Dec. 29, 1964 L. F. PEYSER 3,163,762

X-RAY CONE

Filed June 8, 1962 4 Sheets-Sheet 1

FIG. 1

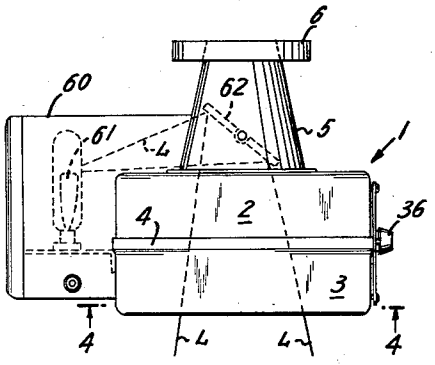


FIG. 2

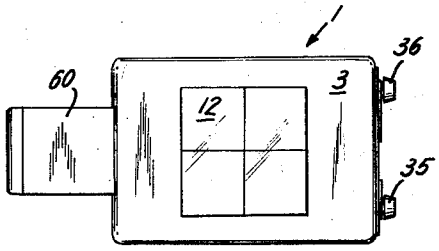
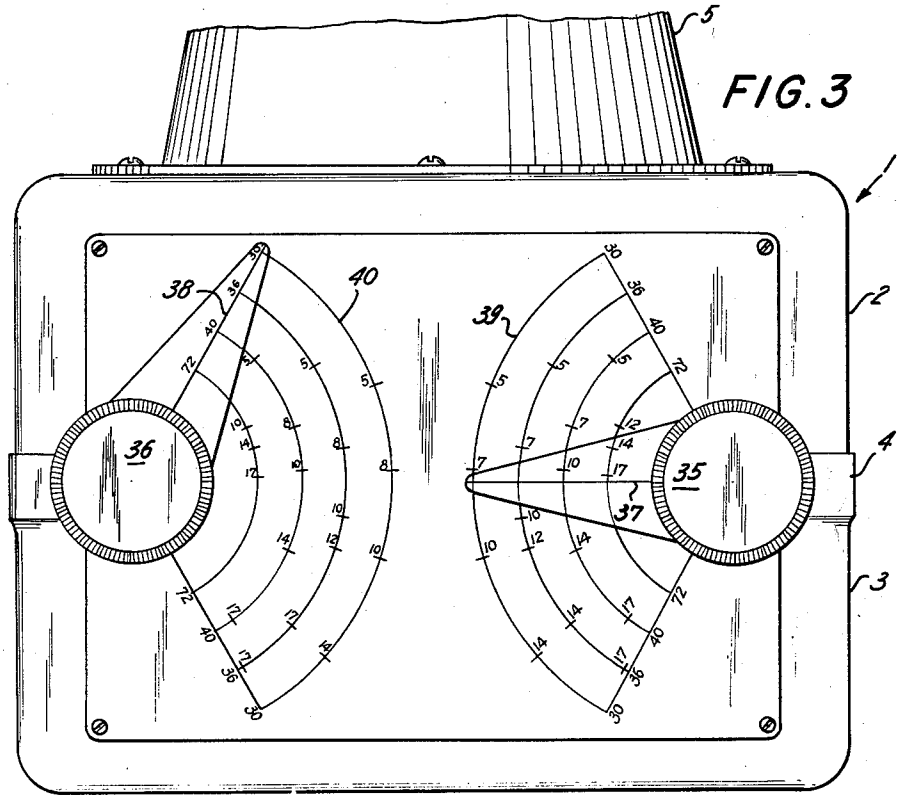


