

[54] **INSERTING AND REMOVING
ARRANGEMENT FOR RADIO EQUIPMENT
AND THE LIKE**

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[58] Field of Search **74/527, 567, 523, 107;**
248/25, 361 R, 361 B; 403/16, 321, 330;
192/56 R

[56] **References Cited**

UNITED STATES PATENTS

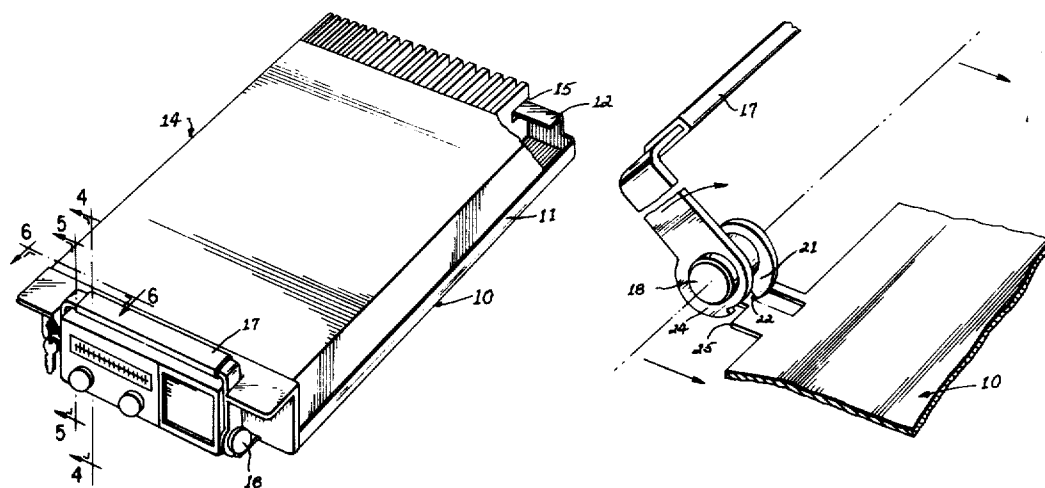
2,371,896	3/1945	Knauer	248/25
2,860,716	11/1958	Flock	248/25 X
3,059,882	10/1962	Staer	248/25 X
3,640,141	2/1972	Hollingshead	192/56 R X

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Assistant Examiner—Frank H. McKenzie, Jr.

[57] **ABSTRACT**

Mobile radio equipment, which must be located in a receptacle in a vehicle, is provided with an arrangement that facilitates the inserting, locking, and removing of the equipment. The arrangement includes a handle rotatably mounted on the front of the equipment. The handle is provided with two cams, one an inserting and locking cam and the other a removing cam. The receptacle is provided with two fixed surfaces, one an inserting and locking surface and the other a removing surface. When the handle is rotated in one direction, the inserting and locking cam engages the inserting and locking surface so that the equipment is pulled into the receptacle and can be locked. When the handle is rotated in the opposite direction, the removing cam engages the removing surface on the receptacle and pulls the equipment out of the receptacle.

