PUBLISHED
MAY 25, 1943.
BY A. P. C.

F. FÖRNBACHER
RECORDING SPEED INDICATOR
Filed Aug. 10, 1940

Serial No.
352,111
5 Sheets-Sheet 1

Fig. 2

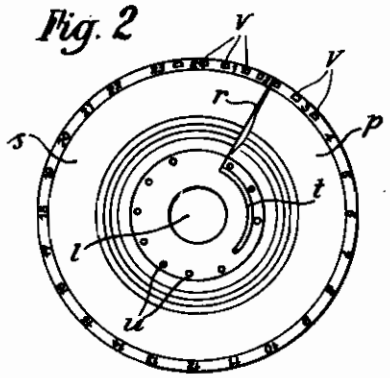
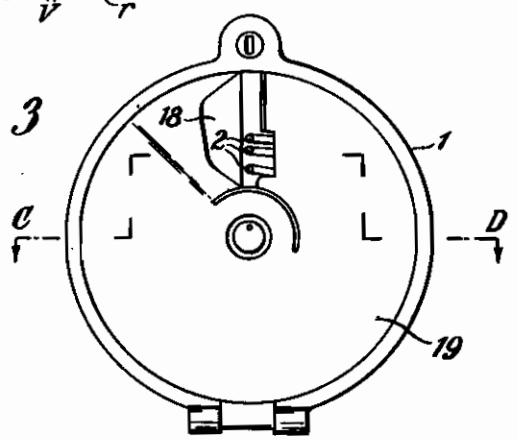


Fig. 1

Fig. 3



Inventor:
Frang Förnbacher,

Attorney:
Harold D. Penney.

PUBLISHED
MAY 25, 1943.
BY A. P. C.

F. FÖRNBACHER
RECORDING SPEED INDICATOR
Filed Aug. 10, 1940

Serial No.
352,111
5 Sheets-Sheet 2

Fig. 5

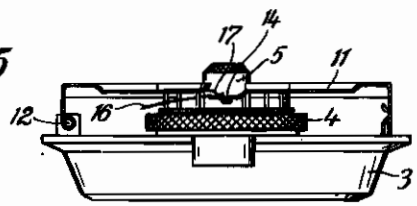


Fig. 6

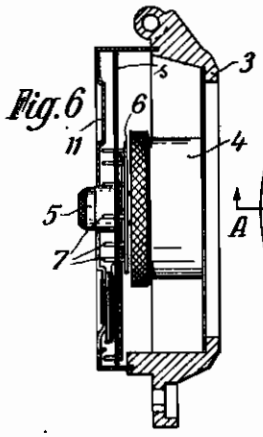


Fig. 4

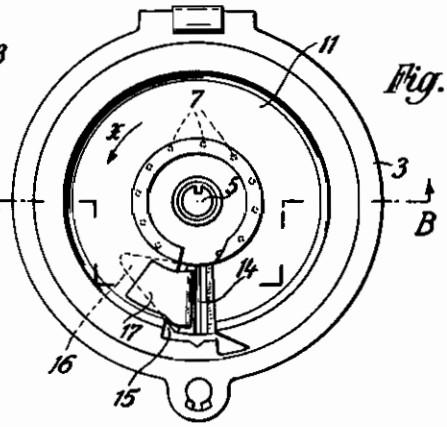
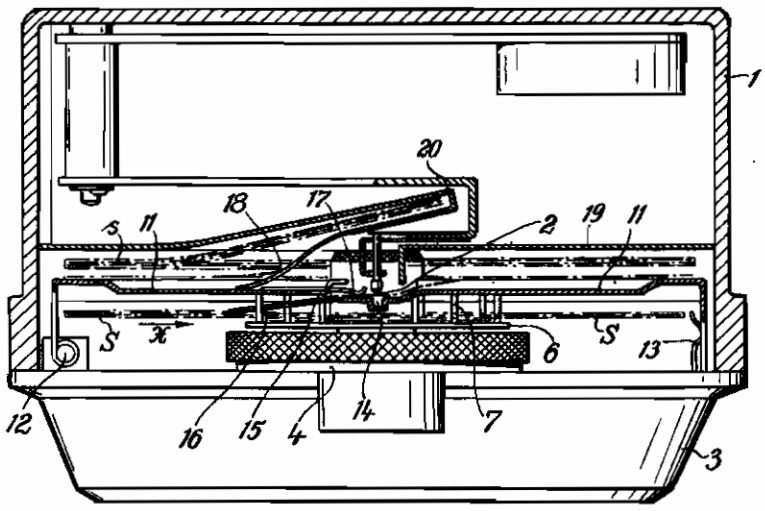


