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T. H. & E. GARDNER.

DENTAL CHAIR.

No. 519,109. Patented May 1, 1894.

Fig. 1. Fig. 1ª

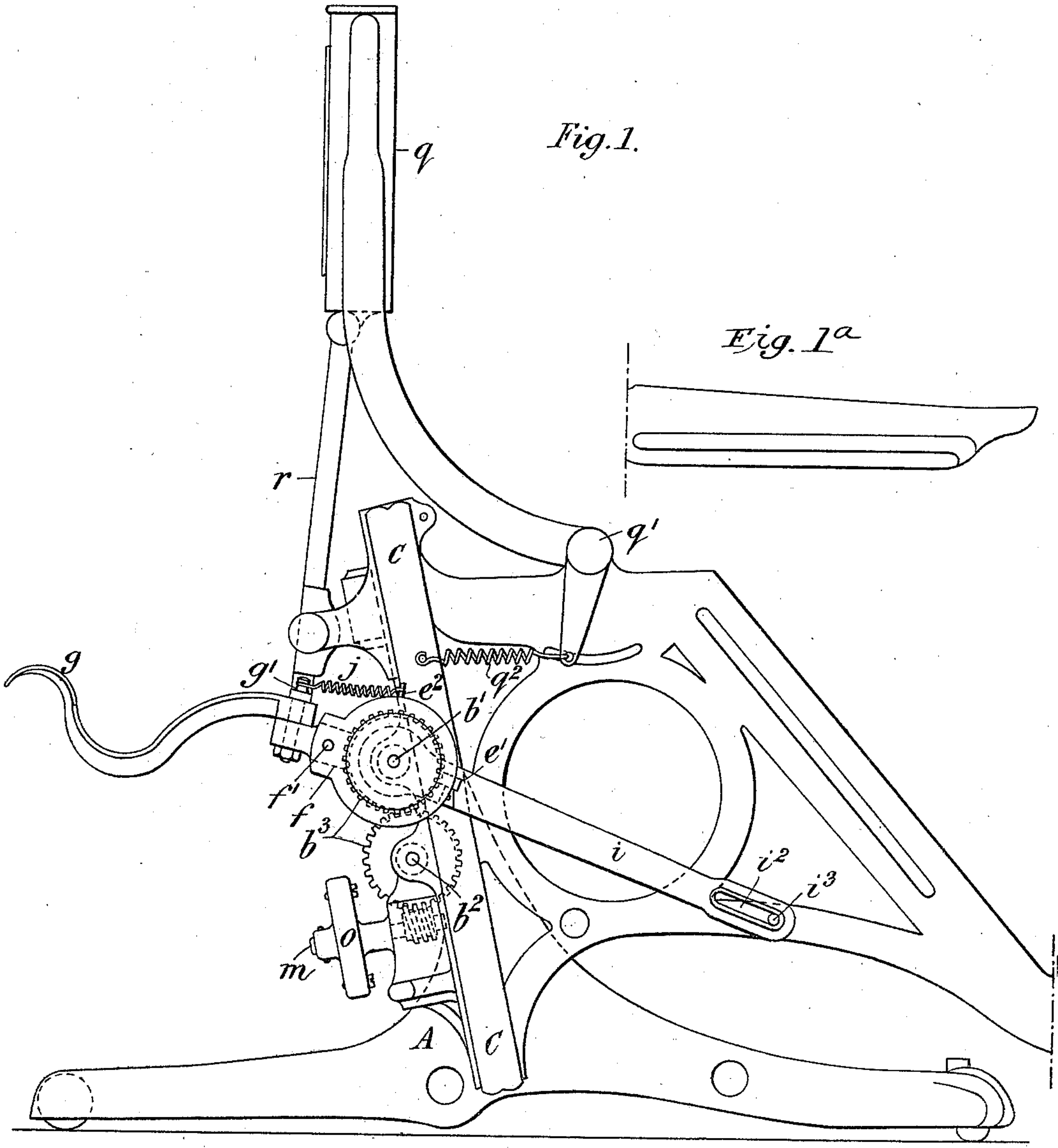


Fig. 6.