3 Claims, 6 Drawing Figures



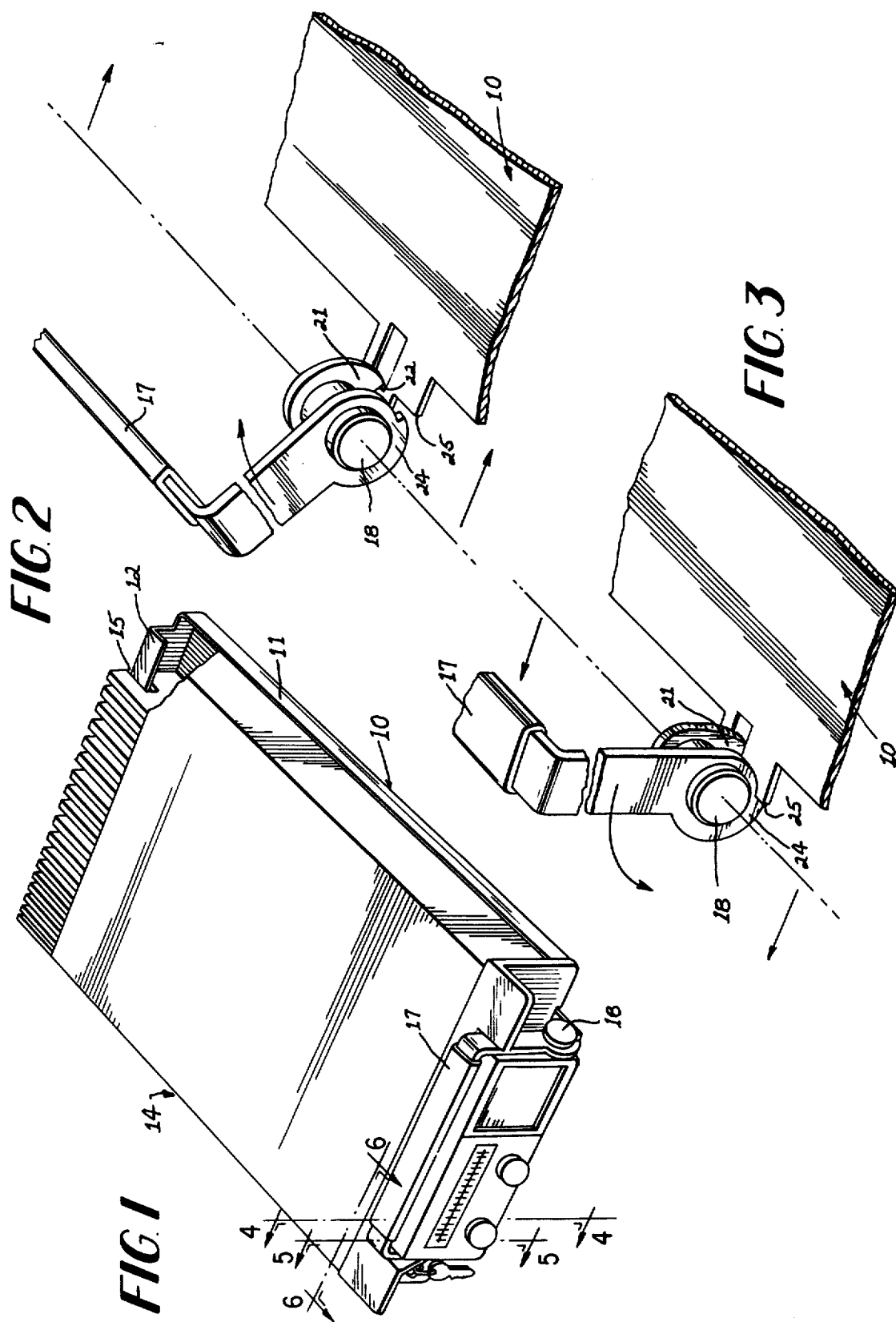


FIG. 4

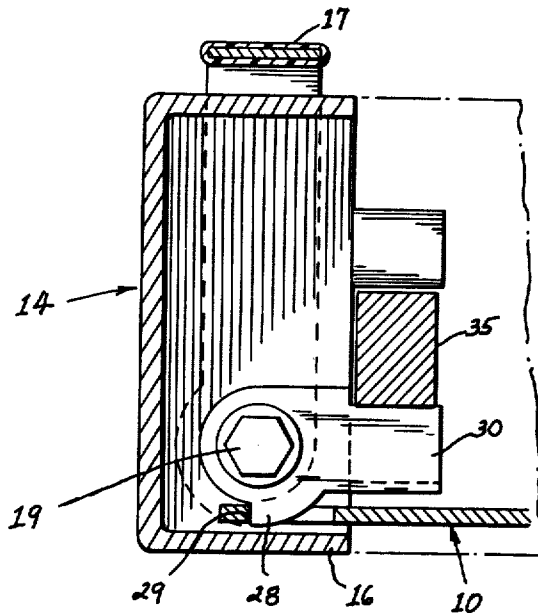


FIG. 5

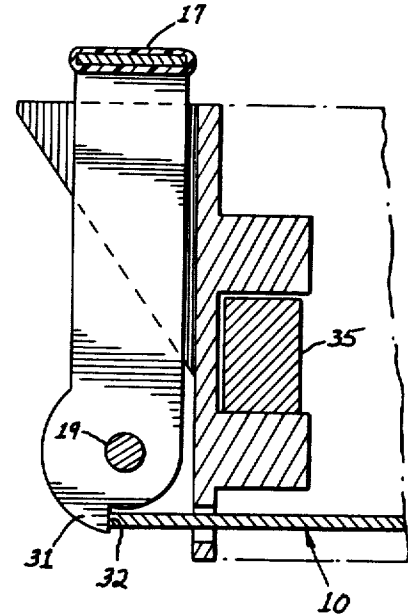
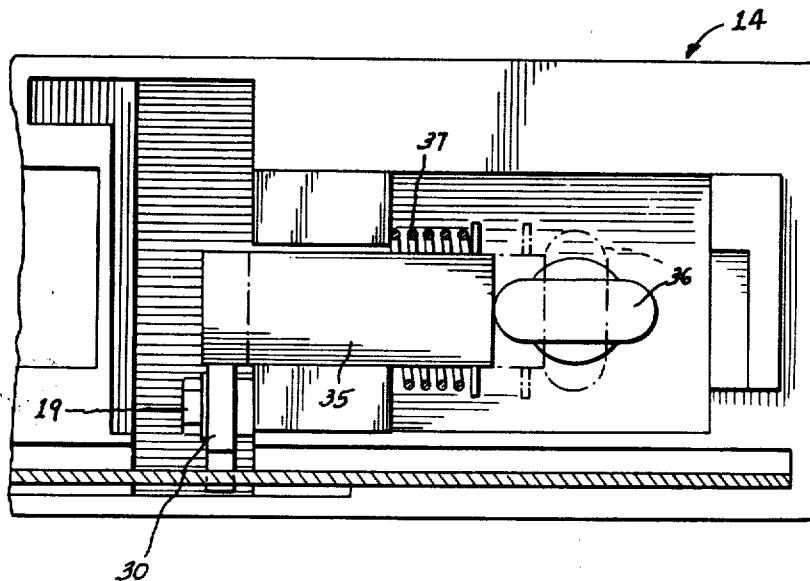


FIG. 6



INSERTING AND REMOVING ARRANGEMENT FOR RADIO EQUIPMENT AND THE LIKE

BACKGROUND OF THE INVENTION

Our invention relates to radio equipment which is mounted in a receptacle. Our invention relates particularly to an arrangement that pulls the equipment into the receptacle by rotation of a handle in one direction, and that pulls the equipment out of the receptacle by rotation of the handle in the opposite direction.

Mobile radio equipment is usually located in a fixed receptacle mounted in a vehicle. The radio equipment should be easily and quickly placed in and removed from its receptacle in the vehicle so as to facilitate service of the equipment. When the radio equipment is placed in the receptacle, it should be securely held and locked so as to avoid vibration and theft.

Accordingly, a primary object of our invention is to provide an arrangement that permits radio equipment to be easily placed in a receptacle, to be securely held and locked while in the receptacle, and to be easily removed from the receptacle.

A number of arrangements have been provided and used for inserting equipment, or for holding equipment, or for removing equipment. However, such arrangements have had one disadvantage or another. For example, such arrangements have required tools, or they have not operated well, or they have not held well, or they have not been easy to operate.

Accordingly, another object of our invention is to provide an inserting and removing arrangement for radio equipment that can be operated without tools.

Another object of our invention is to provide an inserting and removing arrangement for radio equipment that operates easily and well, that holds the equipment securely, and that permits the equipment to be locked.

Another object of our invention is to provide an inserting and removing arrangement for radio equipment that mechanically assists a user in inserting and removing the equipment.

SUMMARY OF THE INVENTION

Briefly, these and other objects are achieved in accordance with our invention by an arrangement having a handle that is located on the front of the radio equipment and that is mounted for rotation by two pivots. At least one of the pivots includes first and second cams. The first cam engages a first fixed surface on the equipment receptacle in such a manner that when the handle is rotated in one direction, the equipment is pulled into the receptacle. The handle can be easily locked in the one rotated position. The second cam engages a second fixed surface on the receptacle in such a manner that when the handle is rotated in the opposite direction, the equipment is pulled out of the receptacle. Additional pulling and security can be provided by a similar arrangement at the other pivot for the handle. The relatively large radius of the handle and the relatively small radius of the cams provides a mechanical advantage that is helpful to the user.

