R. B. SMITH.

SOUND REPRODUCER.

APPLICATION FILED JAN. 11, 1909.

925,846. Patented June 22, 1909.

Fig. 1

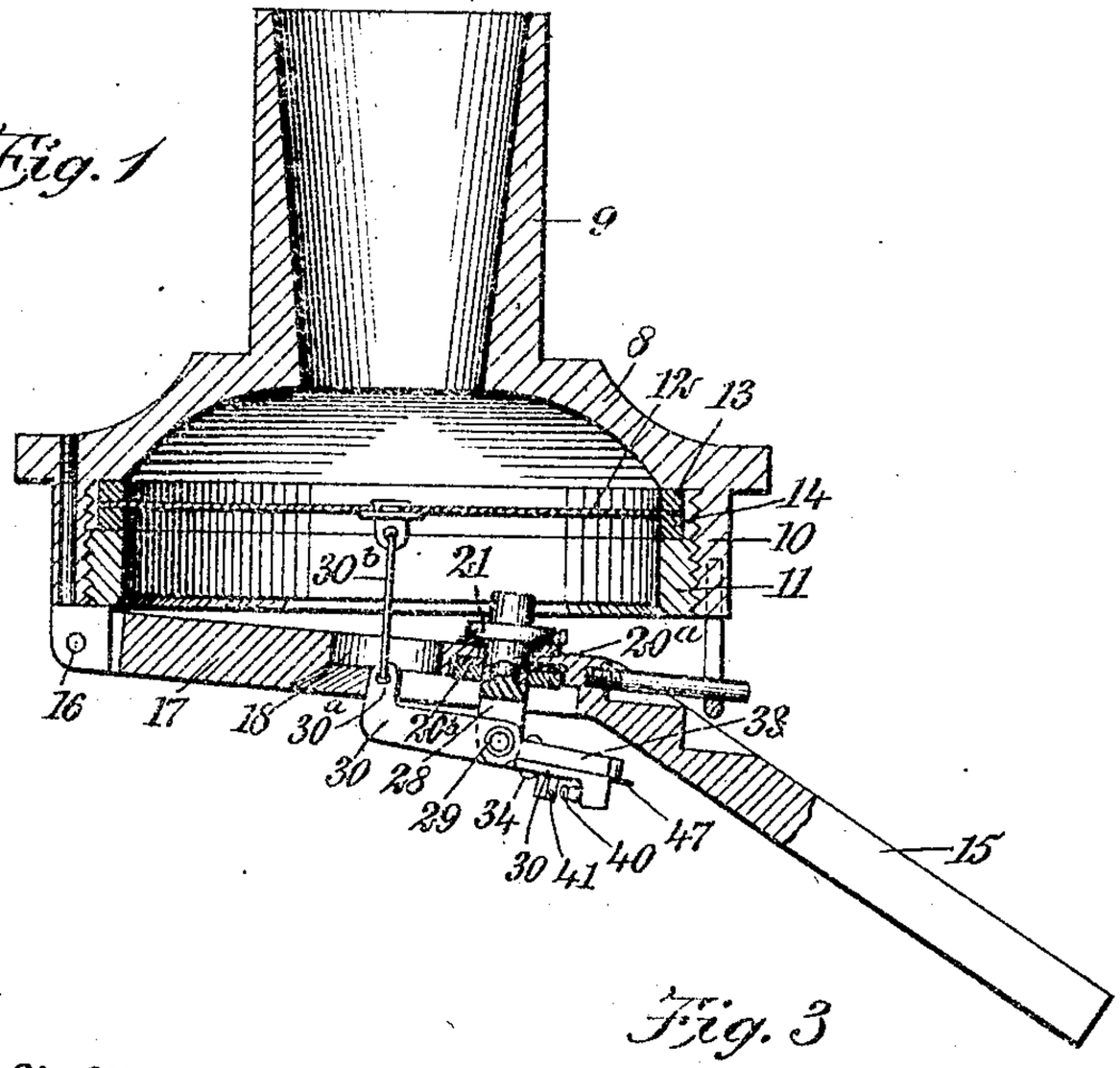


Fig. 2

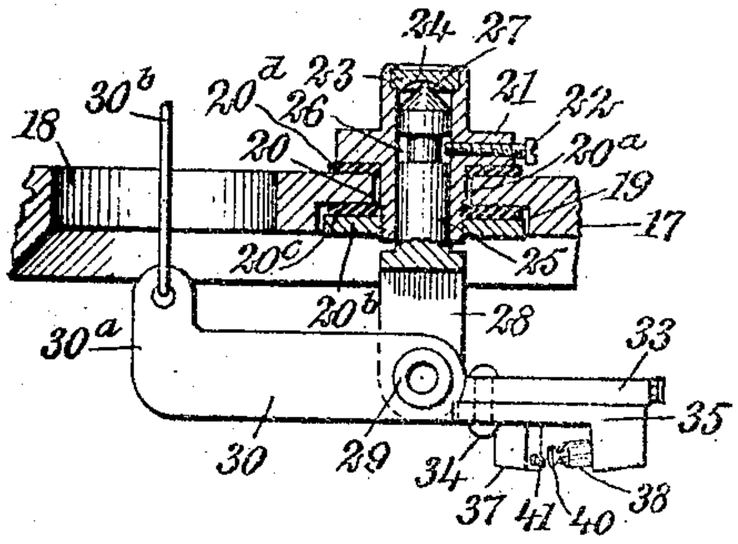


Fig. 3

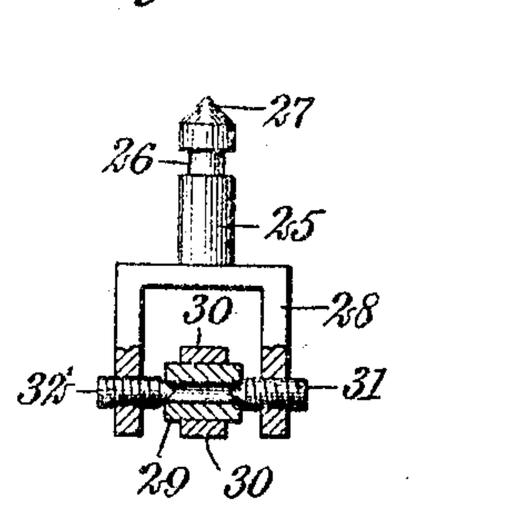


