This invention relates to improvements in slide structures for drawers, shelves, and the like.

The main objects of this invention are:

First, to provide a slide structure for drawers, shelves and the like which is easy in operation and at the same time free from vibration and rattling and hence well adapted for supporting the shelves and shelf-like members in radiophones and the like disclosed in the lid in.

Second, to provide a slide structure having these advantages which is simple and inexpensive in its parts, the parts are easily assembled and at the same time durable and which do not rattle or vibrate even after long continued wear.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary perspective view of a radio-phonograph combination equipped with a slide structure embodying my invention for slidably supporting the phonograph instrument.

Fig. 2 is an enlarged fragmentary perspective view illustrating a slide rail and its relation to the supported member.

Fig. 3 is an enlarged fragmentary section on a line corresponding to line 2—3 of Fig. 2.

Fig. 4 is a plan view of one of the slide bars constituting in effect a case for the anti-friction balls.

Fig. 5 is an enlarged fragmentary view illustrating a detail of the sliding structure for connection to the edge of the supported member opposite from the edge shown in Fig. 3, the sliding bar for holding the anti-friction balls being in end elevation and the slide for connection to the supported member being in section.

Fig. 6 is a fragmentary view partially in section on the line 5—6 of Fig. 3.

The embodiment of the invention disclosed is a modification of slide structure for drawers, shelves and the like disclosed in my Patent No. 2,370,861, granted March 6, 1945.

It has heretofore been the general practice in the manufacture of phonograph cabinets and radio-phonograph combination cabinets to provide the cabinets having at least one half the top thereof removed for opening to expose the phonograph mechanism. This opening of the lid is unhandy and likewise prevents the cabinet being conveniently used as a table or stand or support for books, papers, pictures, lamps and the like. It has been proposed to provide drawer or shelf-like slides for supporting the phonograph mechanism, leaving the same to be pulled out for access. So far as applicant is aware much difficulty has been experienced in providing a durable and suitably rigid structure and one free from vibrations.

My present invention relates to a slide structure which is particularly well adapted for such uses but it will be apparent it has many applications in other fields. The structure yields durable and permitting free and easy manipulation and retraction of the slidably supported member, at the same time prevents rattling or vibration.

In the embodiment of my invention illustrated, 1 represents a radio-phonograph combination cabinet having a compartment 2 provided with a door 3 for the phonograph mechanism shown conventionally at 4. This phonograph mechanism is mounted on a shelf or base 5 which is the supported member or element of my slide combination.

The slide structure in the embodiment illustrated comprises the supporting rails 6 of channel section disposed in inwardly facing relation on opposite side walls of the compartment in which the supported element is housed and is designed to receive the supported element or member 5 and whatever may be arranged thereon.

These rails 6 of channel section are formed from suitable sheet metal stock having substantial spring quality, the legs 7 of the rails being conformed to provide inwardly facing concave ball races or ways 8, the ways or races of opposed legs being in opposed relation, as clearly shown in Figs. 2 and 3. The slide bars 9 are also of channel section and are disposed between the legs 7 of the rails to face inwardly, these members being of such shape and dimensions as to be entirely out of contact with the rails in their operating relation. The web portions 10 of the rails 9 have turned ends 11 providing stops limiting the travel of slide bars within the rails.

The legs 12 of the slide bars 9 are provided with opposed holes 13 receiving the anti-friction ball members 14. In forming the holes, I preferably strike out portions 15 on the inner sides of the legs and portions 16 on the outer sides of the legs. The struck-out portions 15 are disposed along opposite edges of the openings 13 in a line extending transversely of the slide bar, and the struck-out portions 16 are disposed along opposite edges of the openings in a line extending...
longitudinally of the bar. The struck-out or bent-out portions 16 and 18 alternate with each other around the peripheries of the openings. This slide bar in effect constitutes a cage for the balls. It will be noted by reference to Figs. 3 and 5 that the ball engaging surfaces 161 of the struck-out portions 16 are curved vertically to engage the balls 114, and by reference to Fig. 4 that they are curved horizontally to engage the balls. These surfaces so curved constitute portions of concave spherical surfaces having a radius of curvature only slightly greater than the radius of curvature of the balls so that while permitting single point contact of the ball there with they serve as aligning means and quite closely engage the balls. As shown in Fig. 3, the axes 152 of rotation of the balls as they rotate along the ways 8 are disposed in alignment with the concave spherical bearing surfaces 151 on the opposite sides of the ball so that these surfaces constitute bearing surfaces for the balls. As the radius of curvature of the intermediate struck-out portion 16 is greater than that of the portions 15 as shown in Fig. 4, the balls have little or no wearing contact therewith. This facilitates freedom of rotation of the balls in the opening 13 in the slide bar 9.

