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LINKAGE SYSTEM FOR A WAVE-SIGNAL
RECEIVER OF THE TILT-OUT TYPE
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Fig. 1

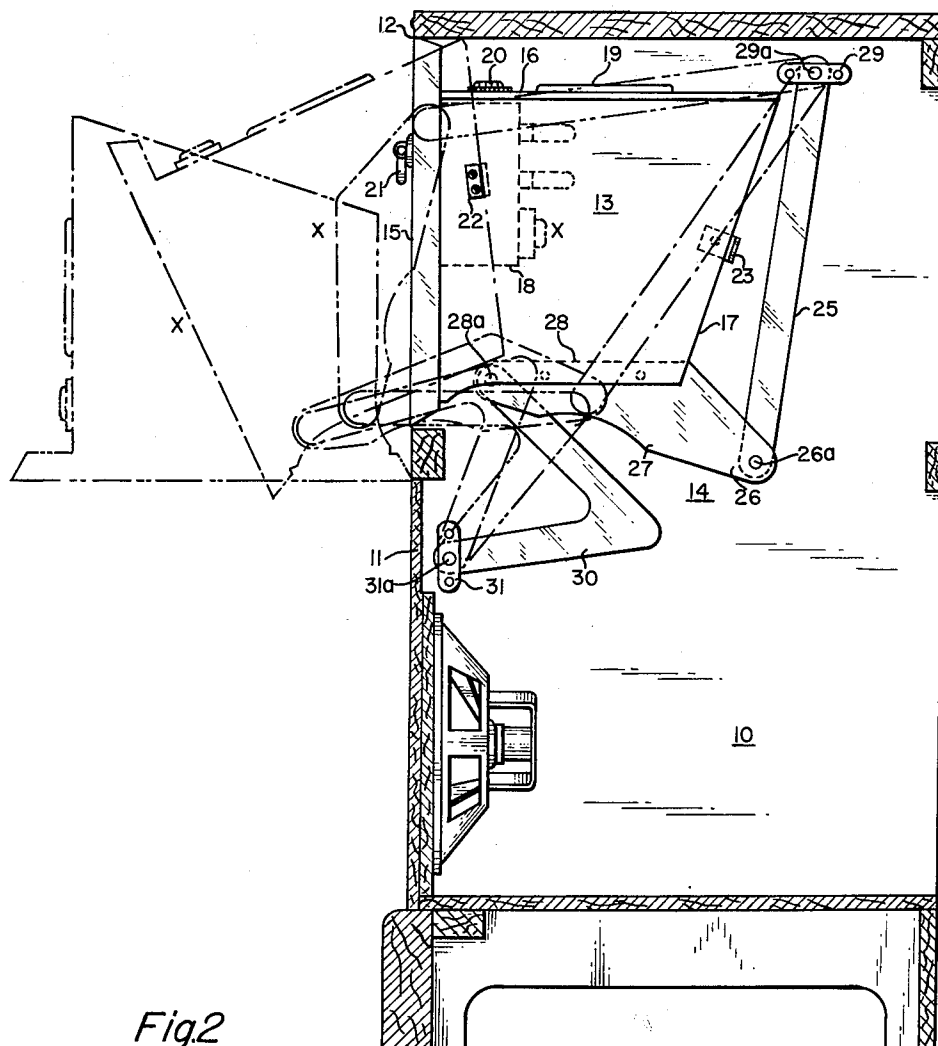
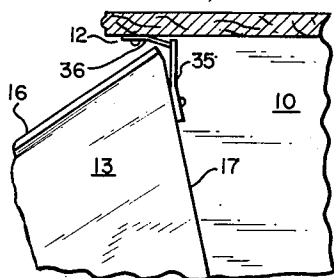


Fig.2



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LINKAGE SYSTEM FOR A WAVE-SIGNAL
RECEIVER OF THE TILT-OUT TYPEEugene J. Polley, Berwyn, Ill., assignor to Zenith
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7 Claims. (Cl. 312-7)

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This invention relates to a wave-signal receiver of the tilt-out type and more particularly to an improved linkage system for supporting a chassis compartment within a cabinet for movement from an initial position to either an operating or a servicing position outside the cabinet.

One known form of tilt-out arrangement for a wave-signal receiver includes a chassis-containing compartment in the nature of a rectangular box of four sides that is movably supported within a cabinet. One side of the compartment is coplanar with the front face of the cabinet when the compartment is in an initial or non-operating position within the cabinet, and the uppermost side of the compartment constitutes a control panel on which the indicator scale and the several control knobs of a radio receiver are mounted. A tilt-out system of this type is disclosed in Patent 2,447,572 of Kurt Emde which is assigned to the same assignee as the present invention. As pointed out in that patent, in order to utilize the least amount of cabinet space for displacing the chassis compartment to its operating position, it is preferable that the compartment initially move in translation, like the motion effected in opening a drawer. Also, it is desirable that the control panel be inclined when in the operating position to facilitate reading of its dial scale. Consequently, following the movement in translation of the chassis compartment, a rotational movement is imparted thereto before it comes to rest outside the cabinet.