Fig. 7



Inventor:
Franz Förnbacher

Attorney:
Harold D. Penney

PUBLISHED
MAY 25, 1943.
BY A. P. C.

F. FÖRNBACHER
RECORDING SPEED INDICATOR
Filed Aug. 10, 1940

Serial No.
352,111
5 Sheets-Sheet 3

Fig. 9

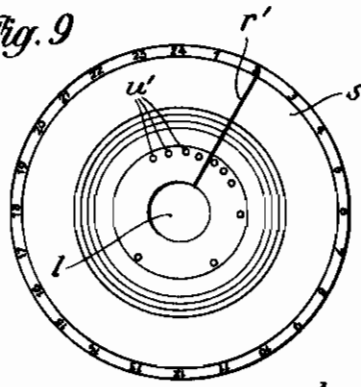
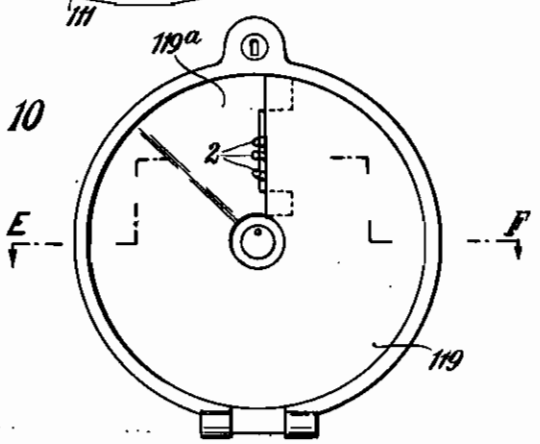


Fig. 8

Fig. 10



Inventor: Franz Förnbacher,

Attorney:
Harold D. Penny.

PUBLISHED
MAY 25, 1943.
BY A. P. C.

F. FÖRNBACHER
RECORDING SPEED INDICATOR
Filed Aug. 10, 1940

Serial No.
352,111
5 Sheets-Sheet 4

Fig. 12

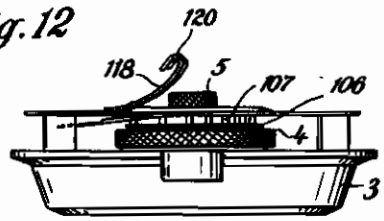
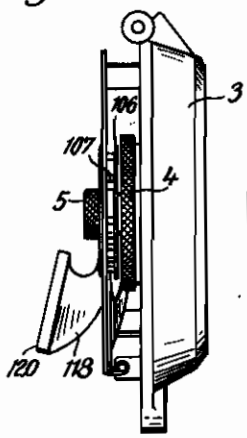


