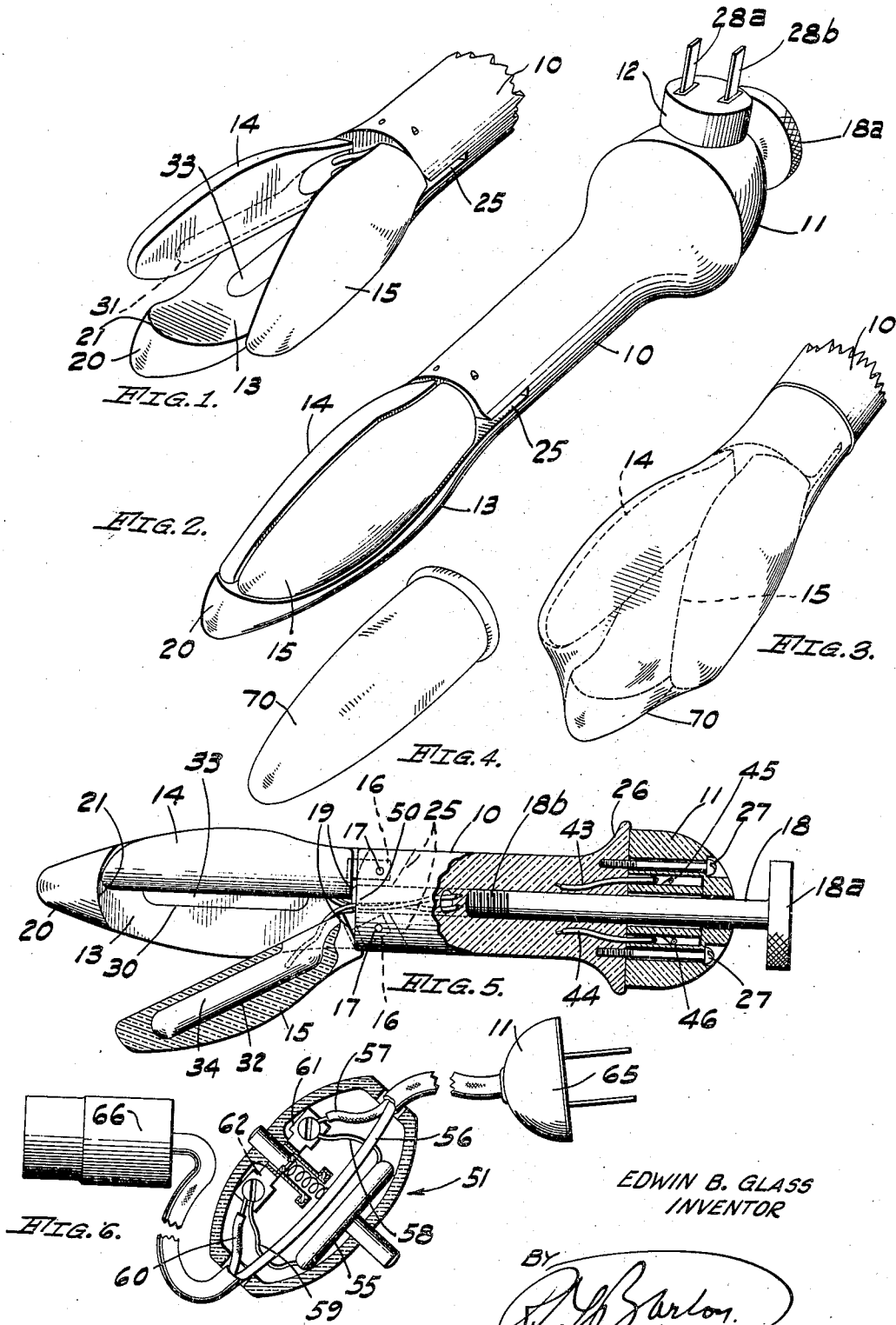


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RECTAL ELECTRODE

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This invention relates to an instrument for treating the prostate gland by electrically applying heat thereto.

Certain abnormal conditions of the prostate gland can be corrected by causing an increase of the blood supply to the organ. This instrument is adapted to electrically apply heat to the prostate gland, thereby creating in it an active hyperemia in order that the increased amount of blood thus caused to circulate through the organ may improve its condition.

It is an object of this invention to provide an instrument capable of easy insertion into the lower portion of the rectum and at the same time having relatively movable electrically heated parts which, while the instrument is in its inserted position in the rectum, are capable of being positioned by adjustment in a superior manner, for more effectively applying to the prostate gland beneficial, electrically produced heat.

Another object of the invention is to provide, in combination with said adjustable parts of the instrument a covering member of an elastic character which will act in opposition to means for mechanically separating or expanding the heating parts of the instrument so as to furnish a simplified means for regulating, as desired, the extent of the expansion of the parts for applying the heat to the gland, as aforesaid.

