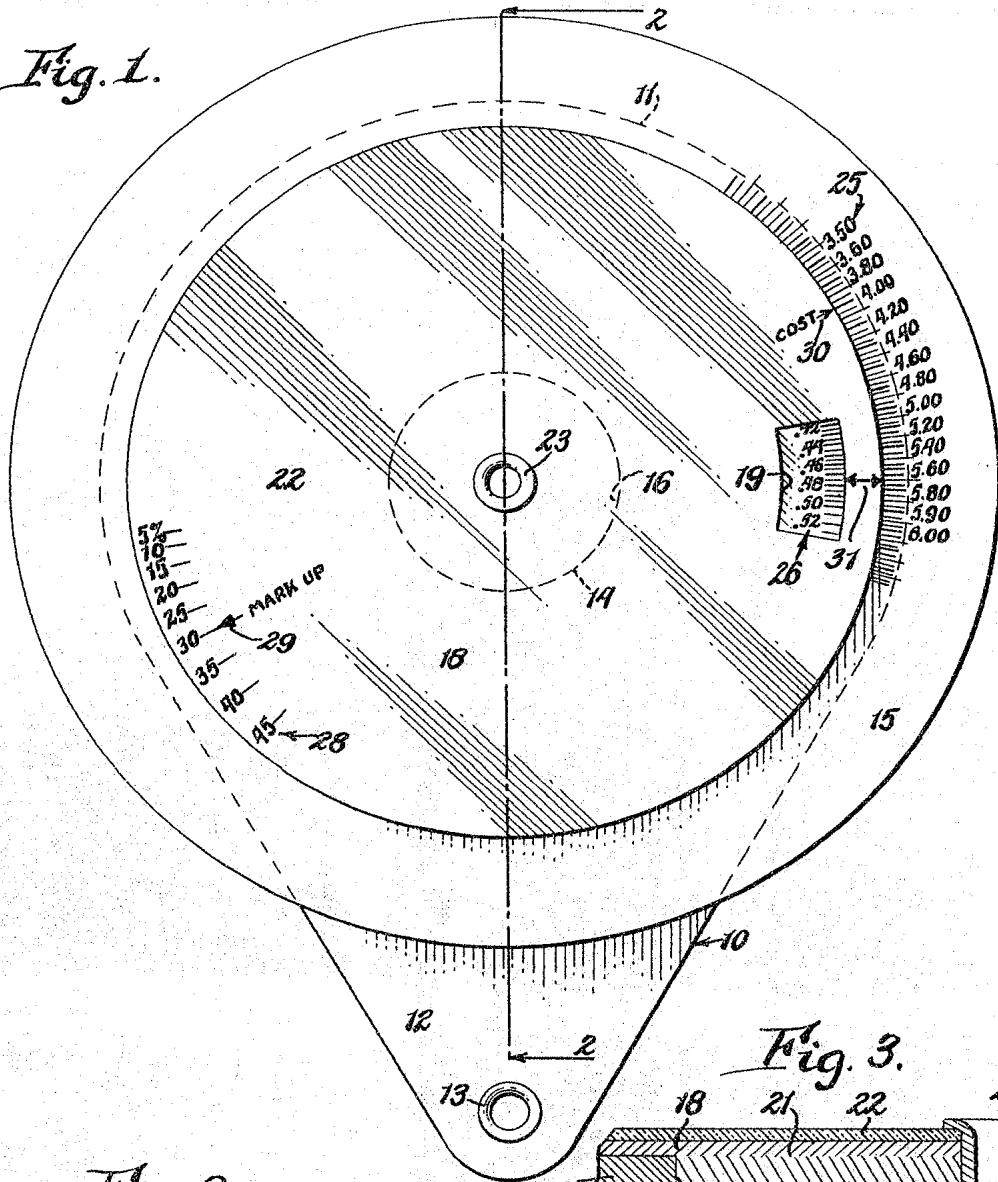


Fig. 2.

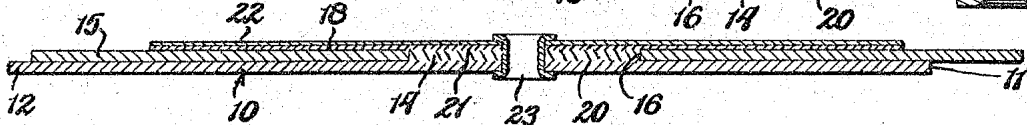
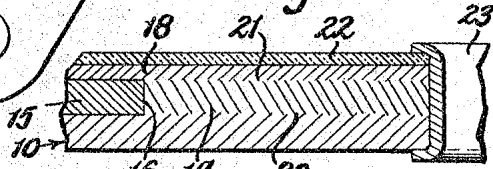


Fig. 3.



