United States Patent

Brackenbrough et al.

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[54] ADJUSTABLE RADIATION SHIELD

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[52] **U.S. Cl.** .....**250/108 R,** 250/86, 250/105, 250/108 FS

[51] **Int. Cl.**.....**G21f 3/00**

[58] **Field of Search**.....250/86, 105, 108 R, 108 FS

[56] **References Cited**

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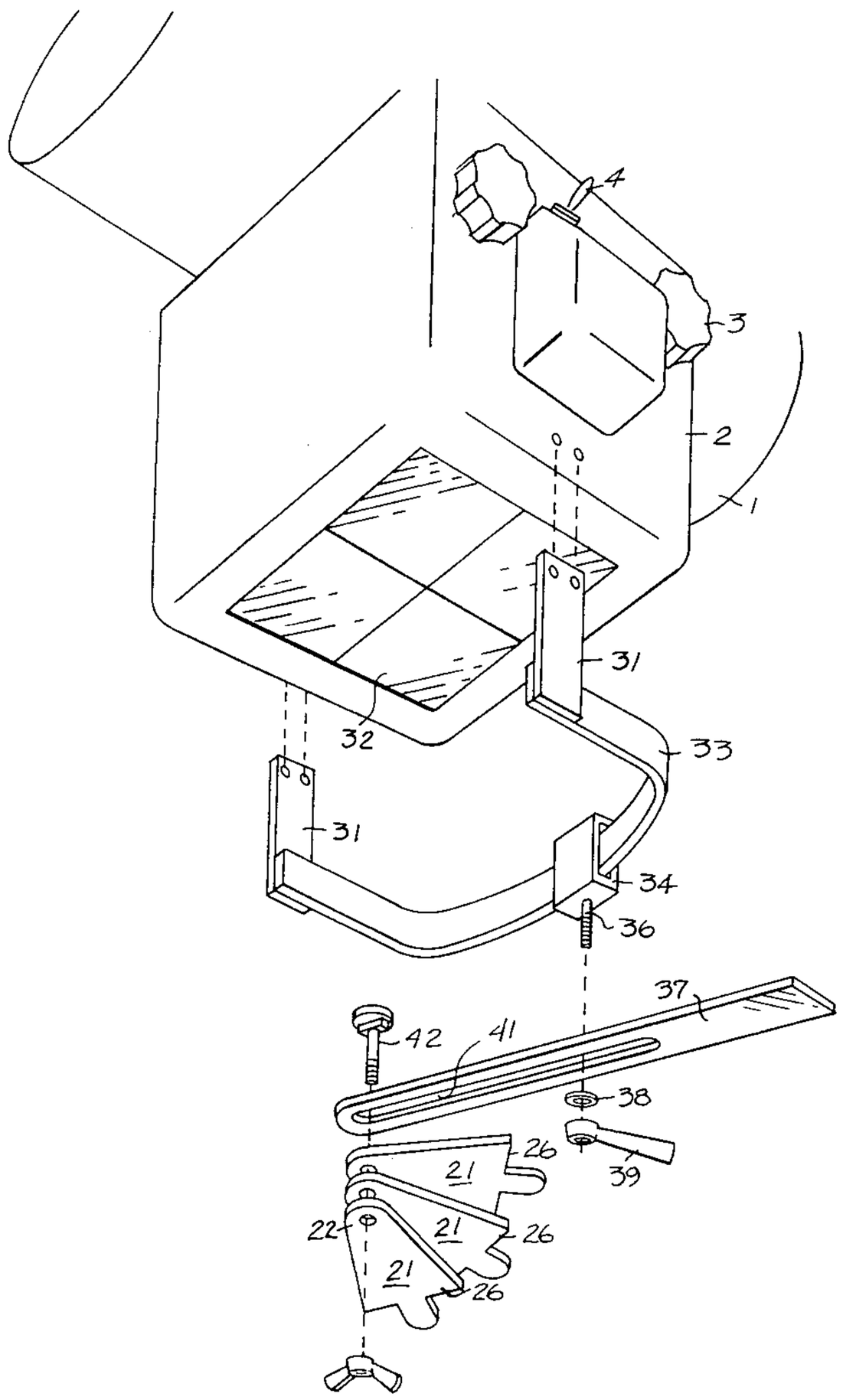
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[57] **ABSTRACT**

This adjustable radiation shield fits on the collimator used on X-ray equipment for indicating and adjusting the exact area to be exposed to radiation. A shutter of the collimator is adjustable to indicate by means of a light field the area to be exposed. A plurality of radiopaque metal plates are mounted on a support on the collimator is such relation to the collimator as to be normally out of the way of the light field, but be adjustable to obstruct a selected portion of the light field, enabling the technologist to visualize by the shadow cast by the shield the exact area to be protected from radiation without the knowledge of or inconvenience to the patient.