FIG. 3



INVENTOR.
LEONARD F. PEYSER

BY

ATTORNEY

Dec. 29, 1964 L. F. PEYSER 3,163,762

X-RAY CONE

Filed June 8, 1962 4 Sheets-Sheet 2

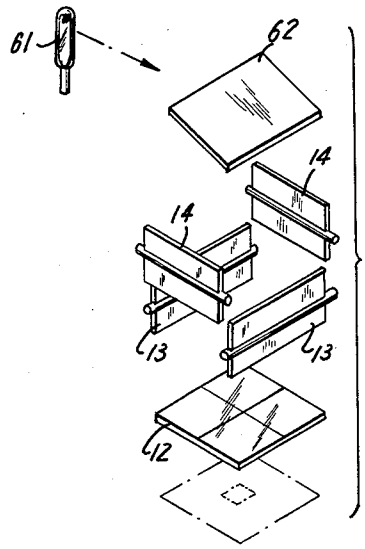
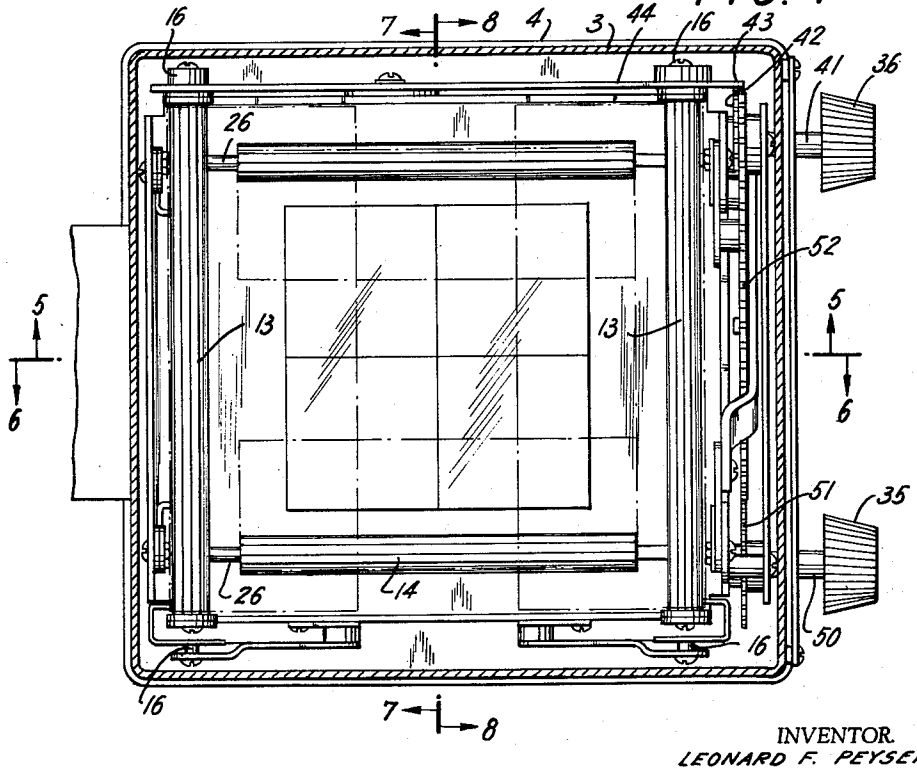


