

July 7, 1931.

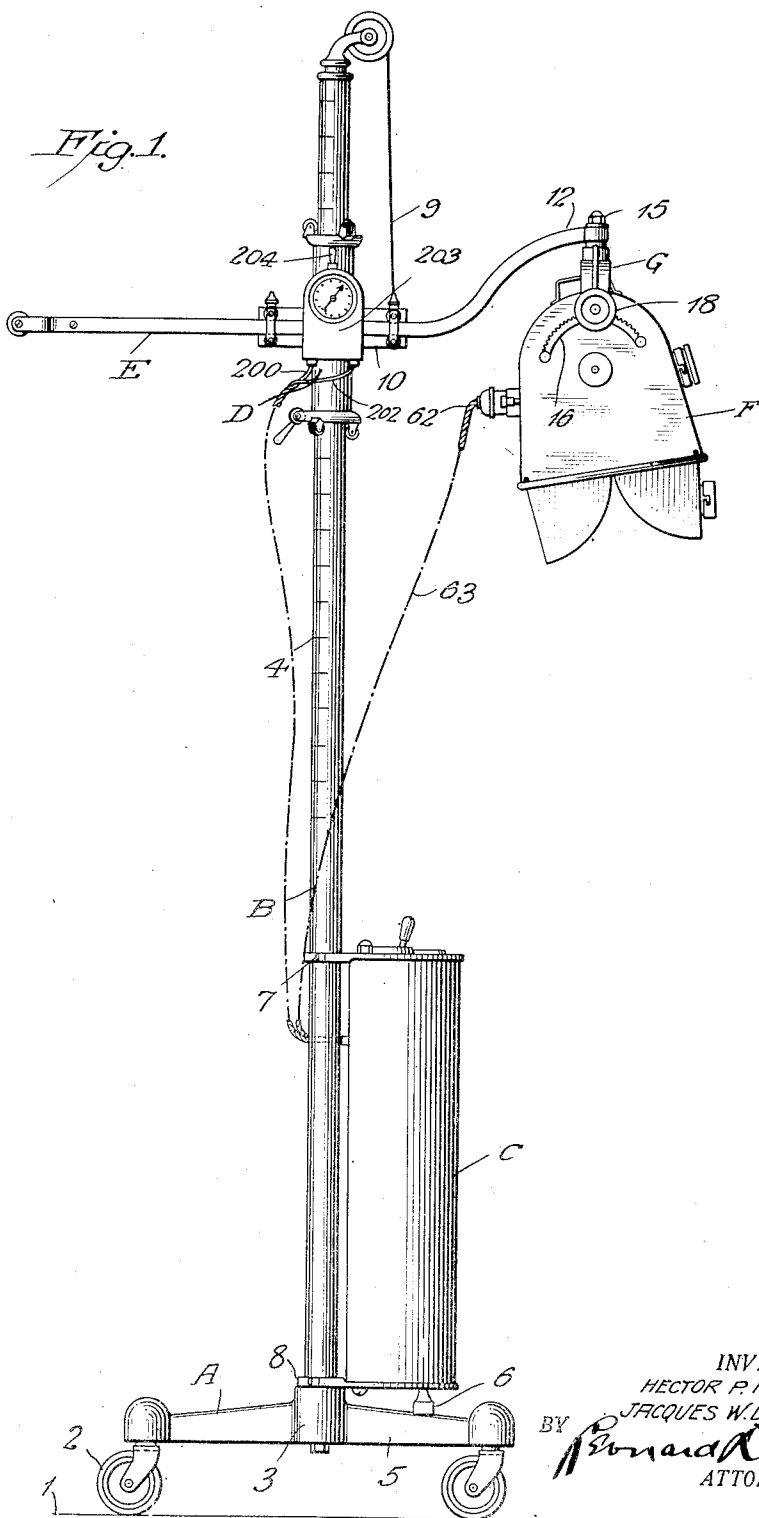
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1,813,383

THERAPEUTIC LAMP APPARATUS

Filed Jan. 30, 1928

6 Sheets-Sheet 1



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THERAPEUTIC LAMP APPARATUS

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Fig. 2.

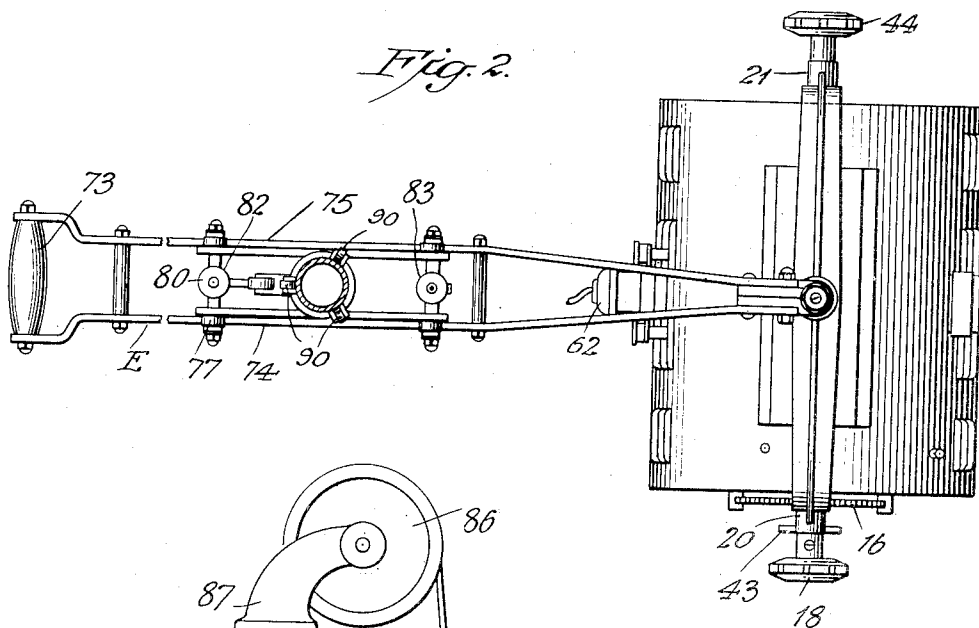


Fig. 3.