The linkage system of the afore-mentioned Emde patent provides the required movement of the chassis-containing compartment between its initial and operating positions. It has been found, however, that in this arrangement servicing of the radio chassis is difficult especially when it is necessary to remove or install the chassis since the chassis is not sufficiently accessible in either of the two available positions of the movable compartment. In the initial position, the walls of the cabinet substantially completely enclose the chassis and its compartment, while in the operating position the compartment walls prevent free access to the chassis.

It is an object of this invention, therefore, to provide an improved linkage system for movably supporting a chassis-containing compartment in a tilt-out type of cabinet and which avoids the servicing limitation of the afore-described arrangement.

It is a further object of the invention to provide an improved linkage system for supporting a chassis compartment for movement from an

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initial position within a tilt-out type of cabinet to either an operating or a servicing position outside of the cabinet, the servicing position facilitating access to the chassis.

The linkage system in accordance with the invention is adapted for inclusion in a tilt-out type of wave-signal receiver which includes an apertured cabinet and a chassis-containing compartment for supporting the compartment for movement from an initial position within the cabinet to either an operating or a servicing position outside of the cabinet. The linkage system comprises a first link pivoted at one end to a point on the compartment below and behind the center of gravity when the compartment is in its initial position. The first link is pivoted at its other end to a point of the cabinet above the center of gravity of the compartment and behind the first-mentioned point. The system further includes a second link pivoted at one end to a point on the cabinet below and in front of the center of gravity of the compartment and pivoted at its opposite end to a point of the compartment displaced vertically and to one side of the last-mentioned point of the cabinet.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a cross-sectional side elevation of a tilt-out type of cabinet for a wave-signal receiver including a linkage system in accordance with the present invention; and

Fig. 2 represents a modified arrangement of a locking system for the cabinet shown in Fig. 1.

With reference now to Fig. 1, the tilt-out type of wave-signal receiver there represented includes a cabinet structure 10 having a front panel 11 provided with an aperture 12 for receiving a chassis-containing compartment 13. The compartment 13 is supported within cabinet 10 by a linkage system 14, constructed in accordance with the invention, for movement from an initial position within the cabinet as shown in full lines to either an operating position shown in dash-dot lines or a servicing position shown in dash-dot-dot lines, both of the latter positions being substantially outside of the cabinet.

Neglecting for a moment the details of linkage system 14, compartment 13 is comprised of a

front panel 15, the exposed surface of which is in the plane of cabinet panel 11 when the compartment is in its initial position, and a control panel 16 which is normal to the front panel. The panels 15 and 16 together with a pair of side members, of which only one designated 17 is shown, define a substantially rectangular box or enclosure and a chassis 18, shown in outline, is supported at the uppermost and foremost confines of the enclosure. The chassis includes the usual components constituting the electrical circuits of the receiver, the details of which are well known and need not be described.

The control panel 16 supports an escutcheon 19, that is associated with a tuning scale, and a cooperating movable pointer coupled to the tuning device of the chassis 18 to provide the usual means for indicating the tuning condition of the receiver. Knob 20 represents one of the several control knobs, customarily positioned on control panel 16 for tuning control, volume and tone control et cetera.

A handle 21 is affixed to front panel 15 to provide a convenient means for manually displacing compartment 13 from its initial position to the receiver operating position in which the linkage system has tilted the compartment essentially out of the cabinet. In order to prevent inadvertent movement of the compartment beyond the operating position, means are provided for releasably locking the compartment in the operating position. Specifically, this includes a stop abutment 22 affixed to the side of the cabinet and a stop element 23 mounted at the rear of compartment-side 17. Engagement of the members 22 and 23 prevents movement of compartment 13 beyond the dash-dot position. In order to effect further movement, stop element 23 is manually deflected clear of stop abutment 22. This may be accomplished by releasably holding stop element 23 in its locking position by means of a wing nut that may be easily released to permit the removal of element 23 from its locking position.

With reference now to the linkage system of the instant invention, a pair of similar linkages are usually provided, one being positioned on each side of the chassis compartment. Since these linkages are identical in construction only one need be described in detail.

The linkage system comprises a first, flat, elongated, link 25 pivoted at one end to a point 26a on compartment 13 below and behind the center of gravity, designated "X," of the compartment when it is in its initial position. The pivot point 26a on the compartment is provided in one extremity 26 of a triangularly-shaped mounting plate 27 affixed to the side wall 17. The extremity 26 is situated beyond the rearmost and lowermost portion of the compartment and the end link 25 is loosely riveted thereto. The other end of link 25 is pivoted to a point 29a of the cabinet above the center of gravity "X" and behind the first-mentioned pivot point 26a by means of a mounting plate 29 loosely riveted to this extremity of the link 25 and affixed to the cabinet wall.

