

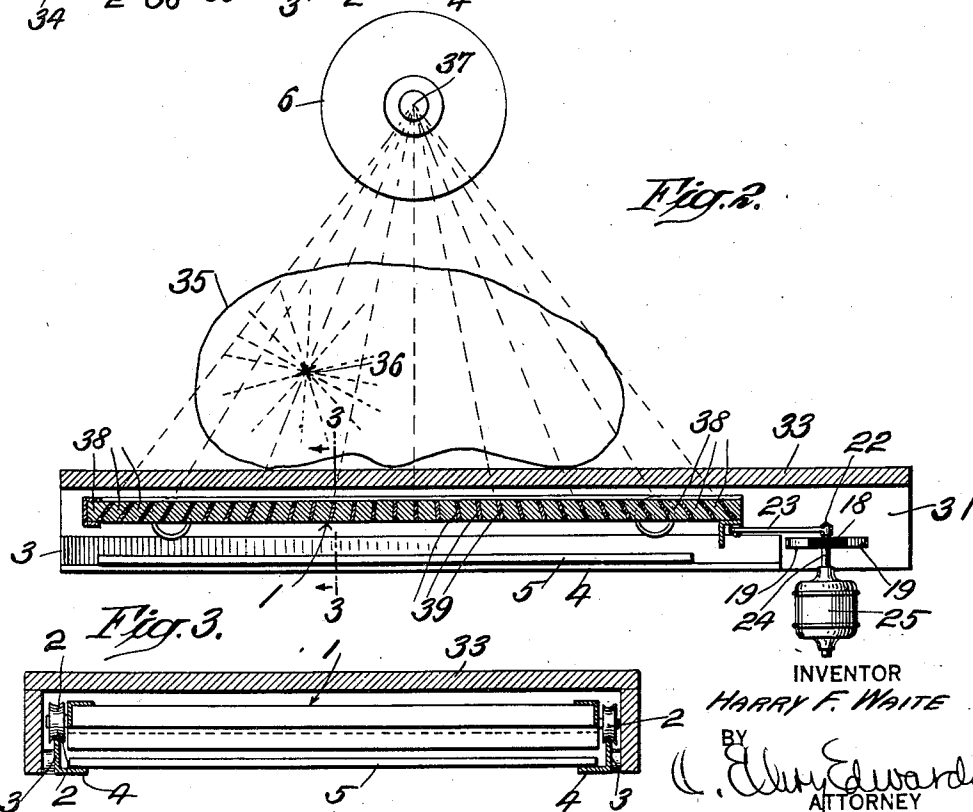
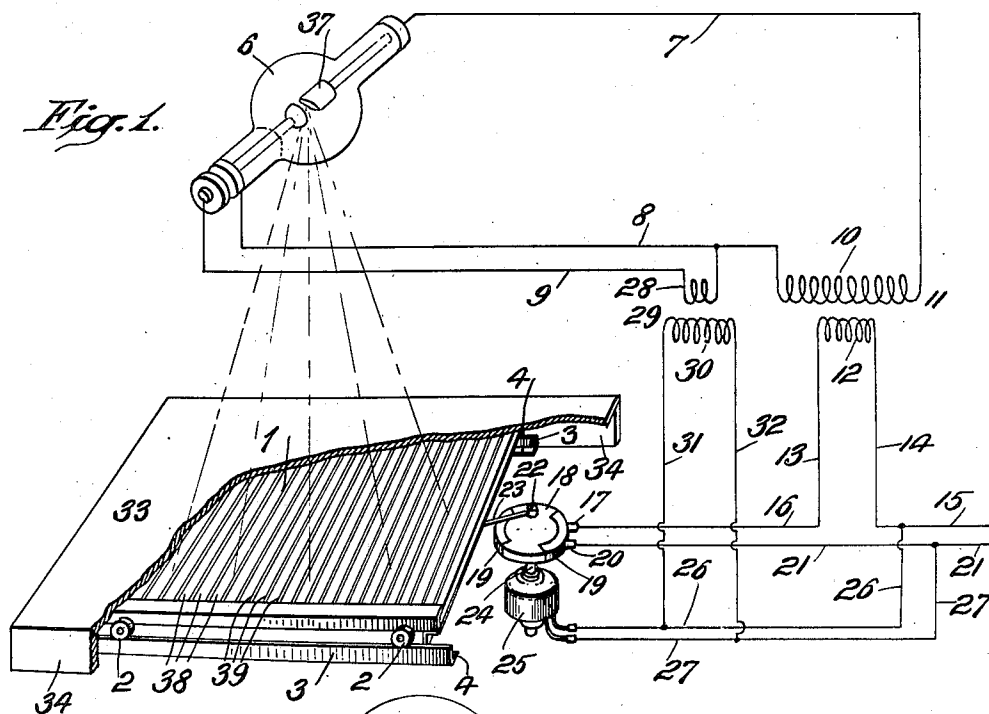
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VIBRATING BUCKEY DIAPHRAGM FOR SCATTERED X-RAY RADIATION