The supported member 5 is provided with slide members 17 and 18, shown in Figs. 3 and 5. These slides are preferably formed of sheet metal and are secured to the underside of the supported member 5 adjacent the opposite edges thereof by screws, one of which is shown at 19 in Fig. 3. The slides 17 and 18 are disposed between the rails 14 and slidably supported thereby, the legs of the rails being under spring tension when the parts are assembled so that they constantly urge the assembled parts yielding together to eliminate rattle and vibration.

The slide member 17 is provided with a flat ball engaging portion 20 so as to permit lateral movement thereof between the rails and thus prevent any bending and avoid the necessity for great accuracy in mounting the parts and for variations in cabinet structure and the shrinking and swelling commonly incident to wood structures as a result of atmospheric conditions. The slide 17 is provided with a downwardly offset portion 21 which extends longitudinally of the slide and is slightly spaced from the balls to permit lateral movement of the flat portion 20 between the balls.

The slide 18 is conformed to provide a ball race or way 22, as shown in Fig. 5, which serves as a lateral guide for the supported member. This slide also has a downward offset 23 to compensate for the upward offset resulting from the forming of the ball way 22 in the slide.

I have illustrated and described my improvements in a very practical embodiment thereof. It is believed that this will enable the application of my invention to a wide variety of uses, particularly where free, easy operation is desired and where the structure should be free from vibration. I have not attempted to illustrate various other embodiments or adaptations which I contemplate as a 1 believe this disclosure will enable those skilled in the art to embody or adapt my invention as may be desired.

Having thus described the invention what is claimed as new and desired to secure by Letters Patent is:

1. In a slide structure, the combination with a supported member, of slide members disposed on said supported member to project from the
with a ball, slide members being slidably mounted between said balls.

3. In a slide structure, the combination with a supported member, of slide members on said supported member to project from the sides thereof, supporting rails of channel section disposed in inwardly facing relation at the sides of the supported member, said supporting rails having inwardly facing longitudinal ball ways in the legs thereof, slide bars of channel section disposed in inwardly facing relation and within said rails and having opposed ball openings in the legs thereof, and balls arranged in said openings to rollingly engage said ways of said rails, said last mentioned legs having concave spherical bearing surfaces disposed along the edges of the openings thereof at opposite ends of the axes of rotation of the balls in said ways, the radius of curvature of the concave spherical bearing surfaces at the opposite ends of the axes of rotation of the balls being slightly greater than the radius of curvature of balls against which they bear to facilitate a one point contact of each concave spherical bearing surface with a ball, the bearing surfaces for each ball being disposed in a line extending transversely the direction of travel of its supporting slide bar, and disposed at and adjoining the opposite ends of the axis of rotation of each ball, said slide members being slidably mounted between said balls.

4. In a slide structure, an elongated outer member of channel section having mutually facing longitudinal ball ways in the legs thereof, a slide bar of channel section disposed within the channel of said outer member and having ball openings in each of the legs thereof, balls arranged in said openings, and an elongated member disposed between the balls in the legs of the slide bar to be rollingly engaged between said balls, the legs of the slide bar being provided with concave bearing surfaces for said balls of a radius of curvature slightly exceeding that of the balls to facilitate a one point contact of a concave bearing surface with a ball, said bearing surfaces being disposed in pairs, the bearing surfaces of a pair being disposed along the opposite edges of a ball opening and in a line extending transversely of the sliding bar and at and adjoining the opposite ends of the axis of rotation of a ball in said opening and in said ball way.

5. In a slide structure, an outer elongated member of channel section having mutually facing longitudinal ball ways in the legs thereof, a slide bar of channel section disposed within the channel of said outer member and having ball openings in each of the legs thereof, balls arranged in the openings thereof for rollingly engaging the ball ways in the legs of the outer channel member, the legs of the sliding bar having bent-out portions provided with concave spherical bearing surfaces for said balls, the bearing surfaces being disposed in pairs, the bearing surfaces of a pair being disposed on opposite sides of a ball opening and in a line extending transversely of the direction of travel of the slide bar, said bearing surfaces constituting the sole bearing surfaces on the sliding bar for said balls, and an elongated supporting member disposed between the balls in the legs of the sliding bar to be rollingly engaged between said balls.

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

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<table>
<thead>
<tr>
<th>Number</th>
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<tbody>
<tr>
<td>1,494,012</td>
<td>Parsons</td>
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<td>2,370,861</td>
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