FIG. 9

FIG. 4



INVENTOR.
LEONARD F. PEYSER

BY

ATTORNEY

Dec. 29, 1964 L. F. PEYSER 3,163,762

X-RAY CONE

Filed June 8, 1962 4 Sheets-Sheet 3

FIG. 6

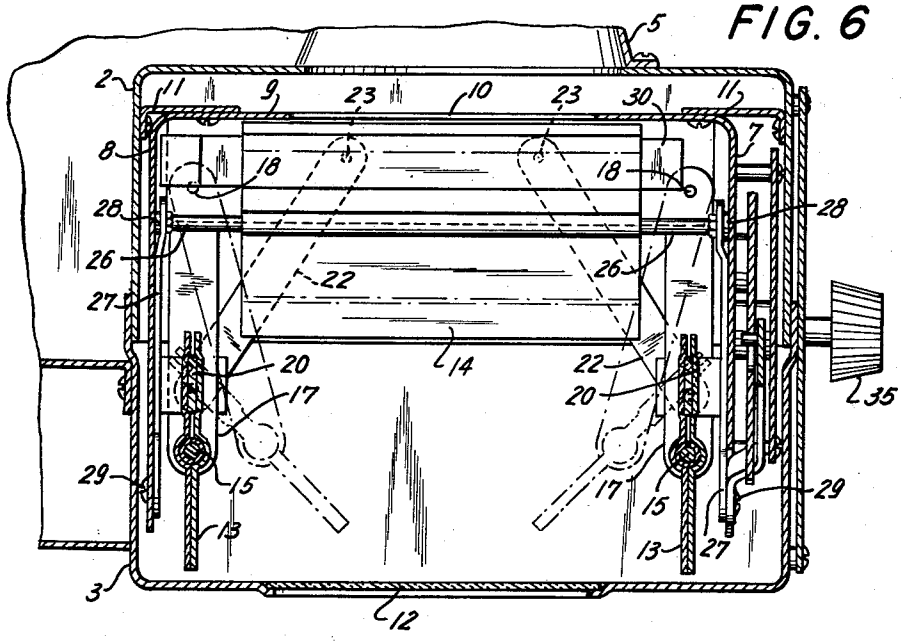
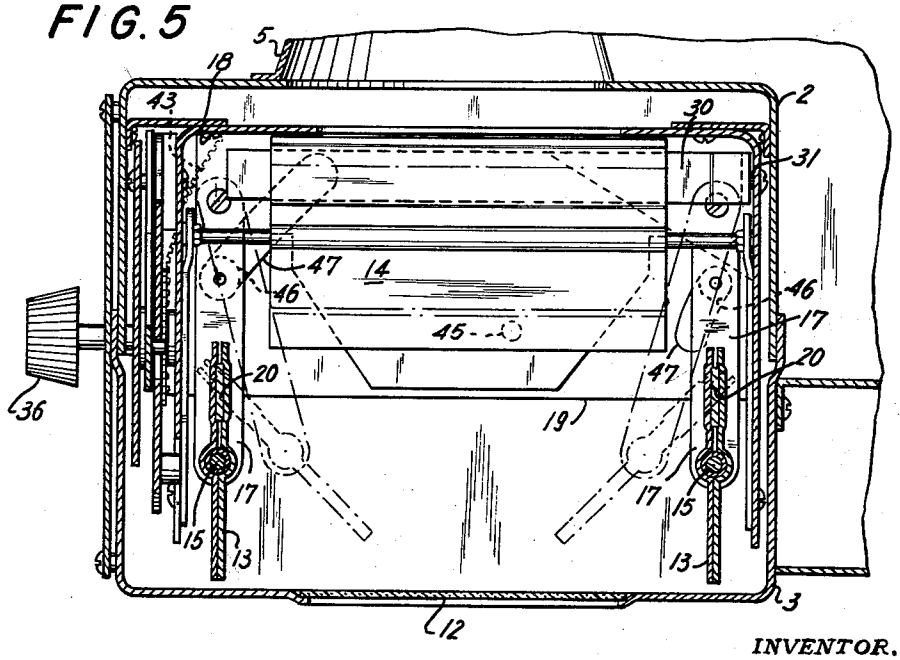