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UNITED STATES PATENT OFFICE.

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VIBRATING BUCKEY DIAPHRAGM FOR SCATTERED X-RAY RADIATION.

Application filed September 28, 1921. Serial No. 503,947.

To all whom it may concern:

Be it known that I, HARRY F. WAITE, a citizen of the United States, and a resident of the city of New York, county of Queens, and State of New York, have invented a new and useful Improvement in Vibrating Buckey Diaphragms for Scattered X-Ray Radiation, of which the following is a specification.

The object of my invention is to nullify the effect of secondary radiations and stray rays so that when a radiograph is made with the use of my device it will be clear and sharply defined and free from all blurring. This and other objects are accomplished by my invention, one embodiment of which is hereafter more particularly set forth.

For a more detailed description of my invention, reference is to be had to the accompanying drawings, forming a part hereof, in which

Figure 1 is a diagrammatic and perspective view of my device.

Figure 2 is a longitudinal section of the same with the wiring omitted, and

Figure 3 is a transverse section taken on the line 3—3 of Figure 2, looking in the direction of the arrows.

Throughout the various views of the drawings, similar reference characters designate similar parts.

My improved diaphragm 1 is provided with rollers or other suitable devices 2 which run on rails 3, which rails have inwardly extending flanges 4 to receive and support a cassette 5 in which is mounted a sensitive medium, as a plate or a film which is adapted to receive the X-rays in the conventional manner, which rays are generated by any suitable generator as a hot cathode tube 6 which is supplied with three lead in wires 7, 8 and 9 respectively. The wires 7 and 8 run to the secondary 10 of a step up transformer 11 and the primary 12 of this transformer is connected in the conventional manner with a suitable source of energy through wires 13 and 14, this latter wire running to a wire 15 which is connected to an alternating current generator, not shown, or any other source of supply, and the wire 13 runs to a wire 16 which is connected to a brush 17 that runs on the rotating switch 18 which is so arranged and disposed that twice in each revolution the brush 17 will be on a contact 19 of the switch and when so on the contact will be connected to a second brush 20 at

the end of a wire 21 which runs to the same source of supply as does the wire 15. The switch 18 is provided with a crank pin 22 and a link 23 which is connected to the diaphragm 1 so that this diaphragm will reciprocate and the parts are so arranged and disposed that the diaphragm will reciprocate while the brushes 17 and 20 are connected through the contacts 19 and not otherwise. The switch 18 is preferably placed at the upper end of the armature shaft 24 of the motor 25 which has its leads in wires 26 and 27 connected to the wires 15 and 21, as shown.