Fig. 4

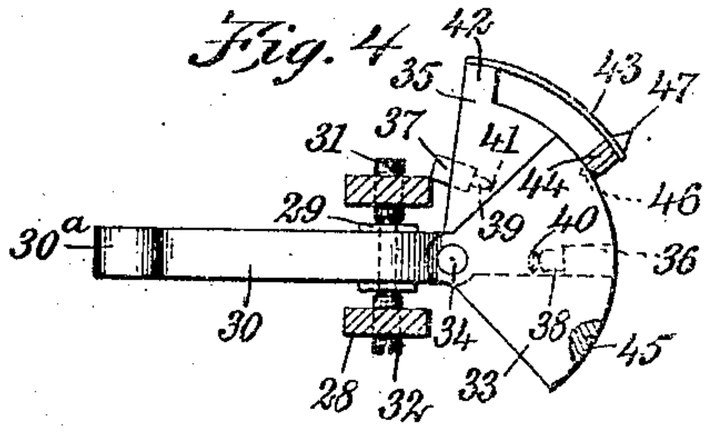


Fig. 5

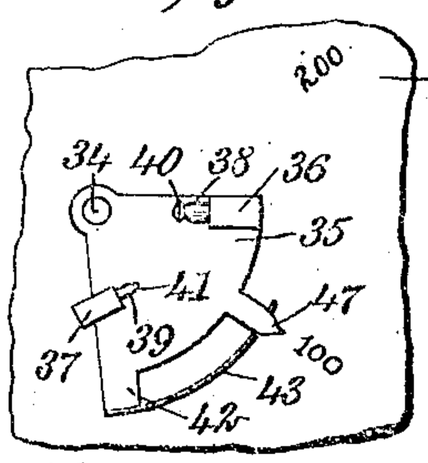


Fig. 6

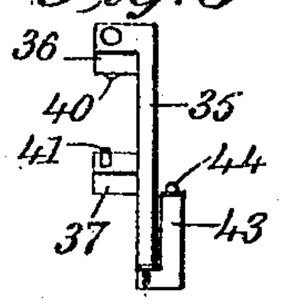
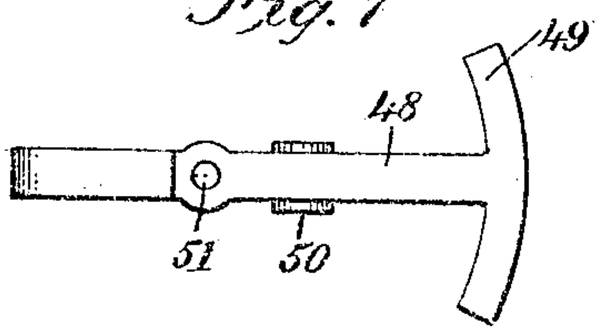


Fig. 7



WITNESSES

F. D. Sweet.

Walton Harrison.