8 Claims, 6 Drawing Figures



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SHEET 1 OF 3

Fig. 1

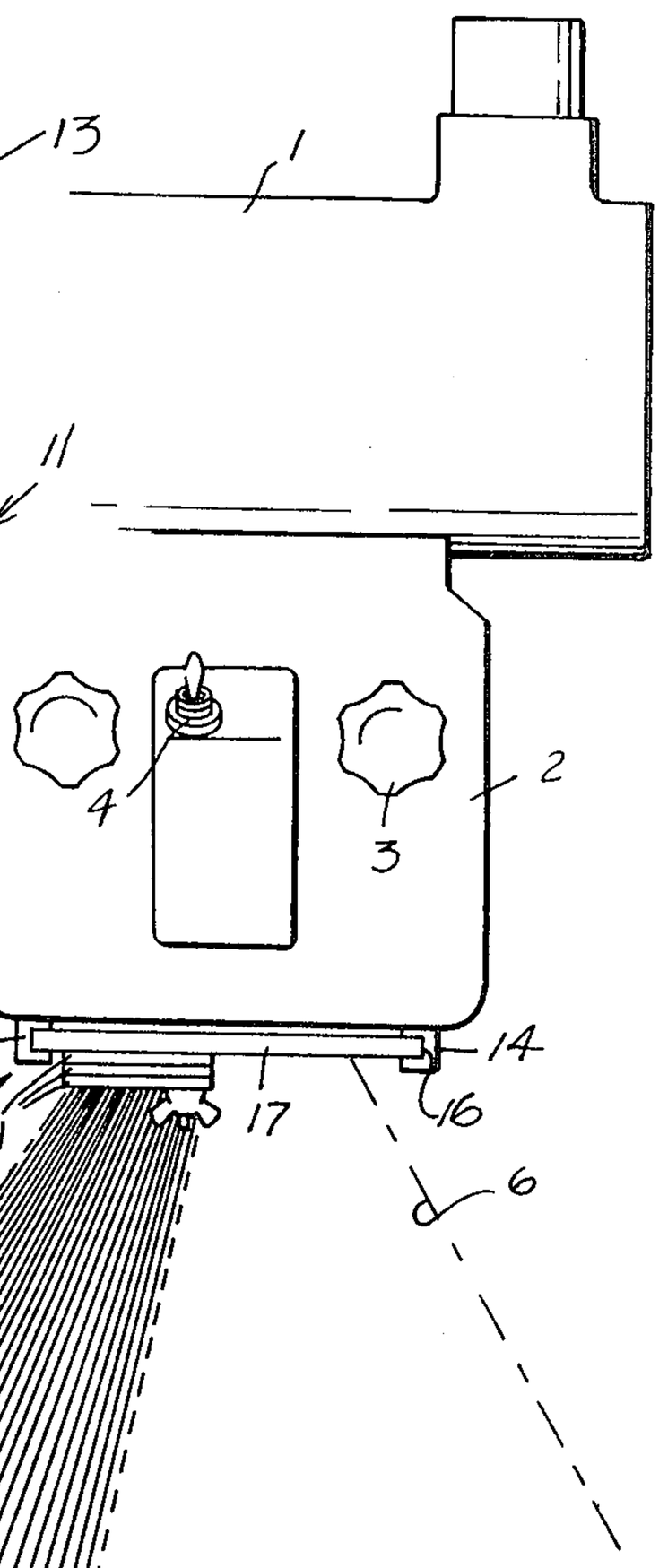


Fig. 2



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Fig. 3

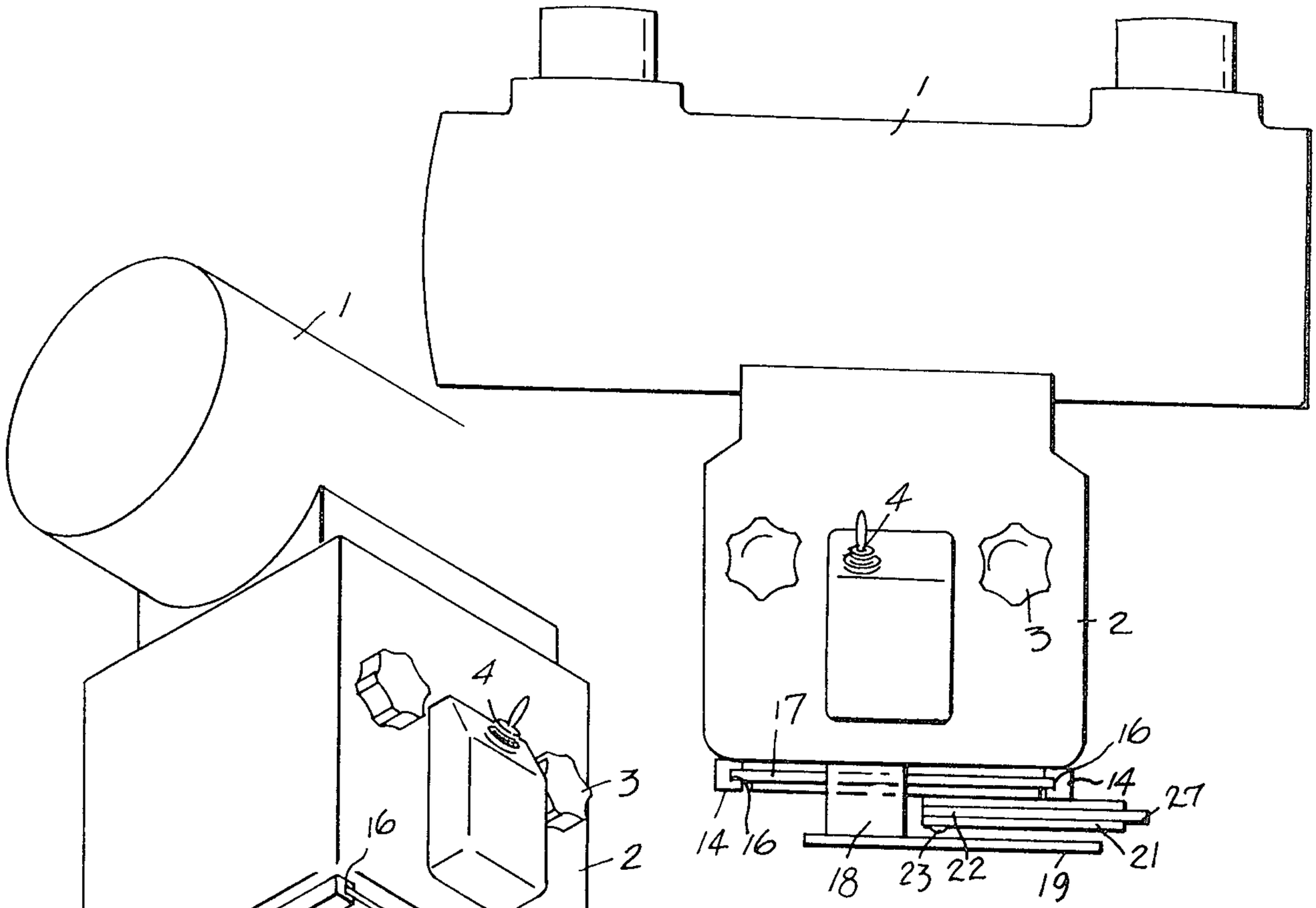


Fig. 4

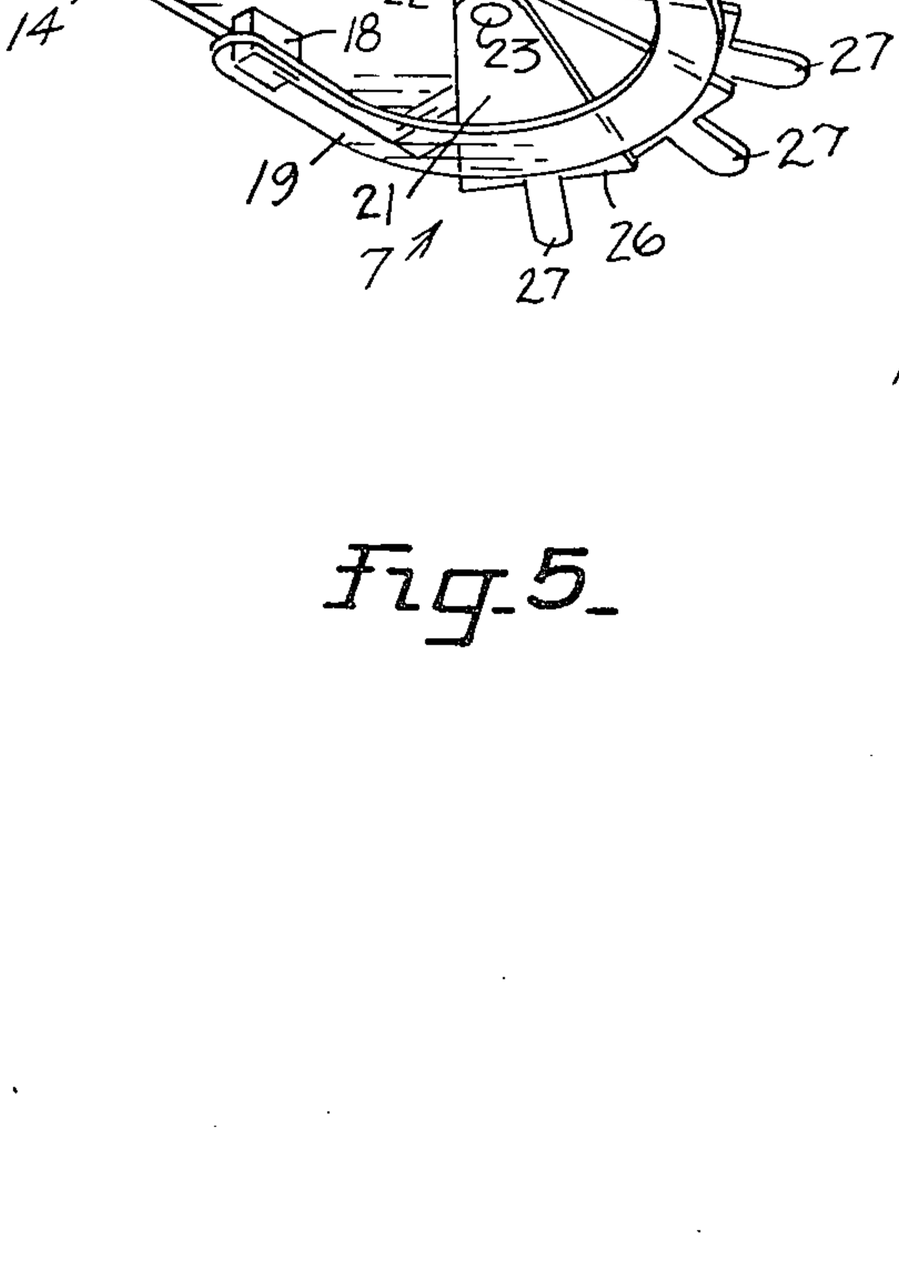


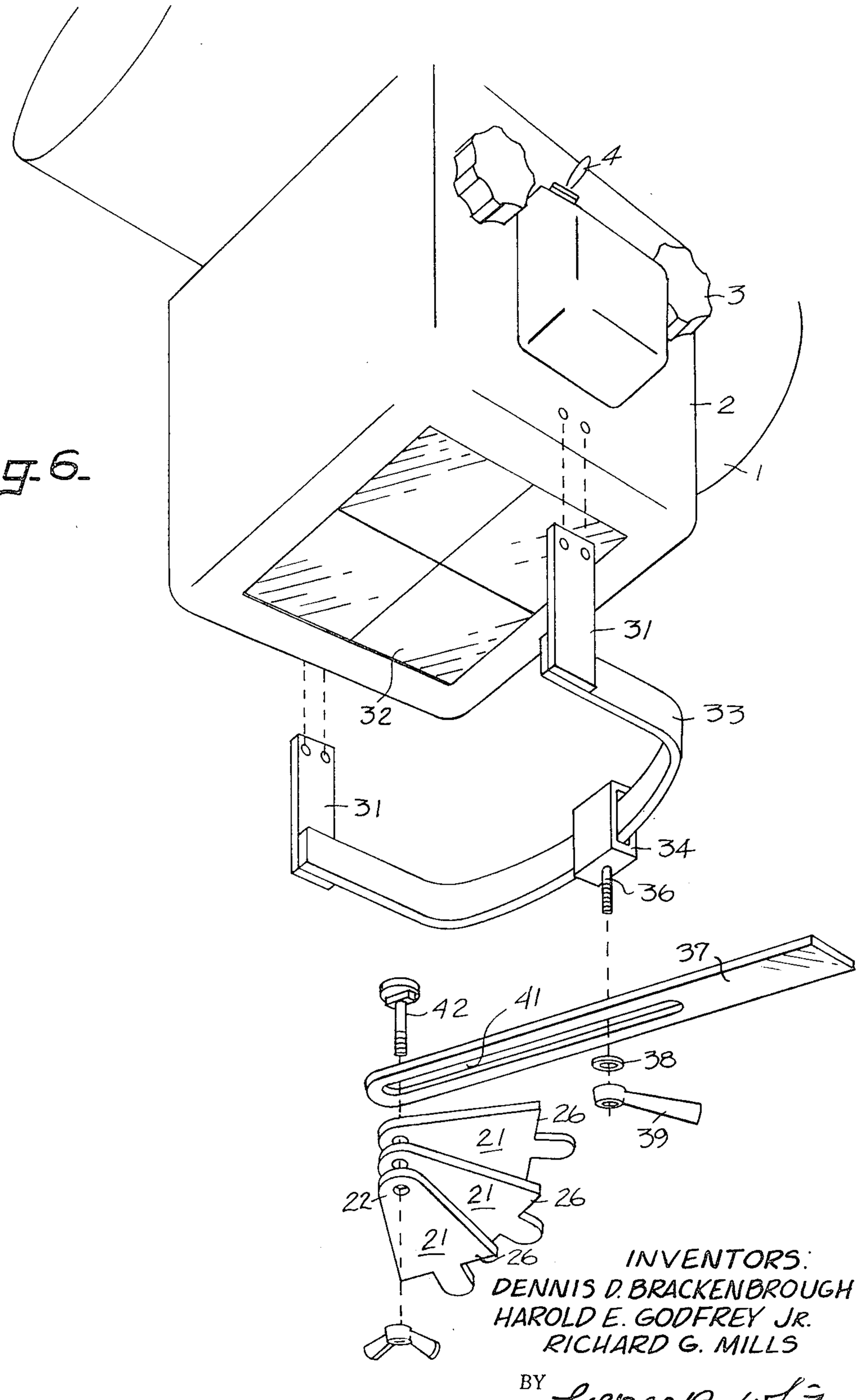
Fig. 5

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Fig. 6.



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ADJUSTABLE RADIATION SHIELD

BACKGROUND OF THE INVENTION

It has been the practice in the radiology field of medicine, when radiographing, to place a lead shield over the reproductive organs. This has been embarrassing both to the patient and the technologist. In some instances the technologist has been lax due to embarrassment and inconvenience in placing the shield over the patient.