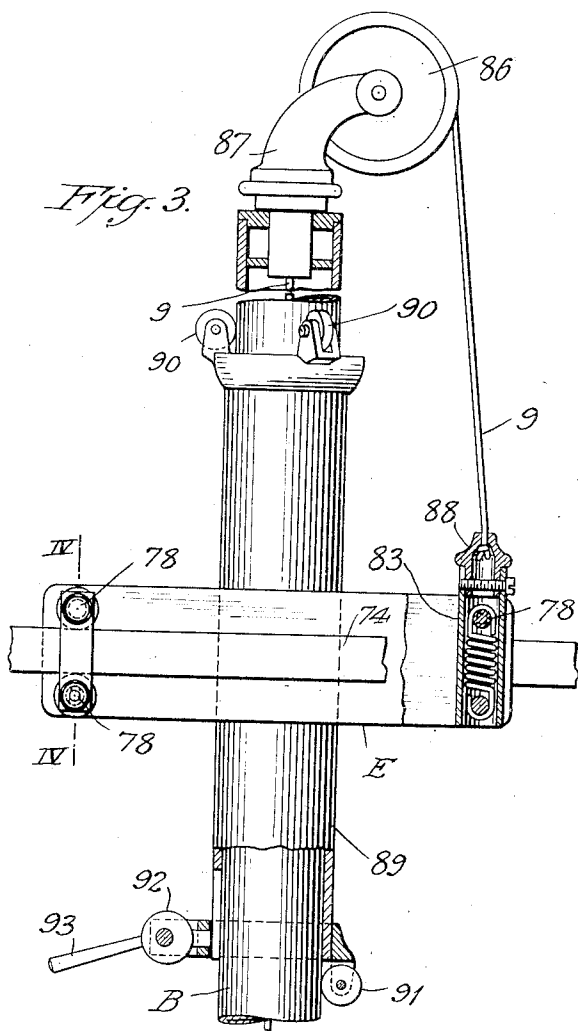


Fig. 4.

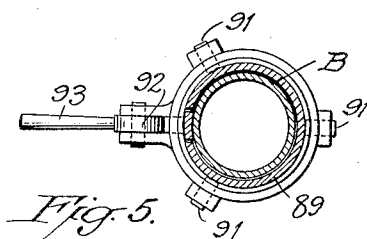
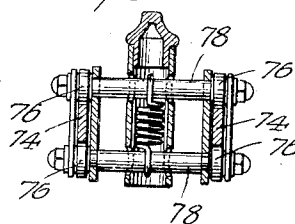


Fig. 5.

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Fig. 7.

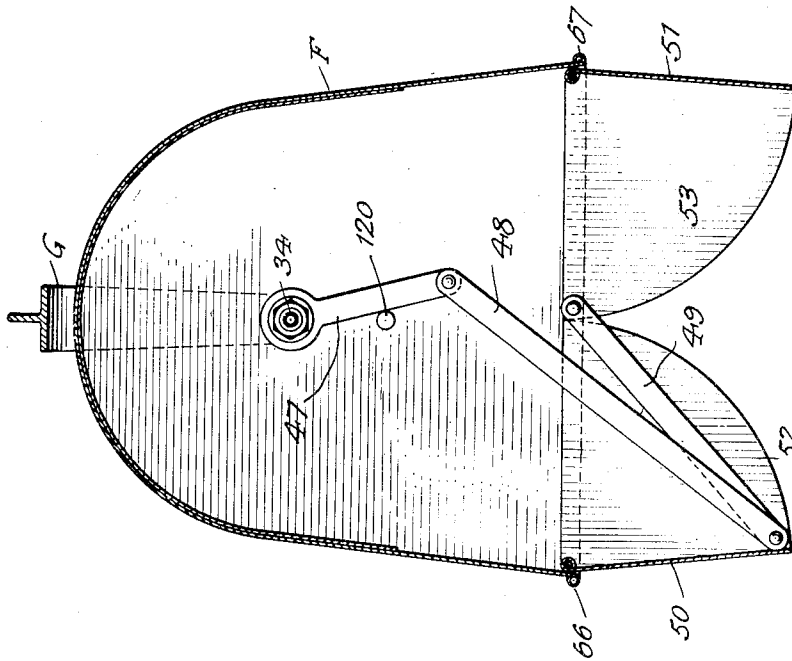
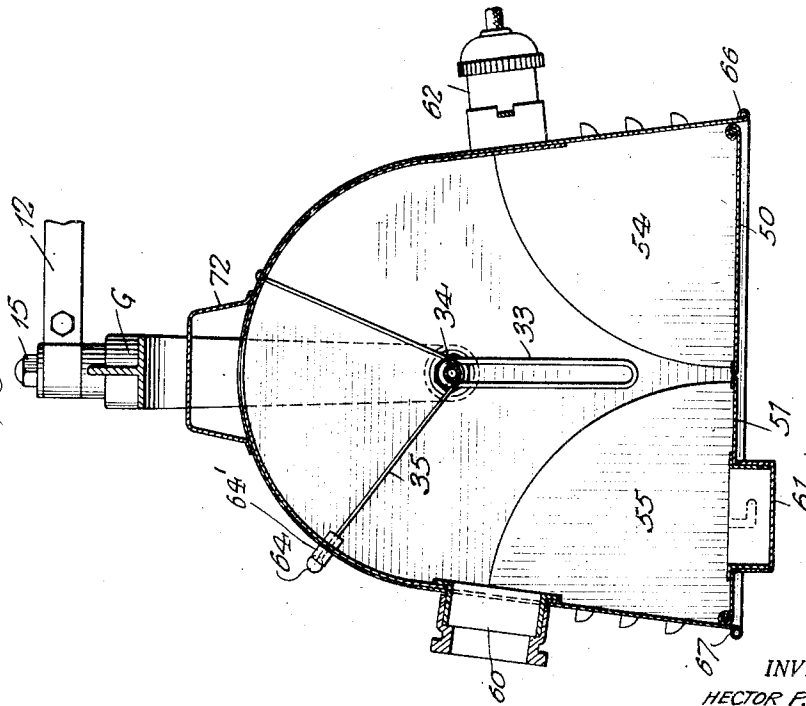


Fig. 6.