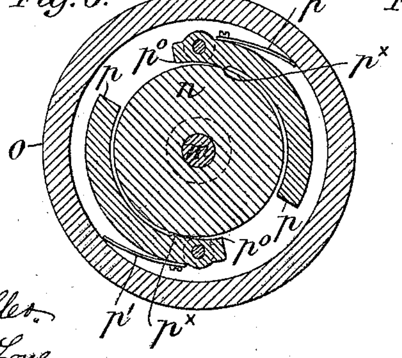
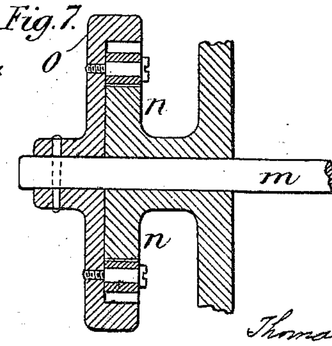


Fig. 7.



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DENTAL CHAIR.

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Fig. 2.

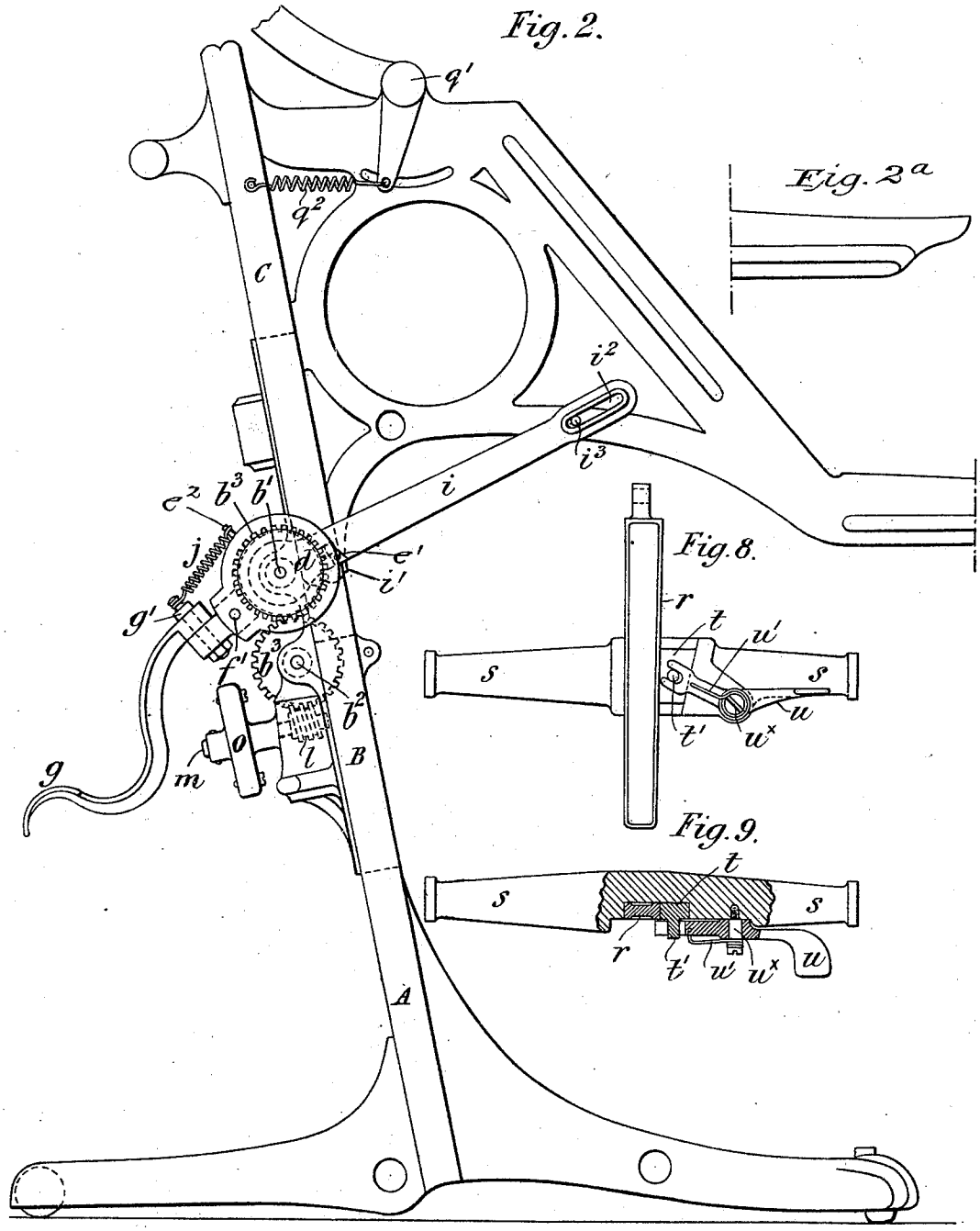