Other objects and advantages of the invention relate to the provision of a more easily sterilized instrument for the purpose stated, to safeguard against causing any electric shock to the patient during treatment, and to apply the heat from the instrument to the prostate gland in a more direct and effective manner.

Speaking more specifically, it is another object of the invention to provide, in an instrument for treating the prostate gland, an arrangement of parts which may be adjusted in such a manner, after insertion into the rectum, as to form a seat or nest for said gland, the nest-forming parts being heated in such a manner as to more effectively apply the heat to all those portions of the gland to which access may be had from within the rectum.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a perspective view of the applicator portion of the instrument showing the adjustable parts in an expanded condition, the covering envelope being omitted and the shank or handle

portion being mostly broken away, in order to contract the view.

Fig. 2 is a perspective view of the complete instrument, except that the elastic covering or envelope is absent. In this view the applicator portion of the instrument is shown in the closed or contracted condition.

Fig. 3 is a view like Fig. 1 except that the elastic envelope is in place, the outlines of the parts covered by said envelope being indicated by dotted lines.

Fig. 4 is a perspective view of the elastic envelope, separately shown.

Fig. 5 is a view showing the instrument partly in plan and partly in longitudinal midsection, the elastic envelope being omitted and one of the adjustable applicator arms being shown in a fully deflected or widely opened position.

Fig. 6 is a sectional view of the electric switch and includes parts electrically connected therewith, parts of the flexible conductors being broken away to contract the view.

Referring in detail to the drawing, the main parts of the instrument are the elongated, generally cylindrical body 10 having secured to its outer (when inserted) end a head 11 furnished laterally with a current intake extension 12, said body having at its opposite end a longitudinal, fixed extension or basal arm 13 which is mainly located at one side of the produced axis of said body, a pair of swingable arms 14 and 15 each of which has at its attached end an offset flattened extension 16 fastened by a pivot pin 17 to said body 10 adjacent to the juncture of the fixed arm 13 with said body, and a manually rotatable shaft 18 having a screw threaded connection with an axial bore provided therefor in the body 10, the inner end portion of said shaft acting as a follower against shoulder portions 19 of the arms 14 and 15 to swing said arms farther apart.

The fixed arm or extension 13 serves as a guide and stabilizer for the swingable arms 14 and 15 with which it cooperates, and therefore said arm 13 may be termed the basal arm of the group of three arms all of which cooperate to convey the desired amount of heat to the prostate gland.

Said fixed extension or basal arm 13 has a bluntly tapered terminal portion 20 furnished with a lateral rise or shoulder 21 which extends laterally beyond the line of the axis of the body 10 of the instrument; that is to say, if the axial line of the body 10 were to be produced it would pass through said shoulder. Owing to its shape and position said terminal portion 20 of said extension 13 is adapted to serve as a pilot or guide

which aids the operator in directing the instrument into the rectal canal. When the instrument is in its inserted position the basal arm 13 stabilizes the applicator portion of the instrument enabling the operator to contact the prostate with a steady pressure of the desired amount.

In cross section, the extension 13 is of a semi-circular shape throughout its length up to a point adjacent to its shoulder 21, thus providing a flat face across which the flat under sides of the swingable arms 14 and 15 may glide during their swinging movements. The pivoted end portions of said arms 14 and 15 are always in a position to rest to a substantial extent upon the upper surface of the extension 13, because said arms need not be arranged to swing outwardly any farther than indicated by the position of the arm 15 in Fig. 5.

The body portion of the instrument, adjacent to its juncture with the basal arm 13, is provided on each side with a transverse slot 25, and the extensions 16, whereby the swingable arms are pivotally mounted, are loosely fitted within these two slots 25. The operating shaft 18 is furnished with an operating head 18a. Said swingable arms, when in their inswung positions, combine with the basal arm 13 to form a bluntly or roundly pointed body shaped as a somewhat slender ovoid for a considerable distance adjacent to its extremity, and therefore easily insertable into the rectum.

The body 10 of the instrument is shown furnished at its flattened outer end with a peripherally extended portion 26, and to this end of the instrument is secured the head 11 which has already been mentioned. Said head is of an approximately hemispherical shape and, by screws 27, is secured to said body in axial alignment therewith and with its flat face abutting against the flat end portion of said body. Said head 11 carries current-receiving extension 12 furnished with terminals 28a and 28b.

The instrument arms 13, 14 and 15, the body 10 and the head 11 are all preferably made of a rubber-like composition such as "Bakelite". The screw threads 18b of the metal shaft 18 may cooperate with screw threads made in the Bakelite around the bore which receives said shaft.