BRIEF DESCRIPTION OF THE DRAWING

The subject matter which we regard as our invention is particularly pointed out and distinctly claimed in the claims. The structure and operation of our invention, together with further objects and advantages, may be better understood from the following description given

in connection with the accompanying drawing, in which:

FIG. 1 shows a perspective view of radio equipment and a receptacle equipped with the inserting and removing arrangement in accordance with our invention;

FIGS. 2 and 3 show perspective views of the inserting and pulling arrangement in accordance with our invention, illustrating how the cams and surfaces engage for pulling the radio equipment into and out of its receptacle; and

FIGS. 4, 5, and 6 show cross-sectional views taken along the lines 4—4, 5—5, and 6—6 respectively of FIG. 1 for further illustrating how the cams and surfaces engage for pulling the radio equipment into its receptacle and locking the equipment, and for pulling the radio equipment out of its receptacle.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a typical example of mobile radio equipment 14 which is positioned in a receptacle 10. The receptacle 10 is securely fastened at some location in the vehicle, such as the trunk of an automobile. When the radio equipment 14 is placed in the receptacle 10, it is desirable that means be provided to assist the user in pulling the equipment 14 into the receptacle 10 and locking the equipment 14 in its receptacle 10. When the equipment 14 is removed from its receptacle 10, it is desirable that means be provided to assist the user in pulling the equipment 14 from the receptacle 10. The arrangement in accordance with our invention provides this assistance to a user. In accordance with our invention, the receptacle 10 comprises a flat plate which receives the equipment 14 and which has sides 11 that prevent the equipment 14 from moving sideways. The receptacle 10 is also provided with a rear retaining member or members 12 which engage retaining slots 15 at the rear of the equipment 14 when the equipment 14 is placed on the plate of the receptacle 10 and pushed toward the rear of the receptacle 10. A handle 17 is mounted on the front of the equipment 14 by two pivots 18, 19. The pivot 19 is not visible in FIG. 1. FIGS. 2 and 3 show details of the right hand pivot 18, which is rotatably mounted in suitable bearings (not shown). The handle 17, an inserting cam 21, and a removing cam 24 are secured to the pivot 18, and all rotate in a fixed relation. At the front of the plate of the receptacle 10, a member extends forward to provide an inserting surface 22 which faces toward the rear of the receptacle 10, and to provide a removing surface 25 which faces toward the front of the receptacle 10. These surfaces 22, 25 are positioned to be respectively engaged by the cams 21, 24. When the equipment 14 is placed in the receptacle 10 and pushed toward the rear, the handle 17 is then rotated in a clockwise direction as viewed in FIG. 2. This rotation causes the inserting cam 21 to engage the inserting surface 22, which in turn pulls the radio equipment into or toward the rear of the receptacle 10 (or to the right as viewed in FIG. 2). The handle 17 and the cams 21, 24 have the position shown in FIG. 3 when the equipment 14 is fully inserted. When the equipment 14 is to be removed, the handle 17 is rotated in a counterclockwise direction as viewed in FIG. 3. This rotation causes the removing cam 24 to engage the removing surface 25, which in turn pulls the equipment 14 out of or toward the front of the receptacle 10 (or to the left as viewed in FIG. 3).

The removing cam 24 and the removing surface 25 are of great benefit, as the equipment 14 sometimes becomes stuck, and any mechanical advantage provided to the user facilitates removal. The mechanical advantage depends on the ratio of the handle radius and the cam radius.

FIGS. 4 and 5 are cross-sectional views taken along the lines 4—4 and 5—5 respectively of FIG. 1, and show details of the left hand pivot 19 of the handle 17. The handle 17, an inserting cam 28, and a removing cam 31 are secured to the pivot 19, and all rotate in a fixed relation with each other, and in a fixed relation with the cams 21, 24. In addition, the inserting cams 21, 28 preferably have the same configuration and relative position, and the removing cams 24, 31 have the same configuration and relative position. At the front of the plate of the receptacle 10, a member extends forward to provide an inserting surface 29 which faces toward the rear of the receptacle 10, and a removing surface 32 which faces toward the front of the receptacle 10. These surfaces 29, 32 are positioned to be respectively engaged by the cams 28, 31, so that the left hand pivot of FIGS. 4 and 5 operates in a manner similar to the operation of the right hand pivot shown in FIGS. 2 and 3. FIGS. 4 and 5 show the equipment 14 fully inserted into and locked in the receptacle 10. In this position, the equipment 14 is held by the cams 21, 28 and their surfaces 22, 29, by the retaining member or members 12 on the receptacle which fit in the slots 15 at the rear (see FIG. 1), and by a retaining flange 16 which is on the equipment 14 and which extends beneath the plate of the receptacle 10 at the front.