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6 Sheets-Sheet 4

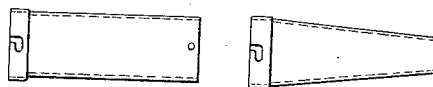
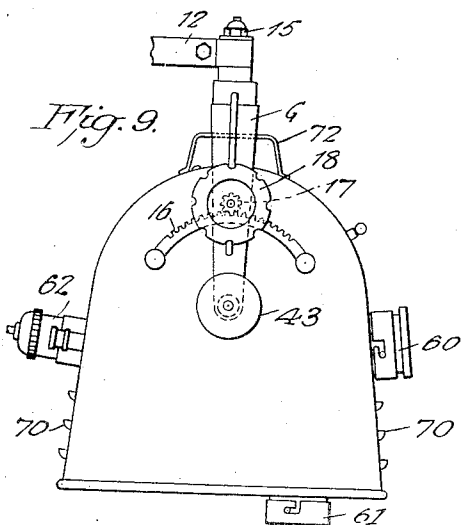
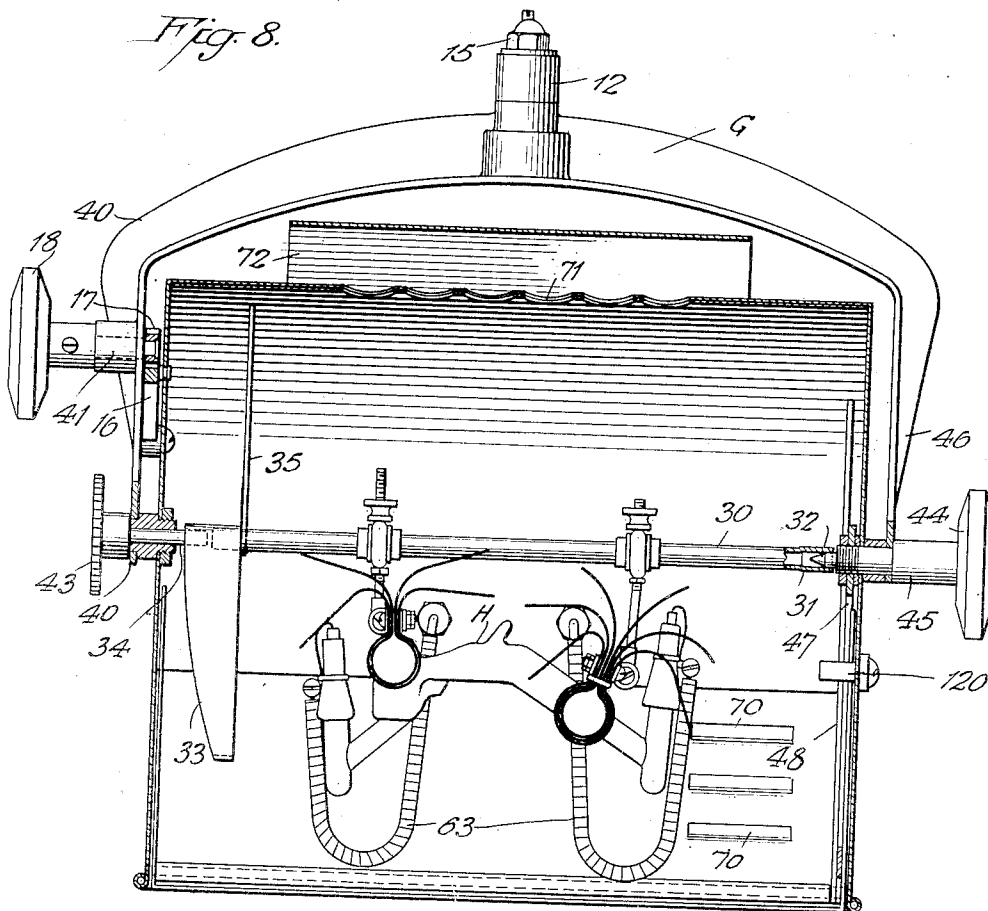


Fig. 10.

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6 Sheets-Sheet 5

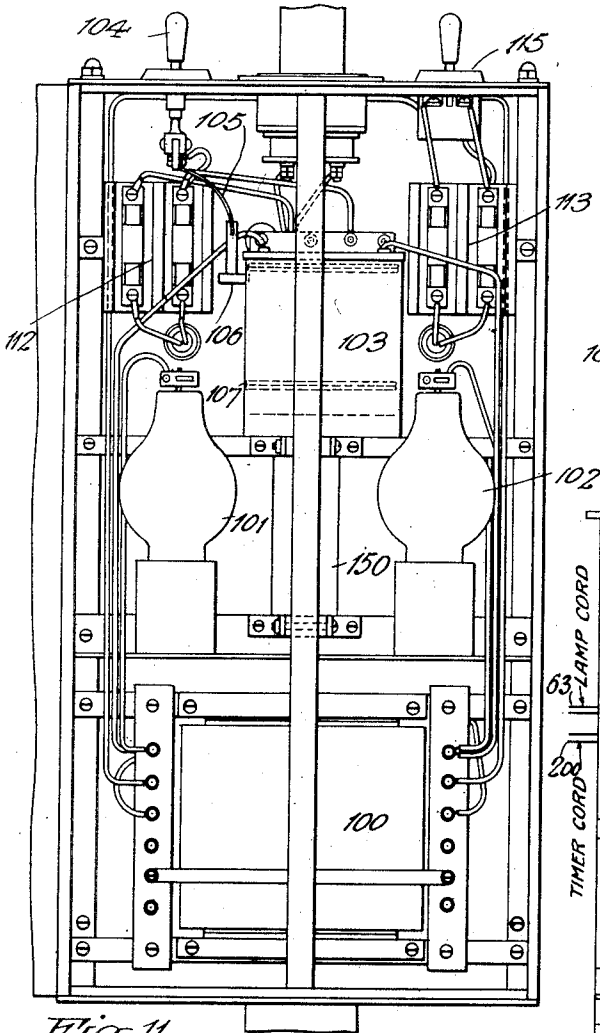


Fig. 11.