Fig. 13



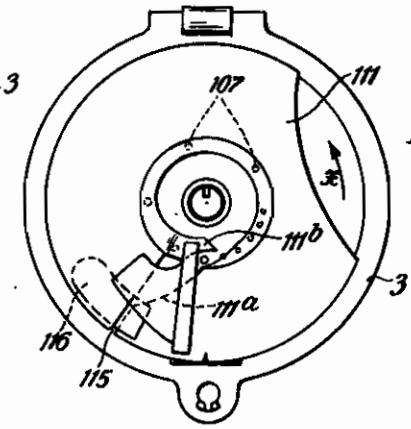
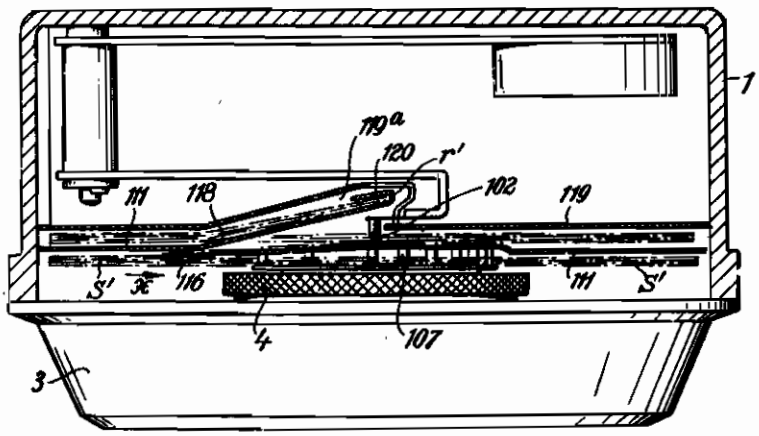


Fig. 11

Fig. 14



Inventor:
Frang Förnbacher.

Attorney:
Harold D. Penney

PUBLISHED
MAY 25, 1943.
BY A. P. C.

F. FÖRNBACHER
RECORDING SPEED INDICATOR
Filed Aug. 10, 1940

Serial No.
352,111
5 Sheets-Sheet 5

Fig. 19

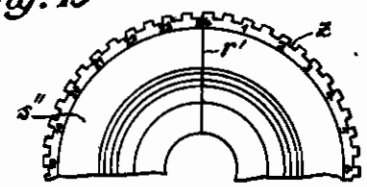


Fig. 20

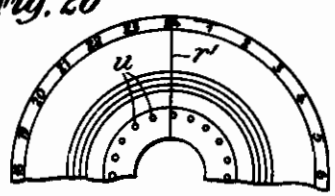


Fig. 17

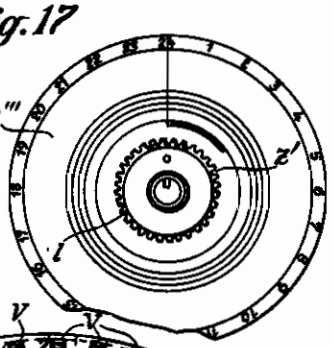


Fig. 18

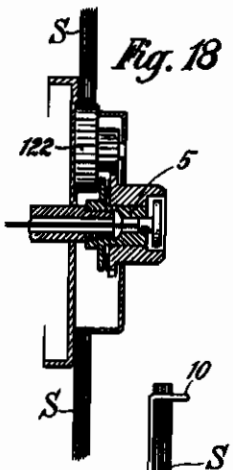


Fig. 15

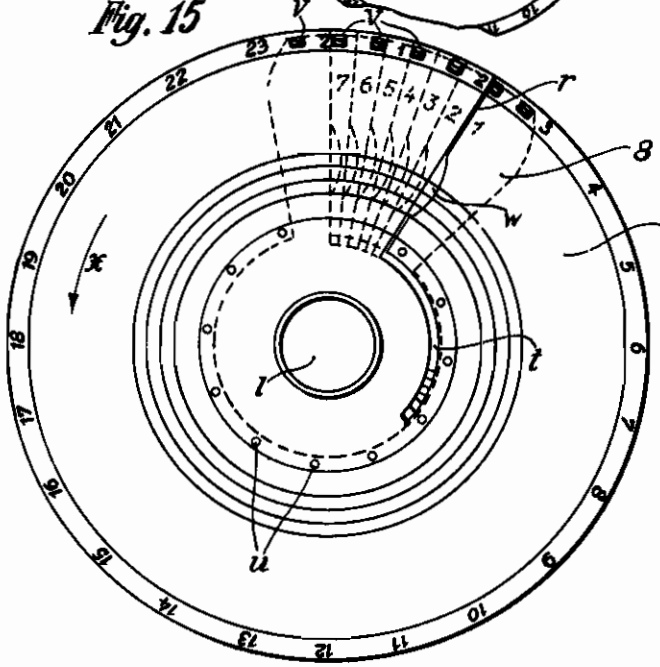
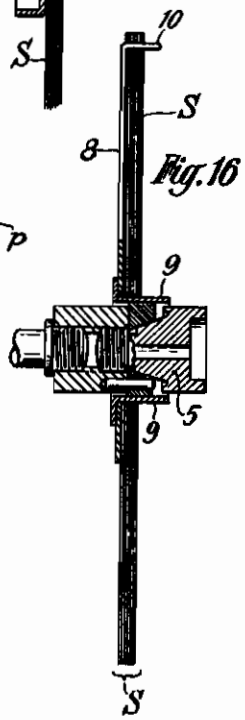