A second, flat link 30 which includes a pair of legs defining an angle less than 90° is pivoted at the free end of one of the legs to a point 28a on compartment 13 below and in front of the center of gravity "X." This pivot point is provided in the extremity 28 of mounting plate 27 to which link 30 is loosely pivoted. The free end of the other leg of link 30 is pivoted to a

point 31a on cabinet 10 in front of the pivot point 28a through a suitable mounting plate 31 that is pivotally connected to link 30 and is affixed to the cabinet side. The pivot points at the ends of link 30 are displaced vertically with respect to one another and the term "vertically" as used here refers to both upward and downward directions along a vertical line.

Since link 30 is angular in form, it has an effective length, defined by a line through its end pivots, that is shorter than its actual length. This effective length of link 30 is also shorter than the length of link 25. The link 30 is disposed with the junction of its legs positioned within the cabinet when compartment 13 is in its initial position. The angle between the legs of link 30 is so arranged that the portion of the link included between the junction of its legs and the pivot 31a is within the confines of the cabinet in all positions of the compartment. By this provision, opening 12 of the cabinet 10 need not be extended to accommodate the movement of link 30 since its angular construction allows the link to operate through opening 12. The displacement of the pivot points 26a and 28a on the compartment and the effective lengths of the links 25 and 30 are so proportioned relative to the depth and height of compartment 13 that the compartment is effectively free of the cabinet when the linkage system is in a reference position in which link 25 is substantially aligned with the cabinet-pivot 31a of link 30. Further, the compartment-pivot point 28a of link 30 in all operating conditions of the linkage system remains on the same side of the line between the pivot points 29a and 31a. In one position of the compartment, link 25 is aligned with pivot 28a of link 30 and the elbow of link 30 remains to the cabinet side of this reference line through link 25 and pivot 28a for all operating conditions of the linkage system.

In the initial position of compartment 13 its center of gravity "X" is between the cabinet-pivot points 29a and 31a of links 25 and 30. Additionally, in this position links 25 and 30 tend to move in downward directions along their respective arcuate paths of travel and the compartment 13 is in a stable position, tending to remain within the confines of cabinet 10. In order to displace compartment 13 to its operating position, handle 21 is grasped and a pulling force is exerted manually in a direction away from the cabinet. With regard to the initial phase of movement of the compartment, the line through the pivots of link 30 is approximately parallel with link 25 and consequently the initial motion of the compartment is essentially in translation. As this parallelism decreases, the motion of unit 13 changes to that of a combined translation and rotation. The rotational component is rather small until the compartment is approximately half way out of the cabinet at which time a substantial rotational movement is effected. This final movement is arrested due to the engagement of the stop devices 22, 23, which brings the compartment to rest in its operating position indicated by dash-dot construction lines. It will be noted that in this position the center of gravity of compartment 13 is outside a vertical line drawn through the cabinet pivot 31a of link 30. Consequently, the compartment tends to remain in a stable position with the stop elements 22, 23 preventing further movement. The cabinet 13 thus is placed in its operating position with control panel 16 exposed to view and acces-

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sible for controlling the receiver operation. Moreover, panel 16 is inclined slightly to the horizontal so that its viewing angle is relatively wide.

If access to chassis 18 is required for any reason, for servicing for example, the stop element 23 is loosened and deflected to clear abutment 22. The compartment 13 may then be manually displaced completely outside the confines of the cabinet and because of the arrangement of the linkage system 14, a tumbling action is effected, causing the compartment to be rotated to a position essentially at right angles to its initial position, as shown by the dash-dot-dot outline. In displacing compartment 13 from its operating to its servicing position, the center of gravity is raised only slightly so that this movement may be accomplished with very little effort. The compartment is stable in the servicing position and chassis 18 may be conveniently reached through the opening of compartment 13 which is at the now uppermost portion thereof.

The unit is returned to its operating position merely by rotating and displacing it toward the cabinet following which stop element 23 may be restored to normal position. From the operating position the compartment is displaced into its initial position by pushing it inwardly relative to the cabinet.

The following dimensions were used in constructing a specific application of the linkage system in accordance with the invention.

Cabinet 10.....	16 inches deep
Opening 12 and panel 15.....	12 inches high
Panel 16.....	10½ inches high
Link 25, distance between pivots 26a and 29a.....	12 inches
Line 30, straight-line distance between pivots 28a and 31a	6 inches
Angle between the legs.....	53°

Location of pivot points in terms of the normal distances from the front face of cabinet panel 11 and from the under surface of the top portion of cabinet 10, with compartment 13 in its initial position.