Fig. 2ª

Fig. 8.

Fig. 9.

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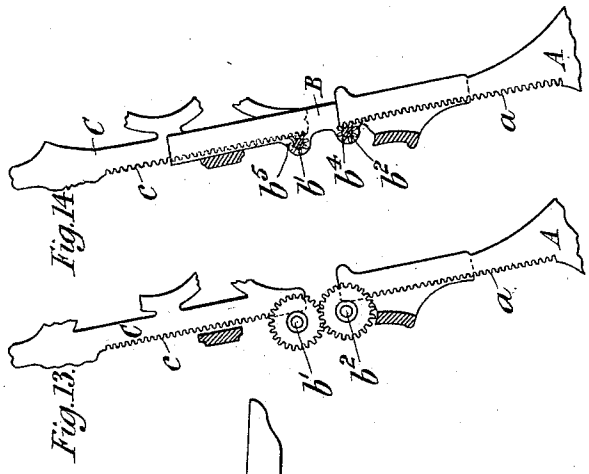
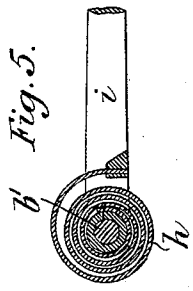
(No Model.) 3 Sheets—Sheet 3.

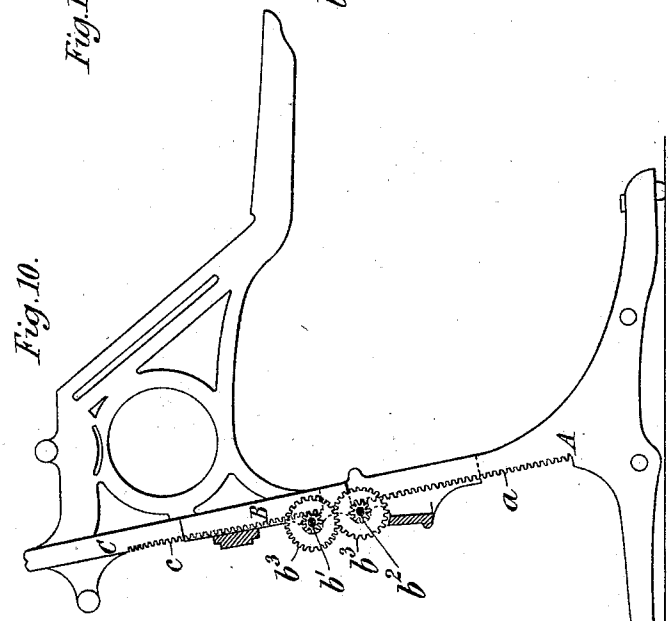
T. H. & E. GARDNER.