The basal arm 13 is furnished along the mid-width of the greater portion of its length with a rather spacious recess or groove 30, and the arms 14 and 15 are likewise provided, in their lower, flat faces, with spacious grooves 31 and 32. Each of these three grooves contains an electric heating element which need not be described in detail as it may be of any preferred well known kind. Two of these elements are lettered, the one in the basal arm 13 being designated 33 and the one in the arm 15 being designated 34, it being understood that the construction in the arm 14 is the same as in the arm 15.

Wires 43, 44, 45 and 46 are provided to convey the current to the three heating elements which have been mentioned. In Fig. 5 the wires 43 and 44 are broken away in order to disclose the shaft 18 between them. The wires 45 and 46 pass under the shaft and connect to the element 33. Wires 43 and 45 connect with the terminal 28a (Fig. 2) and the wires 44 and 46 connect to the terminal 28b. Wires 43 and 44 are both forked at the point designated 50 in Fig. 5, so that a lead from each passes into each heating element.

The switch 51 shown in Fig. 6 is a regular "on and off" switch, but a resistance unit 55 is con-

nected in, as shown, thus making the switch a means of turning more or less current into the heating elements. If the switch is "off" part of the current passes through the lead 56 and the remainder through the leads 57 and 53, resistance unit 55, leads 59 and 60. Leads 57, 58, 59 and 60 are in series. If the switch is "on" the current passes through lead 56 as before, but now it mainly travels from lead 57 through the arms 61, 62 and the lead 60, this circuit having much less resistance than the circuit through the resistance unit 55. Even when the switch is "on" some current passes through said unit 55.

The remaining details of the switch 51 will not be minutely described as the construction of said switch is of a conventional kind. Said switch is furnished with a plug-in attachment 65 to connect with a current supply and with a current delivery attachment 66 connectable with the terminals 28a and 28b (Fig. 2).

Before the instrument is inserted into the rectum the portion thereof to be inserted is enveloped in a sack 70 (Fig. 3) of sheet rubber, the swingable arms 14 and 15 being at this time in their inswung positions. Owing to its elastic character said rubber sheet will yieldingly oppose the outward swing which the operator will give to said arms after the instrument is inserted preparatory to applying the instrument to the prostate gland.

The space between the outswung arms 14 and 15, bounded at its outer end by the shoulder 21 of the basal arm 30, is of a triangular character and, in combination with the applied rubber sheet 70 forms a comfortably lined nest for the prostate gland when the instrument is in its operative position. In this position the three electrically heated arms 13, 14 and 15 are brought snugly up against the prostate, it being understood that the operator will rotatably adjust the screw-threaded shaft 18 to spread the arms 14 and 15 apart whatever distance may be necessary to fit the instrument over the accessible portion of the prostate of the patient being treated, the instrument thus being adapted for accommodation to prostate glands greatly varying in size.

The rubber envelope 70 may be removed, cleaned and sterilized more easily than the entire instrument itself, if used without the shield afforded by said envelope.

The rubber sheet 70, in addition to serving as an automatic retracting means for the swingable arms 14 and 15, safeguards against any electric shock being given to the patient from possible contact of tissue with the electric heating elements. Said sheet also keeps all fecal matter out of the applicator portion of the instrument. Besides these useful functions said sheet safeguards against any hemorrhoidal projection or intestinal fold becoming pinched between the swingable arms when they are swung in preparatory to withdrawing the instrument after the heat has been applied to the prostate for the desired length of time.

As is well known to physicians, the prostate lies in the pelvis in contact with the anterior or front surface of the rectum. The normal gland is about one and one-half inches wide at the base and its posterior or back surface (the portion which is accessible for treatment) is in the shape of a triangle with its apex directed downward. Hence, when the instrument provided by this invention is applied to the prostate according to the foregoing instructions, the instrument fits the gland well, the broadest part of

the gland nesting between the most divergent parts of the swingable arms 14 and 15 and the apex of the gland occupying the narrower space nearer the pivoted ends of said arms. In other words, the two swingable arms of the instrument may be spread out to form, in combination with the fixed portions thereof, a triangularly shaped nest corresponding closely to the space occupied by the two lateral lobes of the prostate, to which the heat is to be applied.

The spreading apart of the swingable arms also has the effect of retaining the inserted instrument in its proper operative position.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What is claimed is:

1. In a treating instrument of the kind described, an elongated partly semicircularly shaped body having at one end a longitudinal, fixed extension which is mainly located at one side of the produced axis of said body, a pair of arms jointly providing a semicircularly shaped body swingably connected with the instrument adjacent to the juncture of said fixed extension with said body, said arms also each having a shoulder portion spaced somewhat away from its pivotal mounting, means to adjustably swing said arms apart to the desired extent and mechanically maintain them in such outswung position, said means comprising a manually rotatable shaft extending longitudinally within said body and having a screw threaded connection therewith and an end portion acting as a follower against said shoulder portions of said arms to swing the latter farther apart, the under side flat faces of said arms and extension being contiguous, there being a groove in the flat face of said extension along the mid-width thereof across which the flat under sides of said swinging arms glide in their swinging movements, an electrical heating element in said groove, and means to electrically heat said heating element while the instrument is inserted in a human rectum.