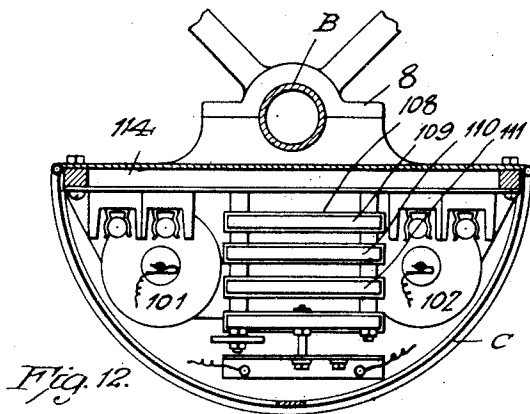


Fig. 12.

Fig. 13.

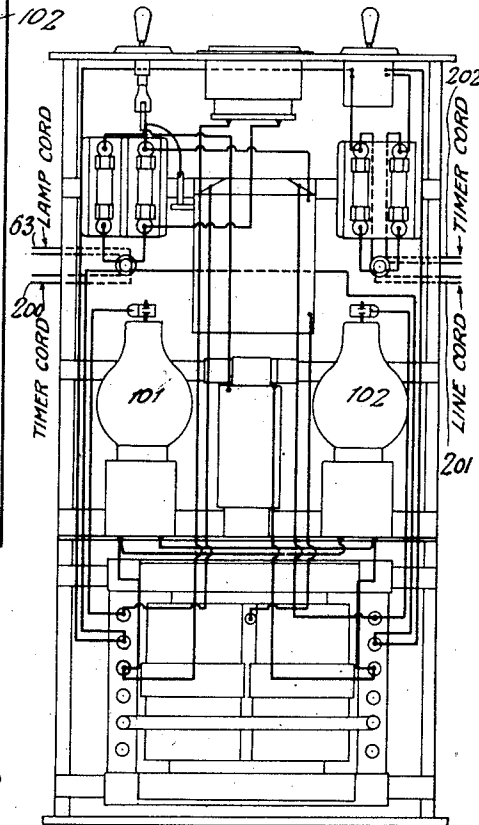
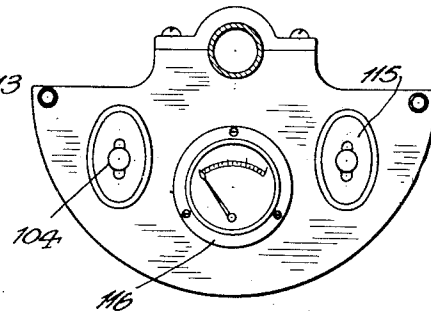


Fig. 14.

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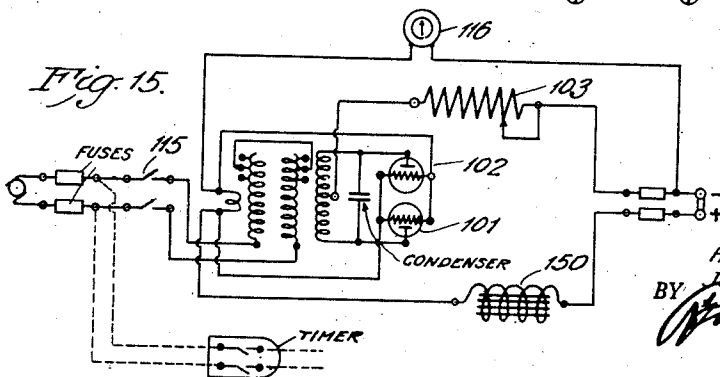
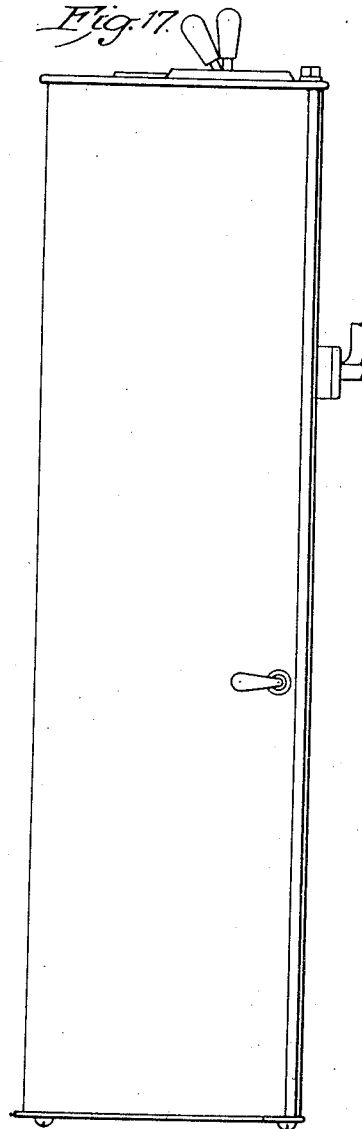
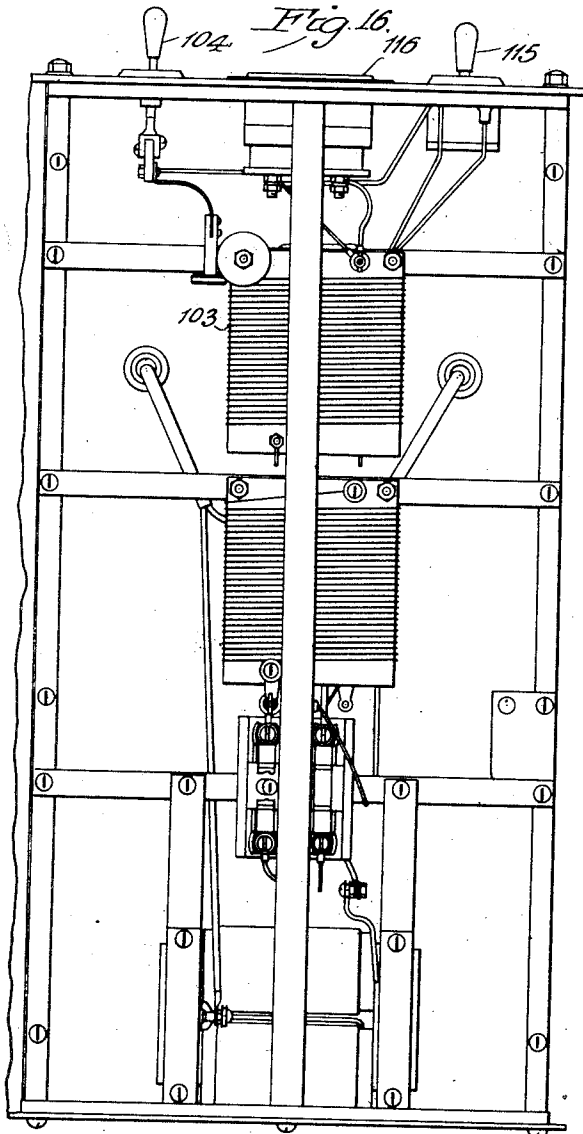
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THERAPEUTIC LAMP APPARATUS

