Sept. 22, 1936. C. A. UPSON 2,054,996

RECORDING INSTRUMENT

Filed Aug. 20, 1934 2 Sheets-Sheet 1

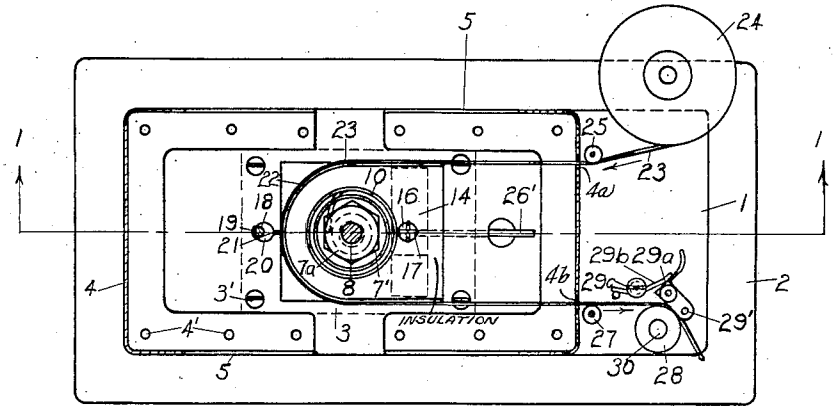


Fig. 2

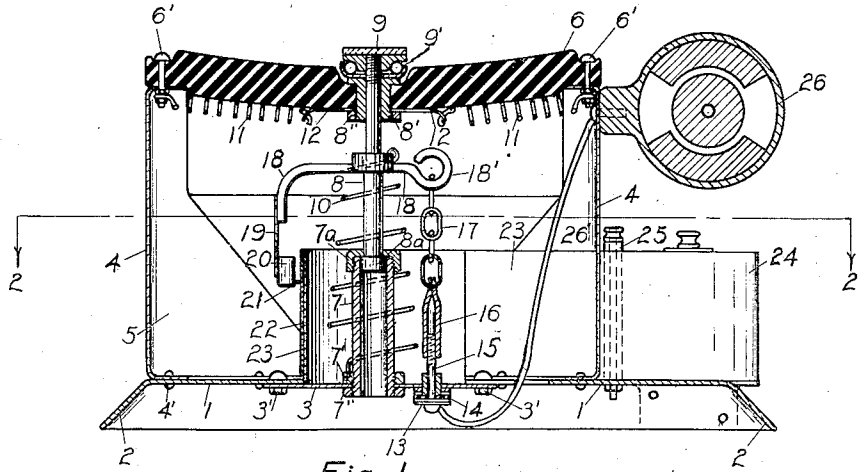


Fig. 1

INVENTOR
Carl A. Upson.
BY
Bruesh & Bruesh
ATTORNEYS.

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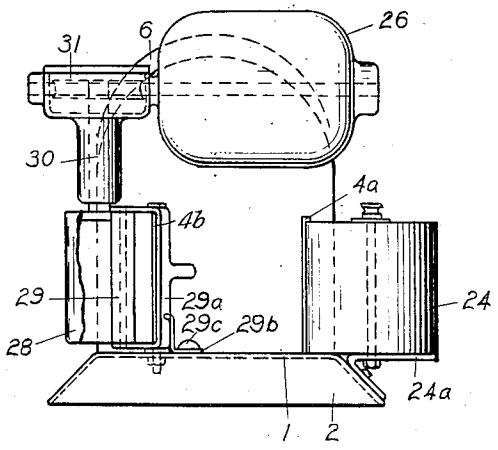


Fig. 3

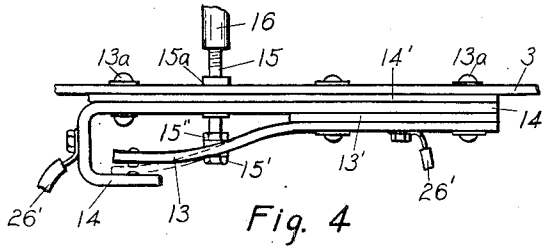


Fig. 4

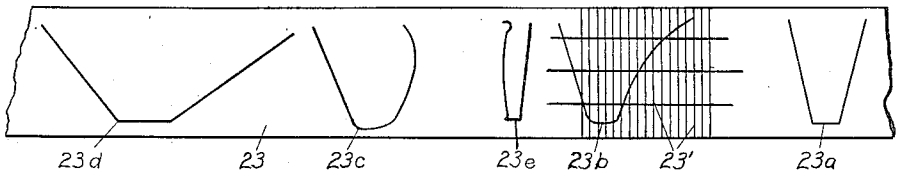


Fig. 5

INVENTOR
Carl A. Upson
BY
Bush & Rust
ATTORNEYS.