Fig. 16



Inventor:
Franz Förnbacher,

Attorney:
Harold D. Penny

Published May 25, 1943 Serial No. 352,111

ALIEN PROPERTY CUSTODIAN

RECORDING SPEED INDICATOR

Franz Förnbacher, Villingen/Schwarzwald, Germany; vested in the Alien Property Custodian

Application filed August 10, 1940

The invention relates to a recording speed indicator, known as tachograph, intended in particular for the supervision of the operation of vehicles. This apparatus contains a dial or disk driven by a clock mechanism and written upon by writing elements adjusted corresponding to the changing operating conditions of the vehicle to be supervised and thus producing a record on the dial permitting of subsequently ascertaining the manner of the driving.

So far these apparatus were as a rule constructed in such a way that after recording on a dial within a period of, for example, 24 hours, the casing of the apparatus was opened and the dial containing the record had to be replaced by a new one. This had the disadvantage, of course, that operating conditions exceeding, for example, 24 hours could not be supervised without opening the casing. Such apparatus are therefore not suited for effectively supervising vehicles which have been on the way for longer periods, for example, one week.

For this reason it has been endeavored in the past to superpose in such speed indicator several dials driven by the clock mechanism and to guide these dials in succession in front of the recording elements. This, however, entails the difficulty of removing the dial, after having been written upon, from the range of the writing or recording elements and of guiding the next following dial in front of the writing elements. It became necessary, therefore, to provide in the circular dials sector-shaped cuttings through which the writing elements, after having produced a record on the first dial, could pass to operate on the next following dial. But the arrangement of such sector-shaped cutting in the dial, so far considered absolutely necessary, has the drawback of reducing the available writing surface of the dial which under certain conditions may result in impairing the accuracy and the clearness of the records. In addition, such dials with sector-shaped cuttings will require for their actuation a clock mechanism of a special kind, since the usual 24-hour division must be distributed not over a closed circular dial of 360°, but over a correspondingly smaller circumference. For this reason there cannot be used for these dials a standard clock mechanism with a rotating period of 24 hours for 360°.

According to the invention this disadvantage is avoided by making radial dials, also provided if called for with additional approximately quadrant-shaped slots, superposed in known manner with corresponding adjustment toward one another, by means of a stationary guiding member engaging the radial dial slot in succession and progressing disengagement of their actuating operation from their position of readiness below a table, preferably used as writing support, transferable upon such table and, after one rotation and after having produced a record, into a collecting chamber. Hence, with this arrangement the dials need not have any sector-shaped cuttings, the said radial slot will suffice, and not impair complete utilization of the dial to 360° of its circumference. For this reason the apparatus may be equipped with a standard clock mechanism.

The gradual transfer of the dials by means of the stationary guiding member from their position of readiness into a collecting chamber results in a reliable transport of the dials owing to their gradual disengagement from the actuating mechanism. For this reason no impairment is to be apprehended of the regular succession of the individual dials.

Further particulars of the invention will be disclosed by the following description of some modes of construction shown by the drawings.

Figure 1 shows in diagrammatical presentation one mode of construction of the apparatus in opened condition.