2. The subject matter of claim 1 and, an elastic sheet enveloping said arms, said sheet offering a yieldable opposition to their aforesaid outward swinging whereby to contract said arms when the shaft is rotated in a direction to relieve its contact with said shoulder portions.

3. In a treating instrument of the kind described, an elongated body having at one end a longitudinal, fixed extension which is mainly located at one side of the produced axis of said body, a pair of arms swingably connected with the instrument adjacent to the juncture of said fixed extension with said body, said arms also each having a shoulder portion spaced somewhat away from its pivotal mounting, means to adjustably swing said arms apart to the desired extent and mechanically maintain them in such outswung position, said means comprising a manually rotatable shaft extending longitudinally within said body and having a screw-threaded connection therewith, and an end portion acting as a follower against said shoulder portions of said arms to swing the latter farther apart, an elastic sheet enveloping said arms, and means to electrically heat said arms while the instrument is expanded while inserted in a human rectum, said shaft being operable to relieve opposition to inswinging of said arms under the urge of said sheet and the human tissues distended thereby,

said extension having a bluntly tapered rise in its outer end portion, which projects beyond the produced axis of said body, said rise forming an abutment in advance of the outer end portions of said arms when the latter are in their inswung positions and serving as a pilot to aid the operator in directing the instrument in the rectal canal.

4. In an instrument of the kind described having a portion insertable in the body of a patient, a plurality of swingable arms carried by said insertable portion of the instrument, means comprising electrical heating elements located in the contiguous faces of said arms to maintain said arms heated while the instrument is inserted, means to swing said arms into a diverging relation to each other and maintain them in their outswung positions, said means comprising a manually rotatable shaft extending longitudinally within said instrument and having a screw-threaded connection therewith, and an end portion acting as a follower against said arms to swing them farther apart, and a sheet of elastic material enveloping said arms and offering yieldable opposition to swinging them apart, a portion of said heating means also heating by the heat of convection a portion of said sheet which is exposed thereto in the regions between said arms in their diverging relation.

5. In an instrument of the kind described having a body portion, a basal arm constituting a fixed elongation of said body portion, said arm having a semi-cylindrical portion, the flat lateral surface of which is approximately in alignment with the axis of said body portion, there being a groove in said lateral surface along the mid-width thereof, an electrical heating element located in said groove, a pair of outwardly swingable arms pivoted to the instrument, the swinging movements of which are both in a plane substantially parallel to said flat surface of said basal arm, said arms also each having a shoulder portion spaced somewhat away from its pivotal mounting and a flat underside which glides across the flat lateral face of said basal arm, there being also a groove in each of the flat underside faces of said swingable arms, an electric heating element located in each of the latter grooves, said basal arm having an outer end portion which is rounded and tapered to give it penetrability and which is offset to such a position that it cooperates with the other arms, when the latter are sufficiently outswung, to form a triangularly shaped pocket in which the prostate gland of a patient may be nested, means carried by the instrument to swing the arms of said pair outwardly, said means comprising a manually rotatable shaft extending longitudinally within said body and having a screw-threaded connection therewith, and an end portion acting as a follower against said arms to swing them farther apart, and an elastic envelope surrounding all of said arms and forming a lining for the nest for the prostate gland.

6. The subject matter of claim 5 and, said envelope being of insulating material and said heating elements being connected by wiring to electrically heat them.

7. An instrument of the kind described having an elongated body portion and a basal arm projecting longitudinally from an end portion of said body, said arm being of a semi-cylindrical character adjacent to its juncture with said body at which place said body is provided on each side with a transverse slot, said slots extending in approximately the same plane as the flat face of the adjacent semi-cylindrical arm, two swingable

arms to cooperate with said basal arm to provide an extended surface for engagement with the prostate, said swingable arms each having a flattened attaching portion operating in one of said slots and therein pivotally fastened, said swingable arms also each having a shoulder portion spaced somewhat away from its pivotal mounting, a manually rotatable shaft extending longitudinally within said body and having a screw-

threaded connection therewith and an end portion abutable against said shoulder portions of said arms to swing the latter apart, and yielding means tending to maintain said swingable arms in their inswung positions.

8. The subject matter of claim 7 and, said yielding means consisting of a rubber sheet which envelopes all of said arms.

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