Patented Sept. 22, 1936

2,054,996

UNITED STATES PATENT OFFICE

2,054,996

RECORDING INSTRUMENT

Carl A. Upson, Hammond, Ind.

Application August 20, 1934, Serial No. 740,638

8 Claims. (Cl. 234—1)

My invention relates to new and useful recording instrument for making graphs showing the characteristics, including force, depth, speed, torque and timing in practicing the movements utilized in administering chiropractic adjustments.

The objects of my invention are:

1. To provide an instrument for the use of chiropractic students and chiropractors upon which they can practice the manual movements required or desired in administering adjustments and by which graphs can be made indicating the characteristics, including depth, speed, amount of force and timing utilized by them in executing such movements, and which instrument may also be used to record corresponding characteristics of movements produced by the use of a mechanical adjusting appliance.

2. To produce an instrument adapted for use in teaching chiropractic by which graphs can be produced of the adjusting movements made in practice by the teacher or student for comparison with other similar graphs of adjusting movements made by the student or by others.

It is well known to those skilled in the chiropractic art that the administration of chiropractic adjustments manually involves the application of physical force applied to the back of the patient along the spine and more particularly the application of physical force to a specific vertebra.

In the application of such force, it is considered important in many cases that the force be applied quickly and quickly released; that the application of force should be limited in the extent of the movement of the spine or vertebrae caused by contact of the practitioner's hand with the patient; and that the application of the force should, in many cases, be accompanied by a twisting or rotational movement of the portion of the practitioner's hand which is in contact with the patient.

The same principles apply when an adjustment is undertaken by mechanical means intended to simulate or accomplish the same purpose as a manual adjustment.

In this specification, for convenience, I use the term "force" to refer to the amount of direct pressure exerted by a chiropractor upon the spine or vertebrae of a patient, in administering a chiropractic adjustment or to the pressure applied in practicing such movements. I use the term "depth" to indicate the extent of the vertical or direct travel of the hand of the practitioner or of the head of an adjusting appliance where such an appliance is used. I use the term "speed" to refer to the rate of movement of either the hand of the operator or the head of the adjusting appliance, both in applying impact or pressure to or upon the patient and during the reverse or return movement of the hand of the operator or the head of the adjusting appliance after completion of the thrust. I use the term "torque" to apply to the rotational or twisting movement frequently used in adjustments; and I use the word "timing" to refer to the interval between the stroke or thrust and the release thereof as well as to the time or point of the stroke or thrust at which the torque takes place or during which the torque takes place. I use the term "stroke" or "thrust" to refer to the direct application of force by the hand of the operator or by an adjusting appliance to the spine or vertebrae of the patient.

I attain the objects above set out by the means illustrated in the accompanying drawings, in which,—

Figure 1 is a vertical section of my appliance on the line 1—1 of Figure 2;

Figure 2 is a sectional plan view on the line 2—2 of Figure 1;

Figure 3 is an end elevation from the right of Figure 1;

Figure 4 is an enlarged detail of the spring switch;

Figure 5 is a view of a portion of a completed graph;

Similar numerals refer to similar parts throughout the several views.

My apparatus comprises a base, 1, which may have a downwardly projecting flange or legs, 2, formed integral therewith. This base is preferably made of a metal stamping, but may be made by a casting or otherwise, of any suitable material.

I form the base with a large central opening for convenience in assembling my apparatus and this opening is covered by a sub-base, 3, formed of sheet metal or other suitable material and may be secured to the base by bolts, 3'.

Side walls composed of ends, 4, and sides, 5, formed of sheet metal or other suitable material, may be united to the base by rivets, 4', or in any suitable manner.

The ends, 4, are preferably rounded at the top and I provide a resilient top or cushion, 6, preferably composed of rubber or of rubber reenforced by suitable fabric. I prefer to make the upper portion of the top or cushion of considerable

thickness so as to afford a resistance comparable to the resistance of the body of the patient.

To reenforce and stiffen the top or cushion, 6, I attach to the middle thereof a plate, 12, preferably of sheet metal. To the ends of the plate, 12, I attach tension springs, 11, the opposite ends of which are attached respectively to the ends, 4. These springs may be of any desired form, size and strength to furnish the desired resiliency and resistance.