Figure 2 shows one of the dials used with this apparatus.

Figure 3 shows a perspective view of the interior of one of the halves of the casing.

Figure 4 shows a perspective view of the interior of the other half of the casing.

Figure 5 is a section of the line A—B of Figure 4.

Figure 6 is a vertical longitudinal section through the casing part according to Figure 4.

Figure 7 shows a section according to line C—D of Figure 3 on an enlarged scale.

Figure 8 shows in diagrammatical representation another mode of construction of the apparatus in opened condition.

Figure 9 shows one of the dials used with the apparatus.

Figure 10 shows a perspective view of the interior of one of the halves of the casing of the mode of construction according to Figure 8.

Figure 11 shows a perspective view of the other half of the casing of this apparatus.

Figures 12 and 13 show the halves of the casing in different side views according to Figure 11.

Figure 14 is a section according to the lines E—F of Figure 10 on an enlarged scale.

Figures 15 and 16 show several superposed dials

to be used with the apparatus according to Figure 1, and a part of their driving elements in plan view and vertical longitudinal section.

Figures 17 and 18 show in differing scales another mode of construction of the dial drive in plan view and in section.

Figures 19 and 20 show two further modes of construction of dials.

In both modes of construction (Figures 1 and 8) the apparatus consists of a casing 1 accommodating the driving mechanism (not shown) for the writing elements 2. These writing elements are coacting with dials whose driving clock mechanism (not shown) is accommodated in the cover 3 pivotally connected to the casing 1. The cover 3 having been closed, the casing will be lockable, so that the recording process on the dial cannot be tampered with.

Several dials which are to be written upon are to be accommodated in the cover 3 of the casing in such a manner that they are guided in succession in front of the writing elements 2, permitting an uninterrupted record extending over several periods, for example, several days.

In the mode of construction according to Figures 1 to 7 there is provided on the spindle 5, rotated by the clock device 4, a disc 6 having pins 7 at its circumference. On this disc or the pins 7, respectively, may be placed a stack of dials S (Figures 15 and 16) consisting of several, for example six or seven, superposed dials. One of these dials *s* is shown in Figure 2. The circular dial *s* shows on its front side, in addition to a time division provided at the circumference of the dial distributed over 360° and running from 0 to 24, those co-ordinate lines not shown in Figure 2, which will be necessary for the subsequent interpretation of the records obtained. Each dial is also slitted alongside a radius *r*. This slot does not extend up to centre hole *l* serving for placing the dial on the spindle 5 of the clock mechanism, but continues in an arc-shaped slot *t*, extending approximately over a quadrant. Thus, there is cut out, as it were, by the slots *r* and *t* from the dial *s* a flap *p*, still connected with the dial, said flap permitting of being bent outwardly from the plane of the dial.

Concentric to the centre hole *l* the dial shows small holes *u* corresponding to the number of the engaging pins 7 (Figure 6), the pins passing through said holes when placing the dial. As will be noted in particular from Figures 15 and 16, the dials *s* comprising the stack S are held by a sector-shaped carrier 8, having in the centre a sleeve projection 8 extending through the dial holes *l*, said sleeve projection permitting of placing the carrier on the driving spindle 5, rotated by the clock mechanism. The carrier at its circumference is provided with several, for instance seven, pin-like teeth 10, extending through corresponding recesses *v* superposed in the same alignment and provided at the edge of the dial. Thus, the stack of dials placed on the spindle 5 of the clock mechanism is carried along not only by the pins 7, but at its periphery also by the teeth, engaging the recesses *v*, of the sector-shaped carriers 8 also taken along by the spindle 5. This carrier 6 co-acts with the dials within the range of their radial slots *r*. The teeth 16 of the carrier serve principally for ensuring satisfactory taking along of the dials *s* within the range of their slots *r* and for maintaining the proper position of the consecutive dials *s* in the stack of dials S.