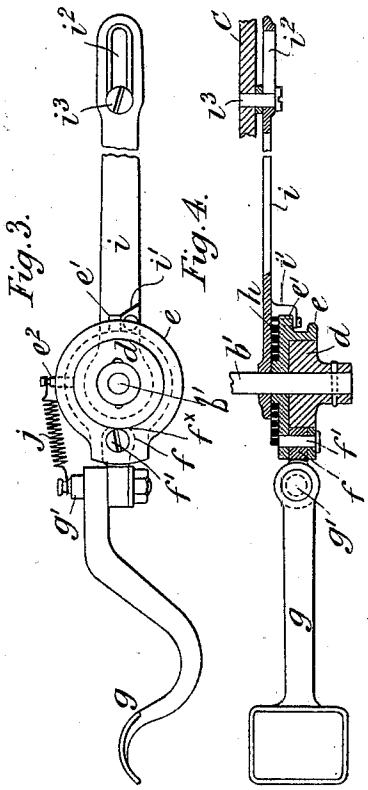
DENTAL CHAIR.

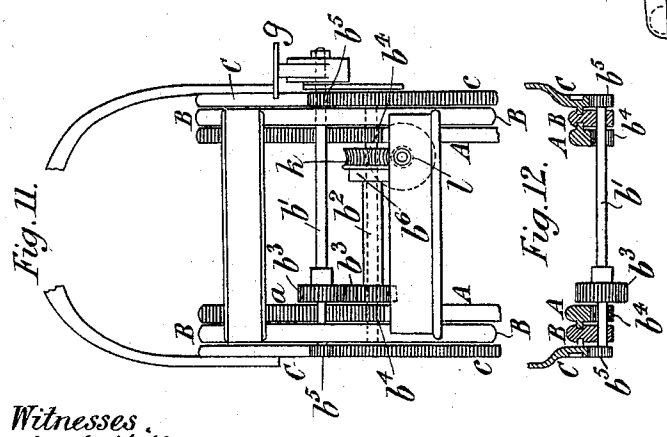
No. 519,109. Patented May 1, 1894.











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UNITED STATES PATENT OFFICE.

THOMAS HARRY GARDNER AND EDWARD GARDNER, OF MANCHESTER, ENGLAND.

DENTAL CHAIR.

SPECIFICATION forming part of Letters Patent No. 519,109, dated May 1, 1894.

Application filed December 6, 1892. Serial No. 454,252. (No model.) Patented in England August 11, 1892, No. 14,508.

To all whom it may concern:

Be it known that we, THOMAS HARRY GARDNER and EDWARD GARDNER, subjects of the Queen of Great Britain, residing at Hadfield Street, Cornbrook, Manchester, England, have invented certain new and useful Improvements in Dental Chairs, (for which we have received Letters Patent in Great Britain, No. 14,508, dated August 11, 1892,) of which the following is a specification.

This invention relates to dental chairs such as described in our former patent dated July 26, 1892, No. 479,415.

In the dental chair to which the invention is applicable there is a fixed chair standard; an intermediate moving part sliding on the fixed standard up and down; and an upper moving part sliding upon the intermediate part and carrying the chair seat. These parts are in all respects as described in our said former patent. On the intermediate part two shafts geared together are provided and on the shafts are toothed wheels; these wheels engage with racks upon the chair standard and upon the upper moving part. The lifting of the chair seat is effected in a novel manner by turning the shafts above mentioned by means of a foot lever and a silent pawl which latter engages with a disk or drum on one of the shafts. The inclination of the foot lever is controlled by means hereinafter described in such a way that the end which receives the foot is always conveniently placed and varies but little in its distance from the ground, although the shaft on which this lever is mounted ascends and descends with the intermediate part of the chair frame. The lowering of the chair seat is controlled by a wheel which is geared with the descending parts. On the wheel are frictional locking levers which are held by springs against a stationary cylindrical surface. The friction thus established is sufficient to prevent movement. If however the wheel be rotated by the hand, centrifugal force removes the locking levers from the stationary surface. If the speed of descent tends to become excessive the centrifugal force causes a further movement of the locking levers and this movement brings them again into contact with the cylindrical surface and again friction is caused which checks the descent of the weight. When the rotation of the wheel is checked by the hand, the mechanism comes to rest. The height of the chair back or head rest is regulated by means of a taper strut or support which connects the back or head rest with a horizontal bar pivoted to the chair frame. The strut lies in a groove formed for it in the bar and a wedge locks it therein so as to prevent downward movement, but permitting it to be raised. By means of a lever the wedge can be withdrawn.