INVENTOR

Richard B. Smith

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

RICHARD BARTHOLOMEW SMITH, OF NEW YORK, N. Y.

SOUND-REPRODUCER.

No. 925,846. Specification of Letters Patent. Patented June 22, 1909.

Application filed January 11, 1909. Serial No. 471,768.

To all whom it may concern:

Be it known that I, RICHARD BARTHOLOMEW SMITH, a subject of the King of Great Britain, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sound-Reproducer, of which the following is a full, clear, and exact description.

My invention relates to sound reproducers, my more particular purposes being as follows: I, to increase the sensitiveness of the stylus lever as regards its movement toward and from the general position occupied by the diaphragm; II, to increase the sensitiveness of the stylus lever as regards its pivotal movement in a direction approximately parallel with the diaphragm; III, to facilitate the ready interchange of different jewels or other record points, so that by the simple action of a movable part one of these jewels or points may be instantly substituted for another; IV, to reduce the friction of the various parts supporting the stylus lever; V, to provide a stylus lever with a plurality of jewels or other record points, and to enable the same to be used independently; VI, to provide an indicator for disclosing which particular jewel or other record point is in proper position to be used; VII, to enable the same stylus lever to be played with various records having different types of sound grooves, by merely throwing one jewel or record point out of service and another one into service, both jewels or points being permanently carried by the stylus lever; VIII, to provide various details of construction looking toward the general improvement of the reproducer.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a substantially central section through a reproducer provided with my various improvements; Fig. 2 is an enlarged fragmentary section through the swivel joint for supporting the stylus lever; Fig. 3 is a view partly in section and partly in elevation, showing the swivel for supporting the stylus lever; Fig. 4 is a fragmentary section showing the stylus lever and the means carried by it for supporting a plurality of jewels or other record points; Fig. 5 is a fragmentary inverted plan showing the under side of the weight and a portion of the stylus lever carried thereby; Fig. 6 is a side elevation showing the point carrier removed from the stylus lever; and Fig. 7 is a plan view of another form of stylus lever.

A dome 8 is provided with a neck 9 and with a cylindrical portion 10, the dome and cylindrical portion together comprising a casing. A diaphragm is shown at 12 and is engaged by rings 13, 14 of resilient material. At 15 is a weight which is mounted upon a pivot 16 and is provided with a flat portion 17 having the form of a disk and having a central hole 18 directly through it. The disk 17 is further provided with an aperture 19 and with a hole 20 which merges into this aperture. A tubular sleeve 20^a is threaded at its lower end and fitted with a nut 20^b which engages a washer 20^c. The tubular sleeve 20^a is provided with an annular flange 21 and extending into the latter and adjustable relatively to the same is a screw 22. The annular flange 21 engages a washer 20^d. The washers 20^c, 20^d are made of leather, soft rubber or the like and serve as cushions. The upper end of the tubular sleeve 20^a is provided with a bearing 23 having generally the form of a disk and provided with a concave bearing surface 24.

A swivel stem 25 is provided with an annular slot 26 and is further provided with a conical end 27, this conical end being preferably made of hardened steel. The conical end engages directly the concave face 24. The lower end of the swivel stem 25 is fashioned into a fork 28 and this fork supports a bearing sleeve 29. Mounted rigidly upon this bearing sleeve is a stylus lever 30 which is provided with an upturned portion 30^a, the stylus lever thus having generally an L-shaped form. A link 30^b engages the upturned end 30^a and is connected with the diaphragm 12. Conical pointed screws 31, 32 extend through the fork 28 and into the ends of the bearing sleeve 29. By this arrangement the stylus lever 30 is very delicately poised, and consequently quite sensitive. The ends of the bearing sleeve 29

merely touch the conical pointed screws 31, 32, as indicated in Fig. 3, so that the stylus lever has comparatively little lost motion relative to the screws 31, 32.

