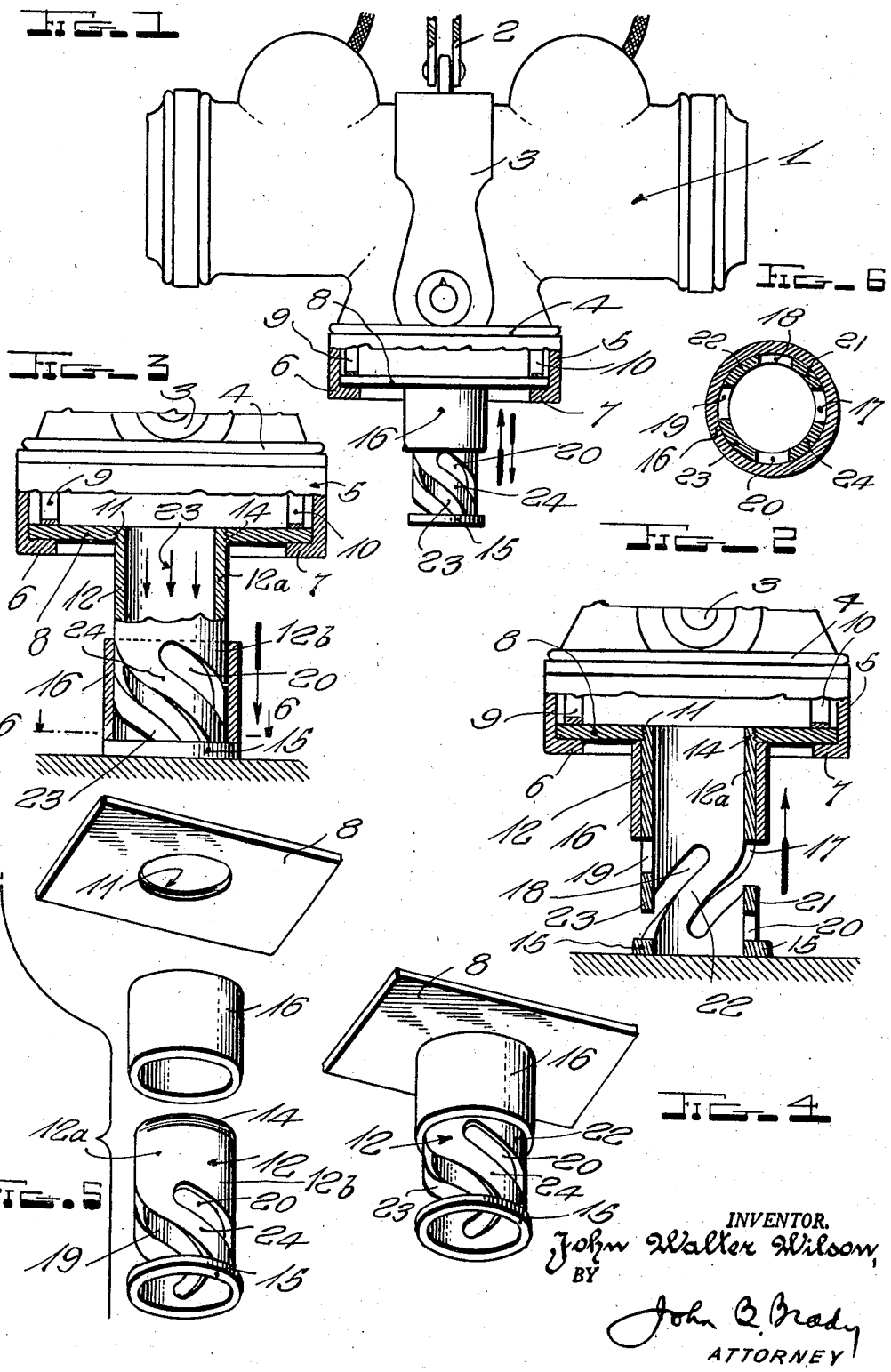
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X-RAY APPLICATOR

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X-RAY APPLICATOR

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My invention relates broadly to X-ray systems and more particularly to an improved construction of applicator for X-ray equipment.

One of the objects of my invention is to provide a construction of improved applicator for X-ray equipment for confining X-ray emanations to a desired area in the treatment of various skin diseases, lesions, tissue, tumors, cancers, etc.

Another object of my invention is to provide a construction of applicator for confining a beam of X-rays to a predetermined area and preventing radiation thereof to any part of the body of the patient under treatment where such X-rays might produce detrimental effects.

Another object of my invention is to provide a construction of applicator tube for X-ray equipment having viewing apertures therethrough which are normally closed to form a metallic barrier or shield for the X-rays but which may be opened to permit the viewing and the centering of the applicator on the lesion in the process of preparing the patient for treatment.