Figure 15 shows in particular that the superposed seven dials, provided in this case, are somewhat displaced toward one another in the direction of the circumference, so that not all radial slots *r* of these seven dials are located under one another.

At the front edge of the flap *p*, permitting of being bent upwardly, is further provided a recess *w*, the purpose of which will be elucidated in the following.

The stack of dials S, described in the foregoing, having been pushed onto the driving spindle 5 and over the pins 7 and 10, respectively, a table top 11 is placed over this stack, said table top covering the clock mechanism and the dials and being pivotally arranged around a link 12 in the cover 3 of the casing and secured in this effective operating position by a bolt spring 13.

The table top 11 is of annular construction and in its centre is provided with an aperture through which may extend the spindle 5 for permitting cooperation with the driving parts arranged in the casing 1. When the cover is closed, the table top 11 is located at such a distance from the writing elements 2 that a dial moving across the table top will be in a position to properly take up the recording marks of the writing element.

In the direction of movement of the clock mechanism and, respectively, of the dials in front of the writing range 14 of the table top 11 is provided in the latter a slot 15 extending in approximately radial direction, the width of said slot being so selected that the upwardly bent flap *p* of the top dial *s* of the stack of dials can pass through this slot. The slot is followed by a tongue-shaped projection 16 extending from the edge of the slot 15 facing the writing range 14 contrary to the direction of movement of the dials *s* downwards to the stock of dials and tapering towards its free end (Figures 4 and 7).

When turning with the aid of the clock mechanism the stack of dials in the sense of the arrow, the fore end of the tongue 16 enters the recess *w* of the top dial and extends under the flap *p* of the dial. In consequence thereof this flap *p*, when the dial continues to rotate, will proceed upwardly over the tongue 16 and through the slot 15 and reach the surface of the table top 11, viz., over the writing range.

The edge of the slot 15, away from the writing range, carries a leaf spring 17, pressing the dial against the table top 11, thereby securing the position of the dial during the recording process.

Acting upon the gradually progressing transfer of the dial, from the position of readiness below the table top 11, to this table, the dial will also be released from its driving connection, viz., from the pins 7 of the carrier plate 6 and also from the teeth 10 of the carrier 8. The teeth 10 coacting with the recesses *v*, provided at both sides of the dial slot *r*, ensures that the driving connection acting on the dial carrying the writing is maintained until such moment when the dial, after having completed a full rotation, entirely reaches the upper side of the table 11 and has been fully covered by the recording marks. Hence, the driving connection with the clock mechanism does not cease until such moment.

The flap *p* of the dial, exerting a guiding action with its front edge *r*, *w* when the dial is rotated, will engage, when a rotation is almost completed, a guiding tongue 18, provided at a partition 19 dividing the interior of the casing 1, said guiding tongue, when the cover is closed, with its free end lying against the surface of the table 11. This will result in the flap *p* of the dial, still continuing its rotation for the time being, running up the

inclined plane formed by the guiding tongue 18. This inclined plane leads to a rear recess 20 of the partition 19, forming, as it were, a collecting chamber for the ends of the flap of the dials bearing completed records. If, after having passed through 360°, such dial is completely writte upon, the flap *p* will have fully entered the collecting chamber 20 and the last pins 7 or teeth 10, respectively, have ceased to be in engagement with the dial. In that case the dial will remain in this ineffective position ensured by the collecting chamber 20, in which it cannot interfere with the working operation of the next-following dial.

In the described arrangement the consecutive dials are thus guided one after another onto the table top by means of the guiding tongue 16, the following dial directly following the preceding dial, thus ensuring an uninterrupted record covering the totality of the time periods formed by the number of the dials combined in a stack. The sequence of the individual dials and their direct consecutiveness cannot be interferred with in this case, for example, by influences acting from without. The dials will be gradually disengaged according to their displacement by the clock mechanism from the driving teeth 7 and 10, respectively, so that the clock mechanism will not be subjected to sudden stresses. But the principal advantage resides in the fact that the dials can be utilized for the entry of records over their entire range, covering 360°, so that for driving the dials may be used a standard clock mechanism rotating over 360° during 24 hours.