The stylus lever 30 is provided with a tail piece 33 integral with it and having generally the form of a sector, as indicated in Fig. 4. Mounted upon the stylus lever 30 and co-axial with the sector 33 is a pivot 34 which supports a movable sector 35. This movable sector carries sleeves 36, 37, and mounted within the latter are jewel holders 38, 39 provided with jewels or record points 40, 41, which may be of different sizes and otherwise of different character. For instance, the member 40 may be a sapphire, whereas the member 41 may be a tantalum point. The sector 35 is further provided with a lug 42 and mounted upon the latter is a leaf spring 43 having generally an arcuate form. This leaf spring at its outer or free end carries a lug 44 which extends toward the adjacent edge of the sector 33 and is adapted to slip into either of the bowl-shaped openings 45, 46, so as to hold the movable sector 35 temporarily in fixed position relatively to the sector 33.

An indicating needle 47 is mounted rigidly upon the sector 35 and may be used for turning the same upon the pivot 34. The needle 47 has thus a general arcuate path of travel, and disposed adjacent to this path of travel are legends 100, 200 (see Fig. 5). When the parts are in such position that the needle 47 is directed toward the legend 100 the jewel or record point 40 is in position to engage a record, and when the needle 47 is adjacent to the legend 200 the point or record 41 is similarly in position for engaging the record.

Since, as above indicated, the jewel or record point 40 may be a sapphire, it may be employed in connection with a record having say 100 threads to the inch, the smaller jewel or record point 41 being suitable for records having say 200 threads to the inch. By shifting the jewels or record points, which is done by simply turning the sector 35 and adjusting the needle 47 relatively to the legends 100 or 200, I am thereby enabled to present the kind of jewel or record point suitable for use with one kind of record having a large number of threads per inch, and by merely turning the sector 35 I can present another jewel or record point suitable for use with a record of a different kind and having a smaller number of threads to the inch. Hence, in taking off a record of one kind and putting on a record of another kind, I merely turn the sector 35.

In Fig. 7 I show another form of stylus lever 48. The latter is provided at its outer end with a sector 49 integral with it and having generally an arcuate form. The stylus lever 48 is provided with a bearing sleeve 50 and also with a pivot 51 for supporting a sector similar to the sector 35 but larger than the latter.

The construction shown in Fig. 5 differs from that shown in Fig. 4 mainly in the relative positions of the pivots 34, 51, as compared with the bearing sleeves 29, 50. In Fig. 4 the pivot 34 is intermediate the sector 33 and the bearing sleeve 29, whereas in Fig. 7 the bearing sleeve 50 is intermediate the pivot 51 and the sector 49. In other respects the stylus lever shown in Fig. 4 is similar to that shown in Fig. 7.

If it should happen that the sector 35 is a little difficult to turn relative to the sector 33, the stylus lever 30, by swinging freely upon its vertical axis, causes the upturned portion 30^a to engage the weight 18, and this renders the stylus needle sufficiently rigid for the moment to enable the operator to turn the sector 35. In other words, the inner surface of the hole 18 serves as a limiting stop for preventing excessive rotary travel of the stylus lever 30. I have found that the upturned portion 30^a (see Fig. 2) gives the stylus lever 30 a considerable advantage. The link 30^b, by pulling upwardly upon the end of the upturned portion 30^a at the time when the jewel or record point 40 is in engagement with a record, renders positive the motion of the stylus lever 30 and prevents lost motion in this lever. I have found that the best results take place when the action between the link 30^b and the upturned portion 30^a takes place at a point slightly below an imaginary line extending from the jewel or record point 40, and also through the axis of the bearing sleeve 29, as will be understood from Fig. 2, the point of connection in question, however, being above the upper edge of the stylus lever 30.

The conical point 27 of the pivot stem 29, engaging, as it does, the bearing face 24 at the geometrical center of the same and being of hardened steel, offers a minimum of friction as regards the turning of the swivel stem 25. This stem is not readily lost or removed from the sleeve 20^a, for the reason that the screw 22 normally holds it in proximate position. The outer surface of the swivel stem 25 and the inner surface of the bearing sleeve 20^a are exceedingly smooth, so as to offer a minimum of friction. The wearing plate 23 prevents entrance of dirt or grit beneath the bearing plate 23, and the delicate bearings contained within the bearing sleeve 20^a are thus thoroughly protected.

The purpose of the washers 20^c, 20^d, serving as cushions, is to improve the quality of the sounds reproduced and to avoid the so-called "scratching", which is so objectionable in machines of this character. As the weight 15^i is to a great extent free while the

machine is in action, there is more or less tendency for this weight to be set in motion by the sound vibrations. The weight has an especial tendency to receive vibratory motions from the stylus lever and thus to not only set up false sounds by the weight acting to some extent like a diaphragm, but also in doing this, to absorb the power of the stylus needle.