Filed Jan. 30, 1928

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

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THERAPEUTIC LAMP APPARATUS

Application filed January 30, 1928. Serial No. 250,523.

This invention relates to therapeutic lamp apparatus of the type in which the rays from a source of light are to be directed upon some part of a patient for a deliberate curative effect. More particularly, the novel features of the invention are directed to the therapeutic application of ultra violet rays emanating from a mercury arc of the quartz tube variety. In the use and application of light of this character great care must be exercised in the control of the intensity of the light at its source, the direction of the impingement of the rays of the light upon the part of the human anatomy under treatment, the localizing of the extent at right angles to the direction of their propagation of the rays of light, the shielding of the operator, as well as of all those parts of the anatomy of the patient not under treatment from the rays of light, and, in some instances, the control of or determining the nature of the medium through which the light must pass from its source to the surface of application on the patient.

In addition to meeting the foregoing desiderata, it is necessary to maintain the source of light in a substantially fixed angular relation to the vertical, particularly when the source of light is a mercury arc quartz tube. In connection with many types of such tubes, it is also desirable to provide for an initial tilting of the tube to strike the arc while at the same time preferably all of the heretofore enumerated functionings are made possible with the apparatus.

An important object of the invention is to provide in a single combination assemblage an economical and durable apparatus which, with convenience and dispatch and by sane, safe manipulation, is capable of adapting itself to each of many therapeutic applications of light, preferably, to all of those enumerated supra.

In carrying out the objectives of the invention, a floor supported pedestal is provided to move freely across the floor on castors; the pedestal supports a vertical, hollow standard on which a carriage is guided in an up and down movement. This carriage in turn provides a horizontal slideway to support an adjustable extension beam. To the

supporting end of this beam is pendantly swiveled a trunnion yoke. To the trunnion yoke is swiveled on a horizontal axis an inverted U-shaped hood within which is mounted the mercury arc tube. Normally the opening of this hood is directed downwardly and its entire mouth is adjustably closable by a pair of interlinked adjustably movable lips. Applicator window structures may be provided in the side wall of the hood or in the wall of one or both of said lips.

All conceivable adjustments are provided by this structure, except for the application of the light rays in a direction substantially upward. For example, the entire lamp stand may be moved bodily on its pedestal against the side of the operating table or couch carrying the patient. The vertically movable carriage may be adjusted up or down to bring the hood to the desired vertical position. A counterweight can cause the entire association of parts proximately supported by this carriage and the carriage itself to be counterweighted. This vertical adjustment can be effected with ease, and, when attained, a still further adjustment of the hood may be accomplished by a swiveling movement of the carriage about its standard. It is possible even to effect both of these adjustments at the same time, namely the up and down adjustment and the swivel. In addition to this adjustment the beam carried by the carriage may with little or no exertion be moved in or out to cause a lesser or greater horizontal separation of the pendant hood from the standard. The lips of the hood may be adjusted to constrict the cross-sectional area of the light beam to be applied to the patient and to shape it from a narrow, elongated rectangle to an area of large dimension in both directions. By a swiveling or single movement of the hood on its trunnion, the angle of the rays of light emerging between the lips of the hood from the source of light may be adjusted to anything desired relatively to the vertical within a wide range of angular adjustment. This swiveling adjustment of the hood on its trunnions may be combined with the swivel of the trunnion yoke upon its vertical supporting stand to effect all

the motions of a universal adjustment about a vertical axis for the emerging light rays.

A further objective advantage in the assemblage of the apparatus is for all of these adjustments to be effected substantially simultaneously and even by a manipulation solely of the hood itself. A further objective advantage is the provision of means for fixing the various parts in any of the various adjusted positions.