The mode of construction according to Figures 8 to 14 operates on the same principle, differing from the before-mentioned construction in general only by the constructional form of the individual parts.

The dials used, an example of which is represented in Figure 9, show a radial slot *r'*, extending from the edge of the dial up to the inner hole *l*. The arc-shaped slot part *t*, existing in the before-mentioned dials, is therefore absent in these dials. There are also no recesses provided at the circumference, corresponding to the recesses *v* in the mode of construction shown by Figures 2 or 15, respectively. But the dials *s'* in this case have, instead, within the range of their radial slots more holes *u'* than on the remaining part of the dial. As disclosed in particular by Figure 11, in this construction the table top 111, covering the clock mechanism and the stack of dials, is provided with a slot 115, through which the edge, understood as the fore edge in the direction of motion, of the dial slot *r'* may pass. In order to be able to lift the dial within the range of this edge from the dial of the stack underneath and passing it through the slot 115, there is provided also in this mode of construction a guiding tongue 116, which with its free end is placed on the surface of the topmost dial available at the time. Hence, this guiding tongue has the effect that the dial, bent upwardly in its entire width, reaches the surface of the table 111. In this case the inner edge 111*a* of the table top is formed and chamfered in such a manner that it augments the effect of the guiding tongue 116 and gradually guides it onto the table top 111 according to the rotating movement in the sense of the arrow *x*. This will result in the holes *u'* of the dial becoming gradually disengaged from the pins 107 of the carrier plate 108 actuated by the clock mechanism. An elastic lug 111*b*, provided at the inner edge of the circular table top 111, serves for having the dial remain engaged with the engaging pins 107 up to the last moment, so that proper transfer is ensured during the entire rotating movement of the dial.

This construction differs from the hereinbefore described mode of construction insofar that the collecting element taking up and securing the dials bearing the records, is not firmly arranged in the casing 1 of the apparatus, but is fastened to the table top 111. This collecting element consists of a guiding sheet 110 set-off U-shaped at its end 120 and firmly fastened to the table top 111. In the case of the casing being closed (Figure 14) this collecting element enters a depression 119*a* of the partition covering the driving mechanism contained in the casing 1. If the cover is opened the collecting element 119, 120 assumes a position permitting its unhindered passing of the recording elements 102 when closing the apparatus. As soon as the front part 120 of the collecting element reaches the partition 119, it bends in such a manner that it will be located behind the recording elements when the apparatus is fully closed. This will ensure that the dial can take up the records over its entire range of 360°.

Apart from these constructional variations the second mode of construction does not fundamentally differ from the first-described mode of construction. The dials rotated by the clock mechanism are guided successively with the aid of the guiding tongue 116 to the table top 111 and thereby under the recording element 182. As soon as a dial has been once rotated by 360° and having been fully written upon, it will be definitely released from the driving engaging pins 107, and with the edge of the slot *r'*, progressing in the sense of rotation, will be taken up into the collecting chamber 120. The collecting chamber will thus have the effect that the dials bearing the recording marks, will be retained in their inoperative position so that they cannot interfere with another registering process.

Instead of making use of the before-described drive of the dials, in which case these dials, as may also be noted from Figure 20, have holes *u* or *u'* coacting with corresponding engaging pins, the dial *s''*, as shown by Figure 19, may be provided with external cogging *z*, meshing with the internal cogging of a ring driven by the clock mechanism of the apparatus.

An additional possibility of the dial drive is shown by the Figures 17 and 18. In this case the inner hole *l* of the dial *s'''* is provided with internal cogging *z'*. This internal cogging is engaged by a pinion 122 driven by the spindle of the clock mechanism 5 and eccentrically disposed to the axis of the dial and the apparatus. Which of these two driving methods is employed is immaterial. When making use of the before-described characteristic features of the invention it will be possible in all cases to attain the advantages referred to in the beginning.

FRANZ FÖRNBACHER.