FIG. 5



INVENTOR.
LEONARD F. PEYSER

BY

ATTORNEY

Dec. 29, 1964 L. F. PEYSER 3,163,762

X-RAY CONE

Filed June 8, 1962 4 Sheets-Sheet 4

FIG. 8

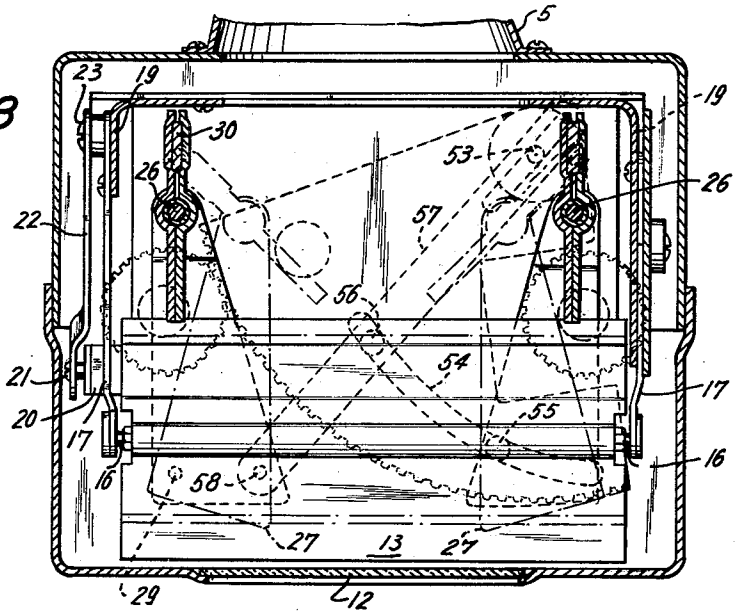
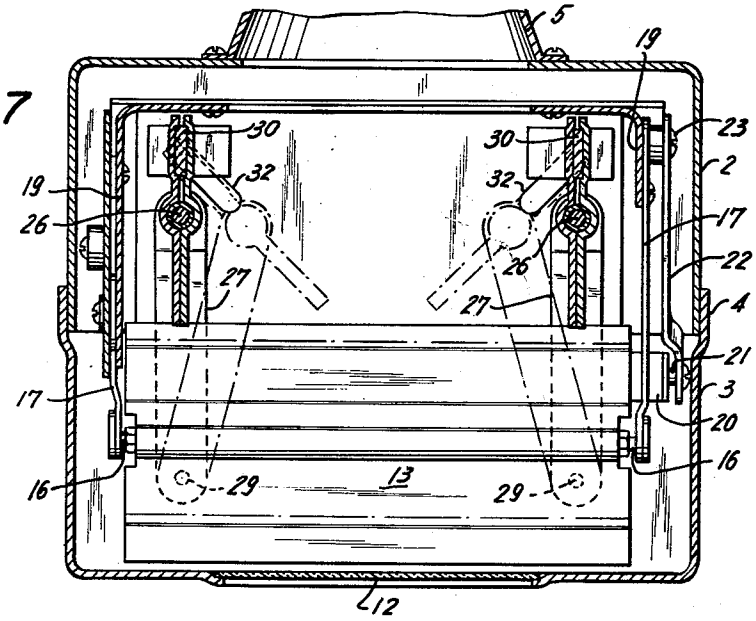


FIG. 7



INVENTOR.
LEONARD F. PEYSER

BY

ATTORNEY

United States Patent Office 3,163,762 Patented Dec. 29, 1964

3,163,762

X-RAY CONE

Leonard F. Peyser, White Plains, N.Y., assignor to Howden Videx Products Corporation, Califon, N.J., a corporation of New Jersey

Filed June 8, 1962, Ser. No. 201,203
7 Claims. (Cl. 250—105)

This invention relates to improvements in X-ray cones.

More particularly, the invention is concerned with cones of the type providing an adjustable rectangular aperture, as in prior Peyser application, Serial No. 708,027, filed January 9, 1958, for X-ray Cone, now Patent No. 3,060,316, granted October 23, 1962.

It is an object of the invention to provide a cone of compact dimensions with full range of adjustment.

A further object is to provide a cone having simple operating mechanism which is not subject to change of adjustment due to wear or use as is the case with cable adjusting mechanisms.

A further object is to provide an adjusting mechanism with visual indication coupled directly to the mechanism but providing a wide spacing of figures for easy reading.

With these and other objects which will appear in the following full description in mind, a cone embodying the invention in a preferred form will now first be fully described with reference to the accompanying drawing, and the features forming the invention will then be pointed out in the appended claims.

In the drawings:

FIG. 1 is a side elevation of the cone of the invention;

FIG. 2 is a bottom elevation;

FIG. 3 is a front elevation on an enlarged scale;

FIG. 4 is a section on the line 4—4 of FIG. 1;

FIGS. 5 and 6 are sections on a common line of FIG. 4 and looking in the directions of the respective arrows 5—5 and 6—6 thereof;

FIGS. 7 and 8 are sections on another common line of FIG. 4, and looking in the directions of the respective arrows 7—7 and 8—8 thereof; and

FIG. 9 is an exploded isometric illustrating the relative position of certain major parts with the supporting structure eliminated.

The cone is enclosed in a generally rectangular casing 1 which may conveniently be formed with an upper section 2 and lower section 3, the somewhat enlarged skirt 4 of the lower section 3 fitting around and over the upper section 2. An upper casing member 5 terminates in means such as the flange 6 for fastening to the X-ray machine in any convenient manner and the over-all dimensions of the casing are such as to accommodate it between the rails and any other obstructions encountered in known X-ray machines, the over-all width of the front of the casing as shown in FIG. 3 being only five inches and the other dimensions in the proportions indicated in the drawing.