Pivot Point	Top of Cabinet 10	Panel 11
26a.....	13 inches.....	10¾ inches.
28a.....	10½ inches.....	2½ inches.
29a.....	1 inch.....	12½ inches.
31a.....	16 inches.....	1 inch.

Fig. 2 represents a portion of the receiver of Fig. 1 and like elements are designated by identical reference numerals. This figure shows a modified stop arrangement which is more easily manipulated than that of Fig. 1. A stop element 35 is affixed to the uppermost and rearmost portion of compartment-side 17 and extends upwardly substantially to the surface of control panel 16. A cooperating stop abutment 36 is affixed to the under side of the top portion of cabinet 10 and extends rearwardly. Abutment 36 is formed of a length of leaf-spring material and is arranged to be normally biased in the position shown. Compartment 13 is represented in the operating position in which stop element 35 engages the free end of abutment 36 thereby preventing further outward movement of the compartment. In order to displace the chassis-compartment to its servicing position, a tool, such as a screw driver, is inserted in opening 12 into engagement with spring abutment 36 to dis-

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place the spring upwardly and free element 35 for travel in a forward direction. After element 35 clears abutment 36, the abutment returns to its normal position. When compartment 13 is returned into cabinet 10, element 35 slides past abutment 36 which then remains in its normal locking position.

While a particular embodiment of the present invention has been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment, a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; and a second link pivoted at one end to a point on said cabinet below and in front of said center of gravity and pivoted at its opposite end to a point of said compartment displaced vertically and to one side of said last-mentioned point of said cabinet.

2. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment, a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; and a second link, having an effective length shorter than said first link, pivoted at one end to a point on said cabinet below and in front of said center of gravity and pivoted at its opposite end to a point of said compartment displaced vertically and to one side of said last-mentioned point of said cabinet.

3. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; and a second link, including a pair of legs defining an angle less than 90°, pivoted at the free end of one leg to a point on said compartment below and in front of said center of gravity and pivoted at the free end of the other leg to a point of said cabinet below and in front of said last-mentioned point of said compartment, said link being disposed with the junction of said legs positioned within said cabinet when said compart-

ment is in its initial position so that the portion of said second link included between said junction and said other end is always within the confines of said cabinet when said compartment is displaced to its operating and servicing positions.

4. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; and a second link pivoted at one end to a point on said cabinet below and in front of said center of gravity and pivoted at its opposite end to a point of said compartment displaced vertically and to one side of said last-mentioned point of said cabinet, the displacement of said points on said compartment and the effective lengths of said links being so proportioned relative to the depth and height of said compartment that said compartment is effectively free of said cabinet when said linkage system is in a reference position in which said first link is aligned with said cabinet-pivot point of said second link.

5. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment, a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; and a second link pivoted at one end to a point on said cabinet below and in front of said center of gravity and pivoted at its opposite end to a point of said compartment displaced vertically and to one side of said last-mentioned point of said cabinet, the displacement of said points on said compartment and the effective lengths of said links being so proportioned relative to the depth and height of said compartment that said compartment is effectively free of said cabinet when said linkage system is in a reference position in which said first link is aligned with said cabinet-pivot point of said second link and said compartment-pivot point of said second link in all operating conditions of said linkage system remains on the same side of the line between the cabinet pivots of said first and second links.

6. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment, a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; a second link pivoted at one end to a point on said cabinet below and in front of said center of gravity and pivoted at its opposite end to a point of said compartment displaced vertically and to one side of said last-mentioned point of said cabinet; and means for releasably locking said compartment in an operating position in which said linkage system has tilted said compartment essentially out of said cabinet.

7. In a tilt-out type of wave-signal receiver including an apertured cabinet and a chassis-containing compartment, a linkage system supporting said compartment for movement from an initial position within said cabinet to either an operating or a servicing position outside of said cabinet, said linkage system comprising: a first link pivoted at one end to a point on said compartment below and behind the center of gravity when said compartment is in said initial position and pivoted at its other end to a point of said cabinet above said center of gravity and behind said first-mentioned point; a second link pivoted at one end to a point on said compartment below and in front of said center of gravity and pivoted at its opposite end to a point of said cabinet below and in front of said last-mentioned point of said compartment, the displacement of said points on said compartment and the effective lengths of said links being so proportioned relative to the depth and height of said compartment that said compartment is effectively free of said cabinet when said linkage system is in a reference position in which said first link is aligned with said cabinet-pivot point of said second link; and means for releasably locking said compartment in an operating position in which said linkage system has tilted said compartment essentially out of said cabinet.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,682,695	Miner	Aug. 28, 1928
2,447,572	Emde	Aug. 24, 1948