In turning the sector 35 upon the pivot 34 there is more or less unavoidable tendency to turn the lever 30 upon the axis of the swivel stem 25 as a center. Since, however, the upturned portion 38 of the stylus lever extends into the hole 18, and since any rotation of the stylus lever upon the swivel stem 25 of the center causes the link 30^b to incline and thus draw the upturned portion 38 slightly upward, it necessarily follows that the upturned portion 38 engages the inner wall of the flat plate 17 so that the hole 18 limits the possible travel of the stylus lever. This arrangement is very convenient for the reason that the operator in turning the sector 35 might accidentally throw a considerable strain upon the diaphragm 12 except for the fact that undue rotation of the stylus lever is thus limited by the size of the hole 18.

The washers 20^c, 20^d effectively cut off, as far as practicable, all rigid mechanical communication between the weight 15 and the stylus lever 30, so that the vibrations of this lever are not absorbed by the weight, but are transmitted directly to the diaphragm, and any accidental motion which may influence the weight is not transmitted to the diaphragm. The net result is that this arrangement greatly reduces the scratching and improves the quality and purity of the tones. The sounds reproduced are therefore much more natural.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination of a weight, a stylus lever mounted thereupon and free to rock and also to turn, said stylus lever being provided with an upturned portion, a link connected with said upturned portion for the purpose of rendering positive the motions of said stylus lever, and means for supporting a jewel upon a portion of said stylus lever opposite said upturned portion.

2. A sound reproducer, comprising a weight, a bearing sleeve mounted upon the same, a swivel stem extending into said bearing sleeve and provided with a conical point, and a bearing plate secured within said bearing sleeve and provided with a surface to be engaged by said point, and a stylus lever supported by aid of said swivel stem.

3. In a sound reproducer, the combination of a supporting member provided with a hole extending through it, a bearing sleeve extending into said hole, means for securing said bearing sleeve rigidly in relation to said supporting member, a screw extending into said bearing sleeve, a swivel stem extending into said bearing sleeve and adapted to be engaged by said screw for the purpose of preventing the removal of said swivel stem from said bearing sleeve, and a stylus lever connected with said swivel stem and supported thereby.

4. A sound reproducer, comprising a stylus lever, a swivel stem connected therewith and provided with a conical point, a bearing surface connected with said bearing sleeve and engaging said conical point, and means for normally preventing the removal of said swivel stem from said bearing sleeve.

5. In a sound reproducer, the combination of a stylus lever, a bearing sleeve connected therewith, said bearing sleeve having open ends, conical pointed members extending into said open ends, and means for supporting said conical pointed members.

6. In a sound reproducer, the combination of a stylus lever, a bearing sleeve extending directly through the same and having generally a tubular form, a fork having portions disposed upon opposite sides of said stylus lever, and conical ended screws extending through said portions of said fork and into opposite ends of said bearing sleeve.

7. A device of the character described, comprising a stylus lever provided with a tail piece flattened out and having substantially the form of a sector, said sector being provided with openings disposed upon its peripheral edge, a second sector movable relatively to said first-mentioned sector, and pivotally mounted upon said stylus lever, means for turning said second-mentioned sector, a locking member carried by said second-mentioned sector and provided with a portion for entering said openings in order to lock said sectors rigidly in relation to each other, and jewels carried by said second-mentioned sector and disposed upon different portions thereof.

8. A device of the character described, comprising a stylus lever, a bearing sleeve for supporting the same, a sector carried by said stylus lever and immovable relatively to the same, and another sector carried by said stylus lever and movable relatively to the latter, the movable sector being connected with said stylus lever by aid of a pivot disposed intermediate said bearing sleeve and the outer edges of said sectors.

9. In a sound reproducer, a stylus lever provided with a sector having generally an arcuate form, and further provided with a bearing sleeve and with a pivot, said bearing sleeve being disposed intermediate said pivot and said sector.

10. In a sound reproducer, the combina-

tion of a diaphragm, a stylus lever for actuating the same, a weight for pressing said stylus lever toward the sound record, and a cushion disposed intermediate said weight and said stylus lever for the purpose of deadening the travel of sound vibrations therebetween.