Examples of uses requiring complex adjustments made possible solely with apparatus such as that of the present invention, are applications of ultra violet light to the spine of a patient who, by reason of injury or disease, can be supported upon the operating table or couch only in an awkward laterally tilted position. With the apparatus of the present invention, the source of light may be brought to any degree of closeness to the spine of the patient, while the lips of the hood may confine the area affected by the rays to any desired extent on either side of the spine. The limitation may be total exposure, or literally only an inch or two inches, and further, regardless of the awkward position of the patient, the trunnion mounting of the hood permits the entire hood to be swiveled so that the direction of the rays is normal to the back of the patient from the source of light. All this is accomplished without exposing the physician operating the apparatus to any of the light rays.

Again, in vaginal application of ultra violet light, an applicator tube or quartz applicator may be fitted to any one of the windows of the hood. The patient may be placed upon a couch or operating table in any one of the usual positions for treatment of this sort while the lamp assemblage, without the use of auxiliary apparatus, adapts itself, by the usual manipulation, to any one of the positions chosen for the patient.

A further object of the invention is to improve the details of construction of the various parts of such a lamp assemblage, for example, lip control of the mouth of a hood, and a link and lever manipulating mechanism for said lips through the control of a simple knob; the provision of automatic take-ups in the guiding of the beam without requiring precision construction; the provision of simple tilting apparatus for the mercury arc without interfering with the hood construction; maintaining normal position of arc tube for all adjustments; an improved assemblage of transformers, rectifiers, and controlling rheostats wholly back of a plane passing through the vertical standard so as to permit the approach of the standard directly against the side of the patient's couch or operating table.

Another important object of the invention is to effect a substantially universal adjustment as to the position of the source of the

light, and of the direction of the light rays, without the exertion of manual effort, at least directly, to overcome the weight of the parts to be moved. Described differently, all mechanical effort is either limited merely to overcoming negligible friction and inertia, or is effective through such leverage as to require a negligible human exertion.

A further object of the invention is to combine with a current rectifier and a mercury arc lamp, preferably of the quartz type, an automatic timing switch, in such a way that automatic timing or continuous operation under manual control may both be had.

The above and further objects of the invention, together with the means and combinations of means whereby these objects are carried out, will be pointed out more particularly in the following claims, which are directed to the illustrative embodiment of the invention described in the following specification, in connection with the accompanying drawings, solely for the purposes of illustration, and not of limitation.

In the drawings

Fig. 1 is a side elevation of the assembled apparatus of the controller cabinet shown on the opposite side of the standard from that in which it is desirably positioned and with an automatic timer of the type described in the copending application of Albert C. Bell of Chicago, Illinois, combined with the apparatus for the automatic timing of ultra violet light exposure.

Fig. 2 is a plan view, partly in section, and drawn to an enlarged scale, of the elevated part of the apparatus.

Fig. 3 is an enlarged side elevation with parts shown in section, of the parts involving principally the carriage and top of the standard.

Fig. 4 is a cross-section through the line IV—IV of Fig. 3, looking to the right, and particularly in elevation.

Fig. 5 is a section partly in plan, through the locality of the carriage sleeve near the locking device.

Fig. 6 is an enlarged elevation of the hood, viewed from the opposite side from that shown in Fig. 1.

Fig. 7 is a cross-section through the hood, showing the link and lever mechanism for the lips.

Fig. 8 is a cross-section through the hood, showing the tube mechanism, in elevation and drawn to an enlarged scale.

Fig. 9 is a detailed end view of the hood, the view corresponding in position with that shown in Fig. 1.

Fig. 10 is a view of applicator construction suitable for use with the apparatus.

Fig. 11 is a front elevation, cover removed, of the controller cabinet together with its mechanism.

Fig. 12 is a top view of the controller cabinet mechanism, partly shown in section.

Fig. 13 is a top plan of the controller cabinet top;

Fig. 14 is a front diagrammatic elevation of the controller cabinet apparatus, showing the circuit connections.

Fig. 15 is a simplified wiring diagram in which the instrumentalities included in the circuit are indicated diagrammatically, and not as they physically appear, and which corresponds to the diagrammatic showing in Fig. 14.

Fig. 16 is a front elevation, with the cover removed, of the direct current form of controller cabinet in which transformers are not present, but in which rheostats 103, in addition to rheostats 103, are employed; and Fig. 17 is a side elevation of the same.

A pedestal A is anti-frictionally supported upon the floor 1 by anti-friction castors 2, and is preferably of cast iron in the form of a spider, one arm for each castor, and preferably four in number. The central boss 3 mounts the vertical tubular standard B which may be provided with graduations 4 to demark and measure elevation relatively to the floor 1. The controller cabinet C is preferably a self-contained structure semi-circular in cross-section, positioned entirely at one side of the standard B, (so that standard B may be brought to the back-side), and supported from two of the spider legs 5 by forked studs 6, and may be stayed against tilting by bracket arms 7 and 8, through which the standard 4 passes.

Mounted to be guided freely in an up and down movement, together with a rotary movement about the standard 4, is a carriage D, directly to which the counterweighted cord 9 is attached, to balance not only the weight of the carriage but of all the apparatus associated with the carriage. The carriage provides a suitable anti-friction horizontal runway 10, in which the extension beam E works laterally to adjust the physical position of the hood F, which is supported at the patient end 12 of the beam structure E. An important part of the construction is that the hood F is not fixedly and directly mounted upon the end 12 of the beam structure E, but has intermediate the hood and the beam structure, a trunnion yoke G, which yoke is swiveled about a vertical axis through the stud 15, upon the end 12 of the beam structure. In turn, the hood F is trunnion swiveled functionally about a horizontal axis which is always maintained horizontal through the medium of the trunnions 20 and 21. The axis of swivel for the hood is such that a swiveling movement is substantially balanced to require little or no power, but nevertheless, for the dual purpose of maintaining a dead, fixed position of adjustment, and of facilitating the manual effort

to effect a swiveled adjustment of the hood, a gear segment 16, centered about the swiveling axis, is fixed to the hood to cooperate with an operating spur gear driven by the hand wheel 18. This maintenance of the unchangeable horizontal axis for the trunnion swiveling of the hood is effective in maintaining ever present the proper operating position for the source of light which is shown as a quartz mercury arc bulb or tube H, which is mounted freely to swivel by reason of its own pendant gravity advantage upon the horizontal stem 30.