The herein invention solves this problem by providing a shield on the X-ray collimator in such relation that it is fully adjustable to obstruct X-rays to a predetermined area, clearly indicated by the shadow of the shield on the light field projected by the collimator on the patient prior to the X-ray exposure.

The adjustable radiation shield device herein is readily attachable to an X-ray collimator, it is simple in operation, more effective in accurate shielding of a definite area from radiation, reduces apprehension on part of the patient and technologist, it is always available being in fixed relation to the cone of the X-ray machine, it saves time, and it can be used and applied without touching the patient and without the patient being aware of the shield protecting his reproductive organs.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmental view of the X-ray machine with the collimator thereon and the shield adjusted to produce a shaded area in the light field.

FIG. 2 is an exposed film showing the blank shielded area.

FIG. 3 is a side view of the device attached to a collimator having a transparent plate support.

FIG. 4 is a bottom plan view of the shield device on the collimator.

FIG. 5 is a perspective view of the shield device on the collimator.

FIG. 6 is a developed view of the shield device and its mounting directly on the collimator casing.

DETAILED DESCRIPTION

The X-ray machine **1** has mounted thereon a collimator **2**, in fixed relation to its cone so that the collimator determines the size and shape of the beam. This is accomplished by a shutter system (not shown) in the collimator which follows the configuration of the conventional fixed cone of the machine. The collimator is provided with suitable controls, not shown, to adjust the shutter to the desired configuration of the X-ray beam. In order to accurately and visually pre-determine the configuration of the X-ray beam, the collimator is internally lighted and by suitable reflectors it projects an ordinary light beam through the shutter, whereby the result of the shutter adjustment can be visually observed. The adjustments are performed by knobs **3**. The light source in the collimator is turned on and off by a usual light switch **4**. When the light beam **6** of the collimator is adjusted to the desired configuration and area, the shield device **7** is adjusted to cast a shadow **8** on the part of the body **9** of the patient to be shielded from radiation. The switch **4** is turned off and the X-ray machine is turned on and the plate **11** is exposed.