The coning mechanism is supported in an inner frame structure comprising essentially a U-shaped member (FIG. 6) having a front wall 7, rear wall 8 and top 9 apertured at 10 as indicated so as to provide a clear path for the beam. The casing is secured to the frame structure by means of brackets 11, and the bottom casing element 3 is formed with an opening receiving the transparent window 12 positioned under the opening 10 previously referred to.

The coning mechanism comprises a pair of lower aperture plates 13 and a pair of upper aperture plates 14 together with mounting mechanism for moving the same between a fully open position (solid line position of FIGS. 4–8) through an intermediate position such as the position indicated in dot, dash lines in those figures and to a fully closed position (not shown), if desired. Each of the plates 13 is mounted on a shaft 15 located midway of its edges, and may be formed of lead sheet bent around and fixed to the shaft, as indicated, and shaft 15, in turn, is pivotally mounted at 16 on the lower ends of arm 17, the upper ends of which are supported by pivots 18 from side walls 19 bent down from the top 9 of the frame previously mentioned. The plates 13 thus have pivotal movements about the axes of their shafts 15 and bodily swinging movements about the arm pivots 18. A bar 20 secured in each plate 13 to one side of shaft 15 and parallel thereto has its end pivotally connected at 21 to the lower end of an arm 22 which is pivotally supported at 23 on the side wall 19 previously referred to. The pivot locations are selected so that when the aperture is wide open (solid line position) the plate 13 is vertical (parallel to the beam axis) and it swings to an approximately horizontal position (at right angles to the beam axis) as the aperture is closed down. In this way, the upper edge of the plate 13 is progressively depressed as the pivot point 15 rises in moving from open to closed position, so that interference between the lower plates 13 and upper plates 14 is prevented while providing a construction with minimum vertical space requirements.

The upper aperture plates 14 are carried on central shafts 26 pivotally mounted at 28 in the upper ends of arms 27 which are supported by pivots 29 on the front and back frame walls 7, 8. Bars 30 parallel to but spaced from the axis of shafts 26 carry guide rollers 31 riding in slots 32 formed in the frame wall structure. In consequence, as the upper plates 14 move from fully open position toward closed position (dot and dash line of FIGS. 7 and 8), the plates 14 which are vertical or parallel to the beam axis in fully open position swing about their shafts 26 so as to lift their lower edges and again prevent interference with the lower plates 13 while providing a construction accommodated in minimum headroom. It will be noted that the vertical space required by the upper and lower plates 13, 14 amounts to no more than the total width of the plates, providing an exceptionally compact construction.

The operating mechanism comprises a pair of knobs 35, 36 having pointers 37, 38 cooperating with arcuate scales 39, 40 marked with concentric arcs for the various exposure distances from 30–72 inches, there being a corresponding scale for film dimension size, from 5–17 inches marked on each concentric arc. It will be noted that each of the scales occupies approximately only 120° of arc while at the same time the numerals are widely spaced and easily read. The knob 36 is secured to a shaft 41 carrying a pinion 42 meshing with the teeth 43 of the gear sector 44 at right angles to it (FIG. 5), the gear sector 44 being pivotally supported at 45 from the frame side wall 19. Arms 17 which carry the lower plates 13 also carry rollers 46 fitting in slots 47 for the gear sector 44 and which are eccentric to its pivot 45. The cam slots 47 are shaped for moving the arms 17 and plates 13 equally and as indicated by the scale 40, as the knob 36 is turned. The plates 14 are operated by the knob 35, the shaft 50 of which carries a pinion 51 driving a gear sector 52 which is pivotally mounted to the front wall of the frame at 53. An arcuate cam slot 54 formed in the sector 52 cooperates with a roller 55 carried by one of the arms 27 and with a roller 56 carried by a link 57 pivotally secured to the other arm at 58, these parts being arranged to impart equal and opposite movements to the plates 14 in accordance with the graduations on the scale 39.

As will now be apparent, in addition to providing a cone construction with minimum vertical space requirements, an exceptionally compact construction has also been provided in the horizontal dimensions, the arrange-

ment of parts being such that the operating mechanism adds very little to the width of the frame structive which supports the shutter or aperture plates 13, 14.