Figure 1 of the annexed drawings is a side elevation of a dental chair constructed in accordance with our invention. The seat in this figure is represented in its lower position. Fig. 1^a is a view of the foot rest. Fig. 2 is a side elevation of the same chair with the seat in its raised position; the back of the chair is not represented in this figure. Fig. 2^a is a view of the foot rest. Fig. 3 is a side elevation of the lifting gear. Fig. 4 is a plan, partly in section, of the lifting gear, and Fig. 5 is a sectional elevation of a portion of the same. Figs. 6 and 7 are sectional views of parts of the lowering gear. Fig. 8 is a rear elevation of apparatus for the adjustment of the back of the chair. Fig. 9 is a plan, partly in section, of the parts shown in Fig. 8. Figs. 10 to 14 are intended to illustrate, by detail views, the telescopic framing of the chair. Fig. 10 is a sectional elevation. Fig. 11 is a rear elevation. Fig. 12 is a horizontal section, and Figs. 13 and 14 are vertical sections.

A is the fixed chair standard. B is the intermediate standard or moving part sliding on the fixed standard up and down; and C is the upper moving part sliding upon the intermediate part and carrying the chair seat. These three parts are so geared by racks and pinions that, for every increment of rise given to B, the intermediate part, the upper part C rises a corresponding increment in relation to the intermediate part. Consequently, in relation to the fixed standard, the upper moving part C rises and falls twice as fast as the intermediate moving part B. To this end the part A has rack teeth upon it at *a a* and the part C at *c c*. The intermediate part carries two parallel spindles b' b^2, which are geared together by the wheels b^3 b^3, and carry pin-

ions b^4 b^4, b^5 b^5, engaged with the racks *a* and *c*, respectively.

The improved lifting apparatus is arranged as follows:—On the spindle b' there is fixed a disk *d*, and this disk is contained within a case *e*, which is loose upon the spindle. *f* is a nipping pawl mounted upon a pivot pin f', which is fixed in the case *e*. The foot lever *g* is connected by a joint pin g' to the tail or outer end of the nipping pawl. The case *e* is connected by a spiral spring *h* with a controlling arm *i*, and the spring normally holds the projection e' upon the case in contact with the corresponding projection i', upon the arm *i*. The controlling arm is slotted at i^2 and a pin i^3 is passed through the slot. This pin is fixed into the uppermost section C, of the chair frame. *j* is a coiled spring connecting the pivot pin g' of the foot lever with a projection e^2, upon the case *e*.

The action of the lifting apparatus is as follows:—When the foot is placed on the rear extremity of the lever *g*, and it is pressed down, the spring *j* at first yields sufficiently to allow the lower corner $f^\times$ of the nipping pawl *f*, to engage and press heavily upon the periphery of the disk *d*. Then, as the downward movement of the foot lever continues, the coiled spring *h* yields and the projection e' leaves the projection i'. The disk *d* now partakes of the movement of the nipping pawl, the spindle b' is rotated and the upper sections of the chair are raised a short distance. On the removal of the foot from the lever *g*, the spring *j* removes the corner $f^\times$, of the nipping pawl, from contact with the disk *d*, and the spring *h* causes the case *e* to turn upon the spindle until the projections e' and *i* are again in contact and the foot lever *g* is again raised. Should a further rise of the chair seat be required, the foot is again pressed on the lever *g* and the action is repeated. It is important to observe that the tread end of the foot lever, as it stands to receive the foot, is always at about the same distance from the ground, for, as the spindle b' rises, the pin i^3 moves upward double the distance and the lever *i* is thrown into a more inclined position. The joint pin g' allows the foot lever to be moved laterally to any position which for the moment is the most convenient.