This stem 30 is capped at the end 31 over the inwardly projecting pivot pin 32 in such a way that it is free to rotate on its own axis and also so far as the mounting pin 32 is concerned, to tilt upwardly. Attached to the opposite end of the stem 30 is a flanged guideway 33, taking over the inwardly projecting pin 34 normally to hold the tube H swiveled upon the horizontal axis of the stem 30, but permitting the left-hand end as viewed in Fig. 8 of the stem 30, to be drawn upwardly by the lifting loop 35 a sufficient amount to strike the arc in the tube H. The arcuate contour of the left-hand edges of the flanges of the guideway 33 permit the free upward swing of the stem 30 without interference by the interior of the hood F, and without disengaging the pin 34. As soon, however, as the pull upon the loop 35 has been terminated, the stem 30, with its attached parts, returns to the horizontal, and regardless of the tilting of the hood itself on its trunnions, automatically maintains itself in the desired normal and substantially horizontal position required for proper operation.

The tilting knob 18 for swiveling the hood F, is journaled in the arm 40 on the trunnion yoke G, and it is preferred that the relative sizes of the spur gear 17 and the tooth rack segment 16, and the friction of the stem 41 be such that for any position into which the hood may be swiveled by the knob 18, it is substantially fixed and stationary in that position, that is, without a deliberate urge it will not shift from the position into which it has been tilted by the gear mechanism. If desired, the knob 43 may be fitted with threaded stems to operate as locks for the tilted position of the hood, or it may merely be an operating knob to aid in the tilting of the hood, or in grasping it for adjusting its position in any way.

In the embodiment shown, the knob 43 is threaded in order to fit into flange guideway 33, also to act as a bearing 34 for part 30. The knob 44 at the opposite end of the hood, through its stem 45, functions as a freely turning trunnion to swivel that end of the hood in the arm 46 of trunnion yoke G, and in addition provides the pin 32 for mounting the stem 30 of the light source, and still

further in addition is the manual operating member for working the lever and link mechanism 47, 48, and 49, which parts cooperatively control and effect the movement of the lips 50 and 51 across the mouth of the hood F. The link 49 is pivoted at its end respectively to the side shutter 52 and the side shutter 53 fixed to and at right angles to the lips 50 and 51. The lever 47 is pivoted at one end to the approximate end of the link 48, the opposite end of which is pivoted to the shutter 52 at the same point as the pivot of the link 49. In this way simultaneous closing and opening for the lips 50 and 51 is effected. The lips 50 and 51 are understood to be provided at the opposite end of the hood, with shutters 54 and 55, similar to the shutters 52 and 53. All these shutters are preferably arcuate on their terminal edges, to facilitate opening and closing within the hood.

Window shutters 60 and 61 are shown provided, 60 on the main side wall of the hood F, and 61 in one of the lips namely, the lip 51. As may prove to be convenient, applicators such as are shown in Fig. 10 may be fitted to these window shutters, or the two parts shown in Fig. 10 may be combined into one applicator. These window shutters likewise are convenient for the application of any desired type of applicator such as a quartz applicator. 62 indicates an electric plug and socket structure for supplying the electric connections to the mercury arc, in association with which insulated flexible leads 63 are preferable. In striking the arc to start the tube in operation, all that is necessary is to grasp the projecting ball 64 on the cord 35, and pull it slightly through bushing 64' to lift the stem 30 at one end. The desired amount of tilting is permitted by the arcuate guideway 33, and upon the release of the cord 35, the tube assumes its normal operating axis. This striking of the arc is, of course, independent of whether the lips 50 and 51 have been swung inwardly on their hinges 66 and 67 completely to close the hood or not. It is also to be noted that this tilting arrangement requires no fixed hinging axis for the tilting of the tube, but that the tube is pendant always to maintain itself in the desired normal position by reason of its swiveling on its stem 30, and upon the loop of the cord 35; or, if the guideway 33 is caused to terminate in the proper position, then the top of this guideway may swivel on the pin 34.

The hood F is preferably provided with shielding ventilating apertures 70 on the lower part of its sides, and 71 at the top, the top apertures preferably being shielded by the open ended roof 72.

The extension beam E is preferably formed of two spaced metal bars symmetrical, but on a vertical plane, and provided at one end with the operating handle 73, the bars in their mid extense 74 and 75 being parallel and

working between anti-friction rollers 76 at one horizontal end of the carriage D and similar ones 77 on the opposite horizontal end of the carriage D. The pins 78 which journal these anti-friction rollers extend through from one side to the other of the carriage, but pass through carriage piercings somewhat larger than the pins, so that the rods 74 and 75 can pass between the anti-friction rollers without binding. The turning movement applied to the extension beam E on account of the weight of the hood F at its far end, would normally cause two sides of these anti-friction rollers, the lower ones near the handle of the extension beam, and the upper ones near the hood, to be out of contact with the edges of the bars 74 and 75, so that upon a forcible hand manipulation of the handle 73, there might be a jerk or chattering on account of the lost motion deliberately maintained in the apparatus as an advantage in fitting the parts together, and in standardized quantity production. This possible disadvantage, however, is entirely eliminated by the provision of tension springs 80 and 81, each preferably housed in a tubular casing 82 and 83. These tension springs working directly upon the journal pins for the anti-friction rollers, drag the otherwise out of contact anti-friction rollers into engagement with the bars 74 and 75. This is a refinement of importance in preventing noisy operation in the adjusting of apparatus of this character. The cord 9 of the counterweight which works vertically within the hollow standard B, preferably passes over a guide pulley 86, which is swiveled in the top end of the standard by means of the inverted hollow castor fitting 87, so that it will turn with the turning of the carriage E about the standard. The free end of the cord 9 is preferably secured in a nipple 88 in turn affixed to the housing 83 which is pierced by the anti-friction roller pins 78 and thereby anchored to the carriage E.