At the center of the top or cushion, I mount therein a sleeve, 8', secured in place by a lock nut, 8'', threaded upon the lower end thereof, and by a flange upon the upper end thereof.

Upon the sub-base, 3, I mount a tubular column, 7, secured to the sub-base by lock nuts, 7' and 7'', threaded thereon.

In the upper end of the column, 7, I slidingly mount a thrust-rod, 8, the upper end of which passes through the sleeve, 8', and has a head, 9, threaded thereon or otherwise suitably united thereto.

Around the column, 7, and thrust-rod, 8, I mount a helical spring, 10, the lower end of which is rigidly secured in an opening in the lock nut, 7', and the upper end of which extends through a small bore in the thrust-rod, 8, or is otherwise securely united thereto.

This spring, 10, is made of sufficient size, strength and resiliency to adapt it to perform several functions. Normally it acts to hold the thrust-rod, 8, in its upper position. It also furnishes a yielding resistance to the downward travel of the thrust-rod, 8, and to the rotational movement of the thrust-rod, 8, in either direction. It also acts to return the thrust-rod, 8, to its normal position when released after being manually depressed or rotated laterally in either direction.

The thrust-rod, 8, has rigidly united thereto an arm, 18, one end of which carries a support, 19, upon the lower end of which is mounted a stylus or marker, 20, the point, 21, of which bears against a strip of paper, 23, which passes over a drum or curved plate, 22, the lower end of which is suitably united to the sub-base, 3.

A spring switch arm, 13, is secured to the sub-base, 3, by insulated rivets, 13*a*, and insulated therefrom by an insulating strip, 13', and a contact point, 14, with an insulating strip, 14', is united to the sub-base, 3, with which point 14 the spring switch arm, 13, may come in contact to close an electric circuit passing through wires, 26', which operates the motor hereinafter described.

The spring switch is normally held open by the switch rod, 15, head, 16, and switch chain, 17, the upper end of which is attached to a hook, 18', formed upon one end of the arm, 18, when the top or cushion, 6, is in the normal position shown in Figure 1.

The drum or curved plate, 22, is united to the sub-base, 3, by any suitable means and affords a plain surface curved on a radius coaxial with the arm, 18, so that the pen point, 21 travels at all times parallel with the drum, 22. A paper reel, 24, is mounted upon a bracket, 24*a*, united to the base by rivets or other suitable means, and the paper from the reel, 24, is led past and in contact with a roll, 25, and through a slot, 4*a*, and around the drum, 22, then passing out of a corresponding slot 4*b* in the same end of the housing and in contact with a roll, 27. A feed roll, 28, preferably composed of soft rubber, is mounted upon a shaft, 30, the upper end of which enters a gear box 31, and is fitted with a worm or other suitable gear, which may be driven by a corresponding gear on the shaft of the motor, 26.

A fork or bracket, 29*a*, is pivotally mounted upon and above the base, 1, and carries a pivot bolt, 29', and tightener roll, 29, which is adapted to hold the strip of paper, 23, in close contact with the feed roll, 28, so that when the feed roll, 28, revolves, it causes the paper, 23, to travel across the face of the drum, 22, and out of one end, 4, of the housing and thence between the feed roll, 28, and the tightener roll, 29, to be observed as it leaves the machine or torn off as desired.

The tightener roll, 29, is normally held in close contact with the roll, 28, by a suitable spring, 29*b*, which is secured to the base, 1, by a set screw, 29*c*, and bears against the bracket or support, 29*a*, exerting pressure thereon adapted to hold the roll, 29, in close contact with the feed roll, 28.

In the operation of my device, the strip of paper, 23, is mounted on the reel, 24, led into the housing through the slot, 4*a*, and around the drum, 22, and out through the corresponding slot, 4*b*, and between the feed roll, 28, and the tightener roll, 29.

The hand of the operator is then placed in the usual position for adjusting with the heel of the palm resting upon the head, 9, of the thrust-rod, 8. A quick downward thrust is then given upon the head, 9, corresponding to the desired thrust movements given in chiropractic adjustments and carries the head, 9, and the thrust-rod, 8, downwardly against the resistance of the springs, 10 and 11, and the resistance of the cushion or top, 6.

As the thrust-rod, 8, moves downwardly, it carries with it the arm, 18, and the pen, 20, the point, 21, of which traces a line upon the paper, 23. As soon as the thrust-rod, 8, starts to travel downwardly, the insulated spring arm, 13, is allowed to contact with the insulated switch point, 14, thus closing the switch and causing the electric current to flow through the wires, 26', and to start the motor, 26. This in turn starts the paper moving around the drum, 22.