Still another object of my invention is to provide a construction of applicator for X-rays comprising a metallic tubular shield or barrier having spirally arranged viewing slots formed therein and closable by an adjustable collar and shield or barrier to permit the viewing of the lesion when the collar is raised to one limiting position and to complete the radiation shielding when the collar is adjusted to the opposite limiting position.

Other and further objects of my invention reside in the construction of applicator for X-rays as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 shows the X-ray applicator of my invention mounted in position with respect to the casing of the X-ray tube suitably suspended on a balanced supporting mechanism for movement over an operating table to the desired position on the body of the patient to be treated; Fig. 2 is an enlarged cross sectional view taken through the applicator and illustrating the position of the adjustable metallic shield or barrier raised with respect to the apertured applicator for permitting the viewing of the lesions through the applicator while the applicator is being adjusted in position with respect to the patient; Fig. 3 is a view of the applicator with the adjustable collar or shield lowered to position covering the viewing apertures in the applicator and preventing undesired or uncontrolled radiation of the X-rays; Fig. 4

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is a perspective view of the assembled applicator with the collar or adjustable shield raised to a position uncovering the apertures in the side walls of the applicator tube and permitting the viewing of the lesion when the X-ray equipment is being adjusted in position with respect to the body of the patient; Fig. 5 illustrates the parts of the X-ray applicator in perspective view in disassembled relation and showing the manner in which the parts interengage; and Fig. 6 is a transverse sectional view taken on line 6—6 of Fig. 3.

Referring to the drawings in detail, reference character 1 designates the casing of an X-ray tube which is supported by a balanced arm mechanism represented at 2 which permits the X-ray tube casing to be moved to a desired position over an operating table for locating the particular area of the body of the patient to be treated. The X-ray tube casing 1 is suspended from the balanced arm or bracket 2 by means of the supporting member 3 which terminates at diametrically opposite sides of the radiation aperture 4 of the casing. The radiation aperture 4 is provided with a depending frame 5 terminating in a pair of inwardly directed parallel extending rails 6 and 7. The rails 6 and 7 serve as supports for the plate 8 which is detachably slidable thereon and is yieldably maintained in position with respect thereto by means of flat spring members 9 and 10. The flat spring members 9 and 10 are interposed between the interior of the top of the frame 5 immediately below the X-ray radiation aperture 4 and continuously urge the transversely shiftable metal plate 8 into sliding engagement with the parallel extending rails 6 and 7, facilitating insertion and removal of the metal plate 8 while maintaining a light tight and X-ray radiation tight joint between plate 8 and the frame 5.

The detachable metal plate 8 is centrally apertured and screw threaded as represented at 11 for receiving the cylindrical X-ray shield or metallic applicator tube 12. The cylindrical applicator X-ray shield or metallic tube 12 is screw threaded at the end 14 thereof to engage the screw threads 11 in plate 8. The other end of the X-ray shield or metallic applicator tube 12 is provided with a transversely extending flange 15. The flange 15 serves as a limit stop for the collar or X-ray shield or metallic barrier represented at 16 which is adjustable over the cylindrical applicator tube 12. The opposite limit stop for the collar 16 is the under surface of the plate 8.

The metallic applicator tube or X-ray shield

12 is provided with a plurality of spirally arranged apertures which I have represented at 17, 18, and 19, and 20. The spiral apertures are interconnected by solid spiral web portions represented at 21, 22, 23, and 24, which are substantially of the same width as the width of the spirally arranged apertures. The spirally arranged apertures form viewing or sighting windows through which the lesion may be viewed as the applicator tube is adjusted in position preparatory to an X-ray treatment. During this adjustment and while viewing the lesion through the apertures 17, 18, 19, and 20, the X-ray shield or metallic collar 16 is maintained in an elevated position as represented in Figs. 1, 2, and 4. The shield 16, when in elevated position, is coincident with the solid portion 12a of the applicator tube 12 while when permitted to drop by gravity to the shielding position illustrated in Fig. 3, the shield entirely encloses the apertures 17, 18, 19 and 20 and surrounds the area 12b, preventing loss by transverse radiation of the X-ray emanations indicated as directed through the applicator tube 12 by arrows 23 in Fig. 3.

The metallic tube 12 constituting the applicator and the adjustable collar 16 constituting the applicator adjustable shield, each form barriers to the emanations of X-rays, transversely of the axis of the applicator 12. The tube 12 and collar 16 may be formed from brass or lead or other metal constituting a barrier or shield to X-rays. The four spirally arranged slots or apertures 17, 18, 19 and 20, when uncovered by collar 16 in the position shown in Figs. 1, 2 and 4, permit a complete view of the area of skin to which the tube is applied. The spiral viewing slots are so arranged that no X-radiation can strike the patient, even though the secondary closure tube 16 is omitted. The rays originate at the focal point of the tube (5½ inches above the lower opening of the applicator) and radiate downward over a roughly hemispherical area. All rays are stopped except those occupying space represented by a cone whose base is equal to the lower opening of the applicator tube and whose apex is 5½ inches vertically away. The rays thus approach the spiral slots 17, 18, 19 and 20 at such an acute angle that with appropriate thickness of the wall of the applicator tube they do not emerge but impinge on the lower edge of the spiral slot. Thus none of the original X-rays emerge through such properly selected openings.