The blank area **12**, as shown in FIG. **2**, is the protected area. The remaining area **13** is exposed as shown on the film plate **11**.

In the illustrative form shown in FIGS. **3** to **5** inclusive the collimator **2** has thereon parallel retaining bars **14** which have channels **16** facing one another. These retaining bars **14** are below the bottom of the collimator **2** which has in it a transparent plastic window. Abase plate **17**, also made of transparent plastic sheet, has thereon a pair of spacing blocks **18** on which is mounted a generally U-shaped transparent strip **19**. A plurality of generally triangular radiopaque metal plates **21** are located between the base plate **17** and the strip **19** so that the narrow ends **22** of the plates **21** are pivotally held together by a suitable pivot **23**. The pivot **23** extends through a system

of slots **24** and is suitably supported on the face of the base plate **17** adjacent the bottom of the collimator **2**. The wider ends **26** of the plates **21** extend beyond the U-shaped strip **19** and have a finger **27** projecting therefrom for manipulation of the plates **21**. The plates **21** may be made of lead, tin, or suitable metal alloy capable of shielding from radiation.

The system of slots **24** includes a cross shape in the middle of the base plate **17** and also a right angle portion **28** at one side in an out of the way position. The plates, by means of shifting the pivot **23** in the system of slots **24**, can be adjusted to the correct position and then spread apart about the pivot **23** so as to produce the shadow for the required area. The U-shaped transparent strip **19** is out of the way and it is substantially aligned with the wider end **24** of the plates **21** to prevent accidental dropping of the plates and to help in maintaining the plates in substantially horizontal position.

In the form shown in FIG. **6** a pair of bracket plates **31** are suitably secured to the opposite sides of the collimator **2** out of the way of the transparent window **32** on the bottom of the collimator **2**. On the free ends of the bracket plates **31** is fixed a U-shaped support bar **33** on which is slideable a support sleeve **34**. From the support sleeve **34** extends downwardly a stud **36** which pivotally supports a flat guide **37** by means of a washer **38** and a handle nut **39**. The stud **36** extends through an elongated slot **41** in the guide **37** so that the position of the guide can be suitably adjusted. The plates **21** are supported on a pivot bolt **42** extended through the elongated slot **41** are are held in place by a wing nut **43**. In this form the guide **37** can be turned around so as to hold the plates in an out of the way position and then can be turned so as to bring the plates **21** under the window **32**, then by suitably shifting the pivot **42** and the guide **37** the plates **21** can be accurately located and then spread apart in the manner heretofore described to produce a shadow over the required area.

We claim:

1. A protective shield device for shielding a selected area of the body from X-ray radiation from an X-ray device, comprising,
a shield element opaque to said radiation,
and means to adjustably support said shield element on said X-ray device in the path of the X-ray beam from said X-ray device to said body, thereby to cast a shadow on a selected part of said body,
said support means including
means on said X-ray device to determine the configuration of the X-ray beam from said X-ray device,
and selectively controlled light beam producing means in said configuration determining means to visually indicate the adjusted configuration on said body,
said shield element being between said light beam producing means and said body whereby the shadow of said element on said body visually indicates the selected area to be protected.

2. The protective shield device specified in claim **1**, and
said support means including
a guide member mounted on said light producing means,
means to adjustably hold said shield on said guide member, whereby said shield is selectively movable into and out of the path of said light beam and said X-ray beam.

3. The protective shield device specified in claim **1**, and
said light producing means being a collimator having a window for said light beam and for said X-ray beam, and said shield element coacting with said window for forming an adjusted shadow on said body.

4. The protective shield device specified in claim **3**, and
said support means including
a guide member mounted on said collimator,
and means to hold said shield element on said guide member in adjusted position relatively to said window.

5. The protective shield device specified in claim **4**, and
said shield element including radiopaque parts, and
means to connect said parts relatively movably for selected configurations of said shield element,

and said shield element holding means including relatively slideable connection between said guide member and said shield element.

6. The protective shield device specified in claim 4, and

said guide member having a system of slots,

said shield element including

a plurality of radiopaque plates,

a pivot holding said plates together adjustably to selected shield configurations,

and means to slideably hold said pivot in said system of slots

for adjustment of said shield relatively to said collimator window.

7. The protective shield device specified in claim 6, and

said guide member being a transparent plate under said window.

8. The protective shield device specified in claim 6, and

said guide member being a rigid element,

and means to support said rigid element adjustably relatively to said collimator window.

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