The part of the carriage E which works upon the standard is preferably a loose fitting tubular shell 89, riding on the standard at the top on three uniformly spaced anti-friction rollers 90, but at the bottom it is preferred that the positioning of the three anti-friction rollers 91 be reversed so the one in the locality to take the reaction imparted by the overhanging hood F. Opposite to this anti-friction roller is a locking eccentric 92, operable by the lever 93, to fix the carriage in position on the standard, both as to elevation and angular position.

Figs. 11, 12, 13 and 14 clearly illustrate details of the preferred layout making possible a semi-cylindrical controller cabinet, and illustrate suitable apparatus for the use of alternating current. A suitable transformer 100 is bounded at the bottom center, which position gives its weight an advan-

tage in stabilizing the combined apparatus upon the pedestal A. Above the transformer are mounted the rectifier tubes 101, 102. In the central top position is the regulating rheostat 103, where it may project outwardly in the maximum depth position of the controller. A feature of the rheostat is that the control lever 104 directly operates the contact arm 105, the free end of which is fitted with a contact roller 106, adapted for direct contact with the edges 107 of the resistance wire convolutions 108, segregated in a plurality of windings 109, 110, and 111. Line fuse blocks 112 and 113 are appropriately mounted on the inner panel 114 at the top and sides thereof. The on and off switch 115 is preferably located symmetrically with the rheostat controller 104, while intermediate these a voltmeter 116 finds a convenient position.

It is to be understood that the various circuits and connections shown both for the alternating current type and direct current type of the apparatus have been illustrated and described in connection with the apparatus merely for purposes of illustration, and not limitation. In connection with the alternating current type of apparatus, it is to be understood that the cord 63 leading from the controller cabinet supplies the direct current for the quartz mercury arc, and the socket connecting this cord to the lamp is preferably a polarity socket corresponding to the direction of current flow required by the lamp H.

What we claim and desire to secure by United States Letters Patent, is:

1. In therapeutic lamp assembly, in combination a mercury arc bulb; adjustable means for supporting and moving and guiding said bulb bodily up and down in a vertical line, and with a revolving motion about a vertical axis, in any direction in the same horizontal plane and in and out in a horizontal straight line, in a swiveling motion about a vertical axis substantially passing through said bulb, and in any combination of said movements while maintaining it always in a normal operating position relatively to the horizontal; a hood enclosing said bulb, bodily movable therewith and partaking of all its aforesaid movements; and separate means for swiveling said bulb independently of said enclosing hood.

2. In a therapeutic lamp, a trunnion yoke, means for swiveling said yoke in a pendant position about a vertical axis; a hood opening downwardly; trunnions swiveling said hood to said trunnion yoke about a horizontal axis and permitting an adjustable swiveling of said hood; and means for mounting a source of light within said hood to maintain a normal operating position relatively to the horizontal both in the line of said trunnions and cross-wise thereto and

independent of any movement of said hood and including a crosspiece supported by said trunnions independently of said hood.

3. In a therapeutic lamp, a hood having a substantially rectangular cross-section; hinged lips for regulating the opening of said hood, each being hinged along respective opposite edges near the mouth of said hood, said lips opening outwards.

4. The structure as defined in claim 3, further characterized by the fact that there is provided a link and lever mechanism for operating said lips simultaneously.

5. In a therapeutic lamp, a supporting yoke; a hood swiveled to said yoke; a gear sector fixed to said hood with the axis of its gear teeth corresponding to the swiveling axis of said hood; and an operating spur gear journaled on said yoke to cooperate with said gear sector in effecting a swiveling adjustment of said hood relative to said yoke.

6. In a therapeutic lamp structure, an inverted trough-shaped hood; means for swiveling said hood on a horizontal axis; a stem within said hood for mounting a mercury arc bulb; relatively fixed inward projections for supporting said stem independently of the movement of said hood; one end of said stem being provided with a guideway to permit a vertical swing of said stem; a cord looped about said stem and projecting exteriorly through said hood for imparting an arc striking tilt to said stem and permitting its return to normal.

7. In a therapeutic lamp structure, a carriage, a horizontally movable extension beam held in said carriage, two sets of laterally spaced means carrying anti-friction rollers in contact with the top and bottom surfaces of said extension beam, spring means connecting said means for taking up the lost motion of vertically opposite anti-friction rollers whereby a tendency to rattle is avoided in operating said beam.

8. In a therapeutic lamp, a trunnion yoke; means for swiveling said yoke in a pendant position about a vertical axis; a hood opening downwardly; trunnions swiveling said hood to said trunnion yoke about a horizontal axis and permitting an adjustable swiveling of said hood; and means for mounting a source of light within said hood permitting a swiveling movement for said source of light other than the swiveling movement due to the swiveling of said hood on said trunnions.

9. In a therapeutic lamp, a trunnion yoke, means for swiveling said yoke in a pendant position about a vertical axis; a hood opening downwardly; trunnions swiveling said hood to said trunnion yoke about a horizontal axis and permitting an adjustable swiveling of said hood; and means for mounting a source of light within said hood to maintain a normal operating position relatively to the

horizontal both in the line of said trunnions and cross-wise thereto and independent of any movement of said hood.

10. In a therapeutic lamp structure, an
5 inverted trough-shaped hood; means for swiveling said hood on a horizontal axis; means for swiveling said hood about a vertical axis; and a swiveling stem within said hood movably for mounting a mercury arc bulb.

10 In witness whereof, we have hereunto set our hands this 31st day of December, one thousand nine hundred and twenty-seven.

JACQUES W. D. CHESNEY.
15 HECTOR P. MacLAGAN.

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