The paper is preferably ruled with cross lines, 23, as shown in Figure 5 and as the motor is so constructed as to travel at a constant speed, the paper will also travel at a constant speed and the direction of the line traced upon the paper relative to the cross lines, will indicate the length of time elapsing during the travel of the pen point.

I prefer to proportion the cross lines upon the strip, 23, and the speed of the motor so that it will take one-hundredth of a second for the paper to travel a distance equal to the distance between two cross lines. The longitudinal lines may mark the depth or length of the vertical travel of the pen point, 21, and consequently of the thrust-rod, 8.

A ball bearing, 9', may be inserted between the head, 9, and the sleeve, 8'.

In administering chiropractic adjustments, it is common to apply a twisting movement of the hands during all or part of the thrust movement. When a twisting movement or torque is applied to the head, 9, of the thrust-rod, 8, it will cause the thrust-rod to rotate on its axis and will carry the arm, 18, with the thrust-rod, 8. This torque may be applied at any point of the downward travel of the head, 9. It may be applied initially or after the head has traveled half of its vertical distance or it may be applied at the end of the thrust. This torque movement will cause the pen to advance or retreat longitudinally upon the paper. When a thrust movement is applied without torque, the graph will appear in practically straight lines as

shown at 23*a* in Figure 5. 23*e* shows torque applied on return movement.

When the downward movement and release of the thrust-rod, 8, are made very rapidly, the graph will appear narrow as at 23*a*, but when the thrust and the release are made slowly, the lines will show a long slope as at 23*d*. It is thus possible from the graphs to tell the characteristics of the thrust or stroke applied by the one operating the machine.

It is well known that the much desired recoil action can be best secured by a very quick adjustment,—that is, by a very rapid thrust, followed instantly by a rapid release.

By the use of this appliance, it is possible for the teacher to make a set of graphs indicating the rapidity and depth of movement utilized by him, as well as the extent and timing of the torque applied by him, and the student, by comparing his graphs with the graphs furnished by the teacher, will have a means of determining when he has acquired sufficient skill and proficiency to enable him to perform the adjusting movements with the necessary force, depth, speed, torque and timing.

Likewise, graphs may be made by the use of calibrated adjusting appliances and the graphs so made can then be calibrated or marked to indicate the amount of force in pounds or otherwise which has been applied to produce a given graph and in this way a series of graphs can be worked out to indicate the proper amount of force and length of travel of the thrust applicable to various classes of cases.

It is well known that the amount of force, length of travel, etc., necessary in the case of a child or a small, weak person, may be much less than the amount of force, etc. required for a strong, heavily muscled person of mature years.

It is well known to the profession that in making chiropractic adjustments a large variety of different "moves" or movements of the hands of the operator, are utilized and that these movements vary greatly in length, direction, and force and also in the relative timing of the vertical and rotational movements—that is, of the thrust and torque movements. For these reasons, the drawings are not to be understood as showing the precise sizes or proportions of the moving and stationary parts of my apparatus nor are the proportions shown to be regarded as critical or essential to my invention.

Machines embodying my invention may be made of various different sizes and proportions and having different degrees of resistance or resiliency so as to be adapted for practice of different "moves" or movements.

It is obvious that the greater the extent of downward movement, the greater will be the resistance of the resilient top and the spring, 10; and the greater the extent of the rotational movement or torque, the greater will be the resistance of the spring, 10, thereto.

My apparatus will record the precise extent of the vertical movement, whether great or small; and the direction and amount of the slant of the vertical lines will indicate the extent of the rotational movement, whether great or small, as well as the relative timing thereof. The student or operator manually depresses the thrust-rod, 8, and rotates it as desired. The stylus records the movement on the paper strip and thereby shows the length of the actual downward movement, the timing of the release of the thrust-rod by the operator and also the extent and timing of the rotational movement or torque. The apparatus in no way controls the timing or extent of any of these movements, but merely records them as actually made.

It is obvious that various modifications may be made in my apparatus without departing from the spirit of my invention and I do not limit my claims to the precise form shown in the drawings.

I claim:

1. A chiropractic practicing machine comprising a base, a housing united thereto, a top mounted upon the upper end of the housing, a vertical column united to the base and extending upwardly in the housing, a thrust-rod rotatably and slidably mounted in the column having its upper end extending above the column and through the top and being supported laterally by the top, a head united to the upper end of the thrust-rod above the top, and a helical spring mounted upon the base and around the thrust-rod having its lower end united to the base and its upper end united to the thrust-rod, said spring being of sufficient size, strength and resiliency to normally support the thrust-rod in its upper position and to return the thrust-rod to its normal upper position when released after having been manually depressed or rotated laterally in either direction.