A visual lighting system, in itself of generally known construction, may be provided in a housing 60, fitted to one side of the casing, the bulb filaments 61 directing a beam of light L against a mirror 62 positioned above the opening 10 previously referred to and having its axis coincident with that of the X-ray beam and its source located optically at the same point. The operation of shutter elements 13 and 14 thus furnished by means of the visual light beam L a visible indication of the field exposed.

What is claimed is:

1. An X-ray cone comprising upper and lower pairs of aperture plates, means for adjustably supporting the said pairs of plates for defining a rectangular aperture, the said means comprising a linkage supporting each said pair of plates and operating means for moving the plates of each pair between a wide open position in which the plates of the pair are substantially vertical and a closed position in which they are substantially horizontal, the said operating means comprising means supporting the lower pair of plates with their upper edges in substantially the same horizontal plane as the lower edges of the upper pair of plates when the plates are in wide open position and for turning the plates toward horizontal position so as to move the said upper and lower edges away from each other, as the aperture is adjusted toward closed position.

2. An X-ray cone comprising upper and lower pairs of aperture plates, means for adjustably supporting the said pairs of plates for defining a rectangular aperture, the said means comprising a linkage supporting each said pair of plates and operating means for moving the plates of each pair between a wide open position in which the plates of the pair are substantially vertical and a closed position in which they are substantially horizontal, the said means comprising primary supporting arms for each pair of plates and means mounting the same for swinging movement upwardly of the lower pair of plates and downwardly of the upper pair of plates, and means mounting the plates pivotally of their supporting arms and for turning them about their pivotal axes, whereby the edges of each pair of plates adjacent the other pair move away from the said other pair as the aperture is decreased.

3. An X-ray cone comprising a substantially square frame having front, rear and side walls, means swingingly and pivotally mounting a pair of opposed aperture plates to two opposite walls and a second pair to the other two opposite walls, operating mechanism comprising parallel shafts carried by one said wall, means drivingly connecting one of said shafts to the aperture plates mounted on the last said wall and its opposite walls, means including operating means for the other said pair of

plates on one of the other pair of walls, and gear means connecting the other said shaft therewith for operating the other pair of aperture plates, the said gear means comprising a pair of gears at right angles to each other and substantially coplanar with adjacent walls of the said frame.

4. An X-ray cone comprising upper and lower pairs of aperture plates and means for adjustably supporting the said pairs of plates for defining a rectangular aperture, and mounting means for a said plate comprising a shaft secured in the said plate in a substantially central position, a pair of arms pivotally supported for swinging movement about a predetermined axis at one end of the said arms and pivotally carrying the said shaft at the other end thereof, operating means for swinging the said arms and plate carried thereby about the pivotal axis of the said arms, and means for turning the plate about the axis of its said shaft, as the plate is adjusted from a wide open position to a closed position of the said aperture.

5. An X-ray cone comprising upper and lower pairs of aperture plates and means for adjustably supporting the said pairs of plates for defining a rectangular aperture, a said plate comprising a doubled over piece of lead sheet and mounting means for a said plate comprising a shaft secured in the said plate between the layers thereof in a substantially central position, a pair of arms pivotally supported for swinging movement about a predetermined axis at one end of the said arms and pivotally carrying the said shaft at the other end thereof, operating means for swinging the said arms and plate carried thereby about the pivotal axis of the said arms, and means for turning the plate about the axis of its said shaft, as the plate is adjusted from a wide open position to a closed position of the said aperture, the last said means comprising a bar between the layers of the said plate, parallel to but spaced from the said shaft, and further means pivotally carrying the said bar for swinging about a predetermined axis.

6. An X-ray cone according to claim 5, in which the said further means comprises stationary elements having cam slots and rollers carried by the said bar at its ends and within the said cam slots for guidance thereby.

7. An X-ray cone according to claim 5, in which the said further means comprises a pair of arms mounted at one end for pivoting about a predetermined axis and pivotally connected at the other end to the said bar.

References Cited in the file of this patent

UNITED STATES PATENTS

2,474,422	Hallstein	June 28, 1949
2,722,611	Haupt	Nov. 1, 1955
2,894,144	Barrett	July 7, 1959
3,023,314	Hura	Feb. 27, 1962