While not necessary, we prefer that means be provided for locking the handle 17 when it is rotated to the inserting position shown in FIGS. 1, 4, and 5. This locking can be achieved by a locking member 30 which may be a part of the left hand inserting cam 28. The locking member 30 may be secured in the position shown in FIG. 4 by means of a bolt 35. As shown in FIG. 6, the bolt 35 moves horizontally to the left and right. A spring 37 may be provided and arranged so that it tends to push the bolt 35 toward the unlocked position. An actuating member 36, which may be operated by a key (as shown in FIG. 1) is provided to move the bolt 35 to the locked position, as shown in the solid lines of FIG. 6. When the bolt 35 is in the locked position, it is over the locking member 30, so that the handle 17 cannot be pivoted to remove the equipment 14. When the equipment is to be removed, the actuating member 36 may be rotated by the key to the dashed line position shown in FIG. 6. This permits the spring 37 to push the bolt 35 to the right as shown by the dashed lines. The actuating member 36 and the bolt 35 may be connected so that they will move to both the locked and unlocked positions in the absence of spring 37. When the bolt 35 is in the right or unlocked position, it clears the locking member 30 so that the handle 17 may be pivoted to remove the equipment 14 from its receptacle 10.

It will thus be seen that we have provided an improved arrangement which assists a user in inserting and locking radio equipment in a receptacle, and in removing the radio equipment from the receptacle. While we have shown only one embodiment, persons skilled in the art will appreciate that modifications may be made to our arrangement. For example, only one set of cams and surfaces may be provided for the handle. Or, more

than two sets of cams and surfaces may be provided for the handle. The exact arrangement or shape of the cams and surfaces may be varied, although the configuration we have shown operates well, is relatively inexpensive, and may be easily produced. And of course, the lock may be omitted. Therefore, while our invention has been described with reference to a particular embodiment, it is to be understood that modifications may be made without departing from the spirit of the invention or from the scope of the claims.

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

1. An improved arrangement for inserting radio equipment and the like in a receptacle and for removing radio equipment and the like from a receptacle, said improved arrangement comprising:

- a. a fixed member positioned on the front of an equipment receptacle, said fixed member having a first opening bounded on one side by a first inserting and locking surface facing toward the rear of said equipment receptacle, and said fixed member further having a first removing surface facing toward the front of said equipment receptacle;
- b. a first pivot mounted on the front of equipment to be inserted in and removed from said equipment receptacle, said first pivot providing rotation about an axis transverse to the direction of insertion and removal;
- c. a first operating handle mounted on said first pivot for rotation thereabout;
- d. a first inserting and locking cam attached to said first operating handle, said first inserting and locking cam having a surface that rotates about said axis, and that engages said first inserting and locking surface and pulls said equipment into said equipment receptacle in response to said first operating handle being rotated in one direction about said axis;
- e. and a first removing cam attached to said first operating handle, said first removing cam having a surface that rotates about said axis, and that engages said first removing surface and pulls said equipment out of said equipment receptacle in response to said first operating handle being rotated in a second direction about said axis and opposite said first direction.

2. The improved arrangement of claim 1 wherein:

- a. said first opening, said first inserting and locking surface, and said first removing surface are positioned near one side of said equipment receptacle;
- b. wherein said first pivot is positioned near said one side of said equipment to be inserted;
- c. wherein said first inserting and locking cam is positioned near said one side of said equipment to be inserted;
- d. wherein said first removing cam is positioned near one side of said equipment to be inserted and removed from said equipment receptacle; said arrangement further comprising:
- e. said fixed member further having a second opening positioned near the opposite side of said equipment receptacle, said second opening being bounded on one side by a second inserting and locking surface positioned near said opposite side of said equipment and facing toward the rear of said equipment receptacle; and said fixed member further having a second removing surface positioned near said op-

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posite side of said equipment receptacle and facing toward the front of said equipment receptacle;

- f. a second pivot mounted on the front of said equipment to be inserted in and removed from said equipment receptacle, said second pivot being positioned near said opposite side of said equipment for providing rotation about an axis coincident with said axis of said first pivot;
- g. a second operating handle mounted on said second pivot for rotation thereabout;
- h. a second inserting and locking cam attached to said second operating handle, said second inserting and locking cam being positioned near said opposite side of said equipment and having a surface that rotates about said axis, and that engages said second inserting and locking surface and pulls said

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equipment into said equipment receptacle in response to said second handle being rotated in said one direction about said axis; and

- i. a second removing cam attached to said second operating handle, said second removing cam being positioned near said opposite side of said equipment and having a surface that rotates about said axis, and that engages said second removing surface and pulls said equipment out of said equipment receptacle in response to said second operating handle being rotated in said second direction about said axis.

3. The improved arrangement of claim 2, and further comprising means joining said first and second operating handles to cause said handles to operate together.

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