The descent of the chair seat, when the foot is removed from the lever *g*, is controlled by the worm wheel *k*, (Fig. 11,) which engages with and is locked by the screw or worm *l*. The worm wheel *k* is not fast upon the spindle b^2, but is connected with a clutch b^6, which permits the spindle b^2 to turn without the wheel *k*, as the chair seat rises, but compels the wheel to turn with the spindle while the chair seat descends. The details of this clutch may be of any approved construction, such, for instance, as shown in our patent above referred to. The teeth of the worm wheel and the worm are so inclined that, when left free, the worm will revolve and allow the load to run down. This, however, is controlled by the mechanism shown by Figs. 6 and 7. *m* is the axis of the worm; it passes through the stationary cylindrical boss *n* and has keyed upon it the hand wheel *o*. Pivoted upon or within the hand wheel are the centrifugal locking levers *p p*, and springs p' p' fixed to the levers and abutting upon the flange of the wheel, press the locking levers inward so that the shoulders $p^\times p^\times$ upon the levers bear upon the cylindrical surface of the boss *n*. The resistance thus offered is sufficient to prevent the wheel starting from rest, nevertheless the wheel can readily be turned by hand and then the centrifugal force moves the locking levers outward sufficiently to lift the shoulders $p^\times$ $p^\times$ from the surface of the boss *n;* consequently movement once started continues until the chair is run down or the wheel *o* is stopped by the hand. If the speed should tend to accelerate unduly the centrifugal force so far overpowers the springs $p'p'$ that the shoulders p^o p^o at the extremities of the locking levers *p* are brought to bear upon the boss *n* and to offer a resistance by which the acceleration is checked.

We do not in this application claim the lowering mechanism just described, as said subject-matter is claimed in our application, Serial No. 491,424, filed November 20, 1893.

The adjustment of the chair back is effected as follows:—The chair back *q* is mounted so that it can swing about centers q' and its weight is counterbalanced by springs q^2. A taper strut or support *r* is jointed at its upper end to the chair back and it lies in a groove formed to receive it in a bar *s*. The bar *s* is pivoted to the frame of the chair so that it can rock and adjust itself to the inclination of the strut. In the same groove with the taper strut, the bar *s* carries a wedge *t*, and when the wedge is forced downward it locks the strut fast to the bar and the chair back is held in the position in which it has been placed, but when the wedge is raised the strut can slide freely in the groove in the bar and the chair back can be placed in the position desired. The wedge *t* is controlled by a lever *u;* this lever is pivoted at $u^\times$ upon the bar *s*, and at one end it is forked and embraces a pin t' fixed into the wedge *t*. At the other end the lever terminates in a palm upon which the foot, knee or hand may be conveniently placed when it is desired to lift the wedge and release the taper strut; u' is a spring applied to the lever *u* and its pivot; this spring when allowed to do so causes the wedge to descend and lock the taper strut. By giving to the strut a tapered form, it is prevented from slipping past the wedge when pressed downwardly. If the strut were straight and operated against a straight side of the wedge there would be a tendency to slip, especially if the surfaces were smooth, but by tapering the strut and causing a wedge

to bear against it there is no danger of slipping when the parts are once locked.

We claim as our invention—

1. The combination, substantially as set forth, of the three sections A, B and C, one of which is stationary and the other two movable, shafts, racks and pinions connecting the sections, a disk secured to the shaft carried by the intermediate movable part B, a foot lever movable about the axis of said shaft, silent pawl gear also movable about the shaft and connected with the foot lever, a stop connected with and controlled by the upper moving part or section C and operatively connected with the foot lever and with the pawl gear to limit the movement thereof, and a spring for raising the lever.

2. The combination, substantially as set forth, of the three sections A, B and C, one of which is stationary and the other two movable, shafts, racks and pinions connecting the sections, a disk secured to the shaft and carried by the intermediate movable part B, a foot lever movable about the axis of said shaft, silent pawl gear also movable about the shaft and connected with the foot lever, a stop arm operatively connected with the movable section C, and having a lug or stop operatively connected with the pawl gear, and a spring acting on the pawl gear and tending to raise the foot lever.

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