The wires 8 and 9 which supply the current for heating the hot cathode run to the secondary 28 of the step down transformer 29 which has its primary 30 connected by wires 31 and 32 to the wires 26 and 27, respectively, as shown. From this it is apparent that the transformer 11 will be energized only when the brushes 17 and 20 are electrically connected and the transformer 29 will be energized at all times when the apparatus is in use so that the cathode will not cool in the tube 6.

The switch 18, the motor 25 and the diaphragm 1 and their connected parts are preferably concealed beneath the protecting cover 33 and between the depending sides 34. The top 33 may carry a body 35 through which the radiograph is taken, and this body may contain a part 36 which will set up secondary radiations. These secondary radiations will blur the radiograph and make the same difficult to read or may seriously "fog" the same. To overcome this difficulty, in addition to making the diaphragm 1 reciprocate, it is made in a peculiar manner which will now be described. Assuming that the tube 6 has an anode or target 37 which generates X-rays which pass from the tube 6 along radial lines and thereby cause secondary rays from a part 36, it is apparent that these secondary radiations will be propagated in radial lines from the object 36 and not from the target 37. Now the diaphragm 1 is made up of wood and lead strips, the wood strips being designated 38 and the lead 39 so that when the X-rays strike the diaphragm they will pass through the wooden strips and hit the metal strips edge on so that the metal strips will present a minimum interference with the X-rays which proceed from the target. On the other hand, they will give a maximum obstruction

to the secondary X-rays which are generated from the part 36, only a few of which will get by the strips 39 and through the strips 38 so that the "fogging" or injury to the radiograph will be a minimum. If the screen 1 were fixed in position, the radiograph would be objectionable because it would have lines running across the same. This difficulty is overcome by causing the diaphragm 1 to reciprocate rapidly under the influence of the motor 25 by which it is driven through the switch 18 and link 23. As this movement is short the strips 38 will offer a very limited interference with the X-rays generated by the target 37.

It will be observed that the table or top 33 is flat so that the object 35 can rest thereon easily and comfortably. It will also be noted that the diaphragm 1 is flat and so is the cassette 5 so that all parts may be used in the conventional manner with the results above noted and no change is required in the cassette or the radiograph.

In view of the foregoing, the operation of my improved diaphragm will be readily understood, assuming that the cassette with its plate or film is in position, as indicated, and that X-rays are generated in the conventional manner. This being the case the motor 25 will run continuously and drive the switch 18 with a constant rotary motion, and the diaphragm 1 will reciprocate to correspond. While it reciprocates X-rays will be generated through a limited part of its movement and not while it is at rest so that the person making the radiograph need give the diaphragm no consideration whatsoever as it automatically acts as it should act so as to screen the radiograph and eliminate the undesirable secondary radiations and yet not mar the radiograph with lines due to the metal laminae 39.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto, but that it is broad enough to cover all structures that come within the scope of the annexed claims.

What I claim is:

1. In a system of the class described, means for generating primary X-rays, means for recording X-rays, movable, repeatedly reciprocating means for eliminating said secondary X-rays and not obstructing said primary X-rays and a rotary switch for preventing the generation of said primary X-rays when the moving, eliminating means is at rest.

2. In a system of the class described, means for generating X-rays, a laminated diaphragm and means for repeatedly reciprocating the same containing in its construction a switch and contacts, this switch and contacts being so arranged and disposed and connected to the reciprocating means so that a circuit is opened when the diaphragm is at rest at and about the time it changes its direction of movement.

3. In an X-ray system of the class described, rotating segments with fixed contacts adapted to bear on the same so that said contacts will be connected twice in each revolution of the disc and disconnected twice, a diaphragm and means for mounting the same so that it may be reciprocated, a crank pin on the switch between the contacts and a link connecting the crank pin and the diaphragm so that there will be no electrical connection between the contacts while the diaphragm is at rest or nearly at rest at the ends of its movement.

In testimony whereof, I have hereunto set my hand this 17th day of September, 1921.

HARRY F. WAITE.