2. A chiropractor's practice instrument comprising a base, a housing united thereto having an elastic top, a hollow vertical column within the housing united centrally to the base and extending upwardly therefrom, a thrust-rod rotatably and slidably mounted in the column and having its upper end extending above the column and through the top, a head united to the upper end of the thrust-rod above and in contact with the elastic top, said top acting whenever the thrust-rod is manually depressed, to exert pressure upwardly upon the head and to return the head to its normal position when released from such manual pressure, and resilient means united to the thrust-rod and to the base normally tending to hold said thrust-rod in its normal position and to return said thrust-rod to its normal position when released after having been manually rotated in either direction.

3. In a thrust-practicing machine, a base, a housing united thereto, a central support united to the base, a manually operable thrust-rod slidingly and rotatably mounted in the support and extending above the support, means within the housing united to the base and thrust-rod to automatically return the thrust-rod to normal position when released by the operator after being manually depressed or rotated, a moving record blank mounted within the housing, and means mounted within the housing and operable by the thrust-rod to record upon said blank the extent, direction, relative timing and duration of the various movements of the thrust-rod when manually depressed by the operator and while being returned to normal position after release.

4. In a thrust-practicing machine, a base, a housing united thereto, supporting means centrally united to the base within the housing, a thrust-rod slidingly and rotatably mounted in said supporting means able to be simultaneously driven downwardly and rotated by manual pressure thereon, means within the housing united to the thrust-rod and to the base to automatically and quickly return the thrust-rod to normal position when released from pressure after being manually moved therefrom, a movable blank mounted within the housing, and means mounted within the housing adapted to record upon said

blank the extent, duration and relative timing of longitudinal and rotational movements of the thrust-rod both when manually moved by the operator and while being returned to normal position thereafter.

5. A practice instrument comprising a base, a housing united thereto having an elastic top, a hollow vertical column united centrally to the base and extending upwardly therefrom, a manually operable thrust-rod rotatably and slidably mounted in the column and having its upper end extending above the column and through the top, a head united to the upper end of the thrust-rod above and in contact with the top, the elasticity of the top enabling it to return itself and the thrust-rod to normal vertical position when released after being moved therefrom, and a helical spring mounted around the thrust-rod having one end united to the base and the other end to the thrust-rod, to return the thrust-rod to its normal angular position when released after being manually rotated therefrom.

6. In a thrust-practicing machine, a base, a housing united thereto, a central support united to the base, a manually operable thrust-rod slidingly and rotatably mounted in the support and extending above the support, means within the housing united to the base and thrust-rod to automatically return the thrust-rod to normal position when released by the operator after being manually depressed or rotated, and means within the housing adapted to make a record of the extent, duration, direction and relative timing of longitudinal and rotational movements of the thrust-rod.

7. A thrust-recording machine for manual movements, having a base with a housing united thereto, a hollow column united to the base, a manually operable thrust-rod rotatably and slidingly mounted in the column, a helical spring mounted around the thrust-rod and column, having one end united to the base and the other end united to the thrust-rod arranged to furnish a yielding resistance to movement of the thrust-rod either longitudinally or rotationally and to return it to its normal position when released after having been moved therefrom, a transverse supporting arm rigidly united to the thrust-rod, an arcuate supporting plate united to the base concentric with the thrust-rod, a record blank mounted in contact with the face of the arcuate supporting plate, and a stylus mounted upon the free end of the supporting arm arranged to bear against and mark a line upon such blank representing both longitudinal and rotational movements of the thrust-rod, and the duration and relative timing of such movements.

8. A recording practice instrument comprising a base, a housing united thereto having an elastic top, a hollow vertical column united centrally to the base and extending upwardly therefrom, a thrust-rod rotatably and slidably mounted in the column and having its upper end extending above the column and through the top, a head united to the upper end of the thrust-rod above and in contact with the top, resilient means united to the base and to the thrust-rod arranged to resist rotational movement of the thrust-rod and to return it to its normal position when moved therefrom, a transverse supporting arm rigidly united to the thrust-rod, a curved supporting plate united to the base and concentric with the thrust-rod, a record blank mounted in contact with the face of the curved supporting plate, and a stylus mounted upon the supporting arm arranged to bear against and mark a line upon said blank representing both longitudinal and transverse movements of the thrust-rod, and the duration and relative timing of such movements.

CARL A. UPSON.