11. In a sound reproducer, the combination of a weight, a stylus lever journaled upon said weight, and a cushion engaging said stylus lever and said weight for the purpose of preventing said weight from affecting the sound vibrations of said stylus lever.

12. The combination of a weight, a stylus lever journaled thereupon, and a washer of sound deadening material engaging said weight for the purpose of preventing undesirable motions thereof from affecting movements of said stylus lever.

13. In a sound reproducer, the combination of a weight, a sleeve connected therewith, sound deadening material disposed intermediate said weight and said sleeve for the purpose of destroying vibrations, a supporting member journaled within said sleeve, and a stylus lever journaled upon said supporting member.

14. The combination of a stylus lever, a stem for supporting the same, a sleeve engaging said stem and serving as a bearing therefor, a supporting member for holding said sleeve, and a cushion disposed intermediate said supporting member and said sleeve for the purpose of preventing the travel of sound vibrations therebetween.

15. The combination of a stylus lever, a bearing upon which said stylus lever is journaled, a sector mounted upon said stylus lever and adapted to turn relatively thereto, said sector extending outwardly away from said bearing, and a member mounted upon said sector for the purpose of engaging a sound record.

16. The combination of a stylus lever, a bearing upon which said stylus lever is journaled, a sector mounted upon said stylus lever and adapted to turn relatively thereto, said sector extending outwardly away from said bearing, and a plurality of record points mounted upon said sector and adapted to be brought one at a time into a predetermined position.

17. In a sound reproducer, the combination of a stylus lever, a support therefor, a sector revolubly mounted upon said stylus lever and adapted to turn upon an axis, said sector extending outwardly away from said support for said stylus lever, and a record point mounted upon said sector.

18. The combination of a stylus lever mounted to rock upon an axis, a member mounted upon said stylus lever and adapted to be turned into different positions relatively thereto, said member extending in a general direction outwardly away from said axis upon which said stylus lever is mounted, and a plurality of record points mounted upon different parts of said movable member and adapted to be brought one at a time into positions opposite to said axis from the center of rotation of said sector.

19. The combination of a stylus lever mounted to rock upon an axis, a member movably mounted upon said stylus lever and extending in a general direction toward said axis, said member being adapted to be turned angularly into different positions, a plurality of record points mounted upon said member and adapted to be brought one at a time to a position opposite the axis of said stylus lever from the support of said member, and means for locking said member in different positions relatively to said stylus lever.

20. The combination of a diaphragm, a stylus lever in operative relation to the same, a stem upon which said stylus lever is journaled, a weight for supporting said stem, a cushion mounted upon said weight, and mechanism disposed intermediate said cushion and said stem for deadening sound vibrations.

21. The combination of a stylus lever, means for connecting the same with a diaphragm, a movable member mounted upon said stylus lever and adapted to turn in a plane crossing the plane in which said stylus lever normally rocks, record points mounted upon said movable member, and indicating marks for enabling the operator to determine the positions of said record points relatively to said stylus lever.

22. The combination of a stylus lever provided with a sector fixed in relation thereto, a movable sector disposed adjacent to said fixed sector, means for securing said movable sector rigidly in relation to said fixed sector, and a plurality of record points mounted upon said movable sector.

23. The combination of a stylus lever provided with an upturned portion, a supporting member upon which said stylus lever is journaled, so as to rock in two planes crossing each other, said supporting member being provided with an opening into which said upturned portion extends for the purpose of preventing said stylus lever from turning beyond certain limits in one of said planes, a diaphragm, and means for transmitting motion from said upturned end of said stylus lever to said diaphragm.

24. The combination of a weight provided with a central opening, a stylus lever journaled upon said weight and adapted to turn in a plane substantially parallel with the general plane of said weight, said stylus lever being provided with an upturned portion extending into said opening so that said weight serves as a limiting stop for preventing ex-

cessive travel of said stylus lever when thus turning, a diaphragm, and means for transmitting motion from said upturned portion of said stylus lever to said diaphragm.

25. The combination of a weight, a stylus lever journaled thereupon and adapted to turn, a sector journaled upon said stylus lever and adapted to turn upon a center independently of the axis of rotation of said stylus lever, and means for preventing excessive travel of said stylus lever relatively to said weight when said sector is turned by hand, and a record point mounted upon said sector and adapted to be brought into a predetermined position by the rotation of said sector.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD BARTHOLOMEW SMITH.

Witnesses:

WALTON HARRISON,

EVERARD B. MARSHALL.