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Fig. 4.

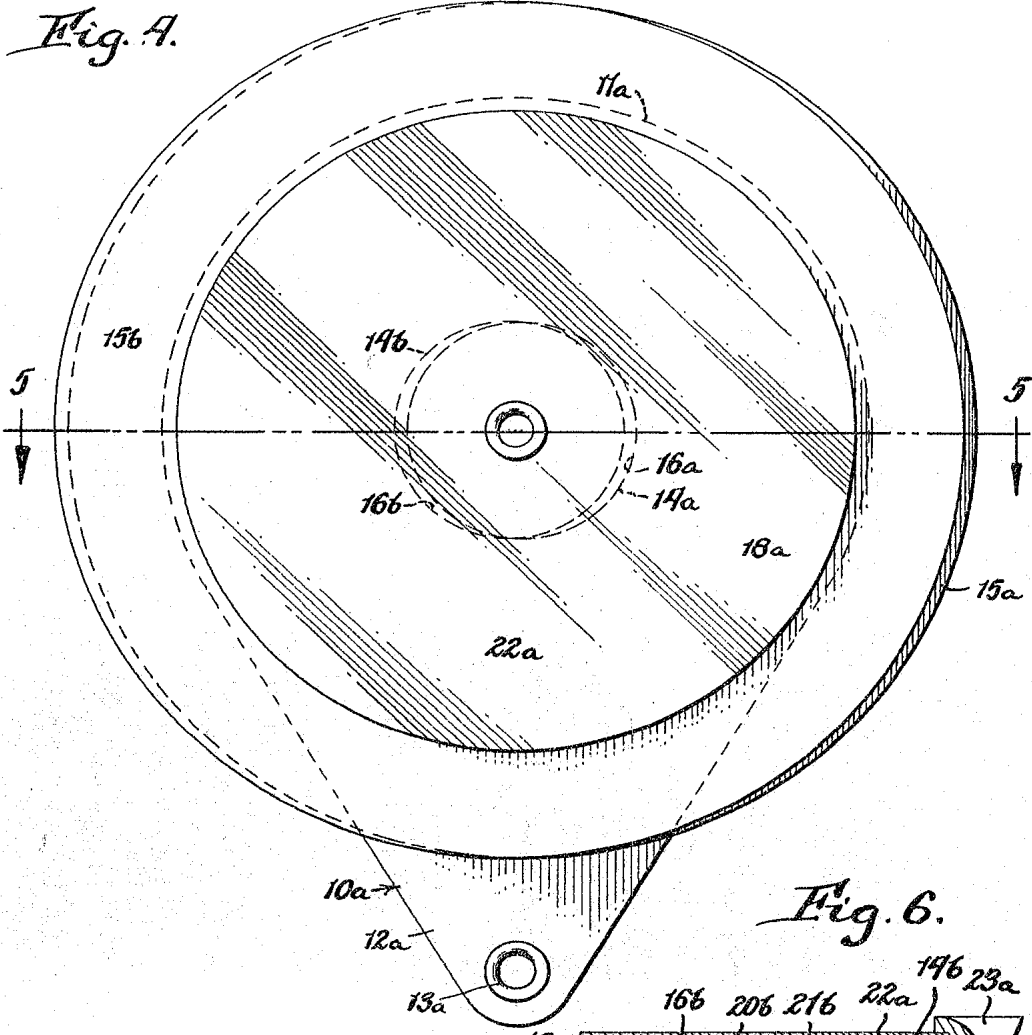


Fig. 6.

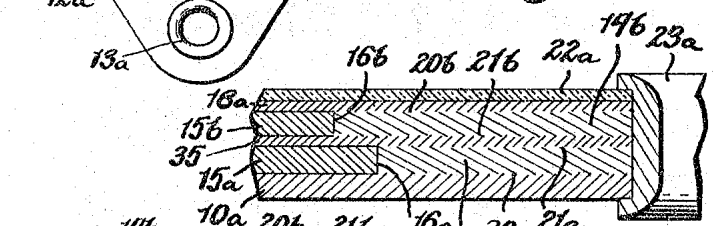
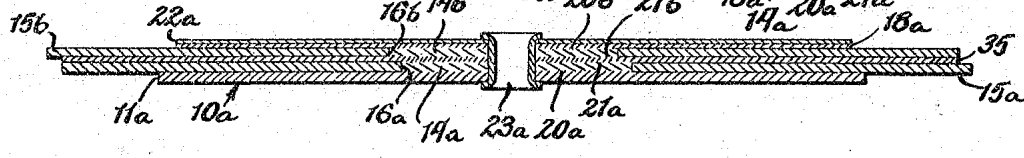


Fig. 5.



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