Whenever X-rays are stopped by any material, secondary rays are produced. Such rays are soft and much less penetrating and powerful than the incident ray; when brass is used they offer little if any danger to the patient. Such rays as these do emerge from these slots, but none are directed so as to strike the patient, but travel laterally and back toward the tube only. To those unfamiliar with X-ray physics, these rays may be erroneously considered sufficiently dangerous to the operator to need protection. It is for this reason that the secondary sliding tube 16 to close the slots was designed. The operator should really afford himself much more than this protection since even the patient generates soft secondary X-rays while being treated. This sliding tube 16 also may be desirable when treating lesions within the mouth or in other concave areas of patients where some of the lateral radiation might be considered objectionable.

By a slight movement of the head of the attendant the entire area of skin inside the end of the tube 12 can be clearly viewed and the applicator can thus be quickly and accurately positioned. The long pitch of the spiral slots 17, 18, 19 and 20 around the tubes is such that no direct X-ray radiation takes place through the slots. The thickness of the tubes and the width of the web of the metallic tube 12 between the slots forms a direct metallic barrier to any such radiation. This has been tested photographically. A complete set of these applicators run from tubes of ¼" to 3" in diameter for treating various sized lesions.

I desire that it be understood that the principles of my invention may be employed without the addition of the sliding or adjustable tube 16 for, as I have hereinbefore pointed out, it is not essential that the viewing apertures always be closed to eliminate excessive radiation.

While I have described my invention in its preferred embodiment, which is a form that has proven highly successful in use, I realize that modification of the construction may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. An applicator for X-rays comprising a tubular X-ray shield for confining X-rays directed upon a lesion, said shield having the wall thereof provided with spirally arranged apertures to form sighting openings for viewing the lesion and an adjustable collar constituting an X-ray shield for normally covering the sighting openings and longitudinally slidable on said tubular X-ray shield for uncovering the sighting opening for permitting the visual centering of said tubular X-ray shield upon the lesion.

2. An applicator for X-rays comprising a tubular shield for confining X-rays to a predetermined area, a multiplicity of spirally disposed apertures in the wall of said tubular shield, an X-ray shield collar slidable over said tubular shield and operative to normally cover said spirally disposed apertures and movable to a position uncovering said apertures for permitting a view of the lesion over which said tubular shield is locatable.

3. An applicator for X-rays comprising a tubular shield for confining X-rays to a predetermined area, an enlarged flange on one end of said tubular shield, a supporting plate connected with the other end of said tubular shield, said tubular shield having a solid cyclindrical wall portion adjacent said supporting plate, and a spirally apertured cylindrical wall portion adjacent said enlarged flange and an X-ray shield collar slidable over said tubular shield and movable from a position covering the spirally apertured portion of said tubular shield to a position adjacent the solid portion of said tubular shield for sighting the lesion over which said tubular shield may be centered through the spirally apertured portion of said tubular shield.

4. An applicator for X-rays comprising a tubular shield for confining X-rays to a predetermined area, a multiplicity of spirally disposed apertures in the wall of said tubular shield with X-ray shielding webs therebetween, an X-ray shield collar movable over said tubular shield and operative to normally cover the spirally disposed apertures in said tubular shield and movable to a position uncovering said apertures for permitting a view of the lesion over which said tubular shield is centered.

5. An applicator for X-rays comprising a tubular shield for confining X-rays to a predetermined area, a supporting plate on the upper end of said tubular shield, a flange on the lower end of said shield, the portion of said tubular shield adjacent said flange having an alternate solid and apertured wall section for providing viewing apertures interconnected by shielding webs and the portion of said tubular shield adjacent said supporting plate being solid, and an X-ray shield collar surrounding said tubular shield and operative to drop gravitationally to a position limited by said flange for covering said viewing apertures and movable to an elevated position limited by said supporting plate for uncovering said apertures for permitting the viewing of a lesion over which said tubular shield may be centered.

6. An applicator for X-rays comprising a tubular X-ray shield for confining X-rays directed upon a lesion, the wall of said tubular X-ray shield being impervious to X-rays and being apertured in sighting positions to permit lateral observation of a lesion while being treated with X-rays.

7. An applicator for X-rays comprising a tubular X-ray shield for confining X-rays directed upon a lesion, the wall of said tubular X-ray shield being impervious to X-rays but being spirally apertured in a multiplicity of positions around the tubular X-ray shield to permit lateral observation of a lesion while being treated with X-rays.

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