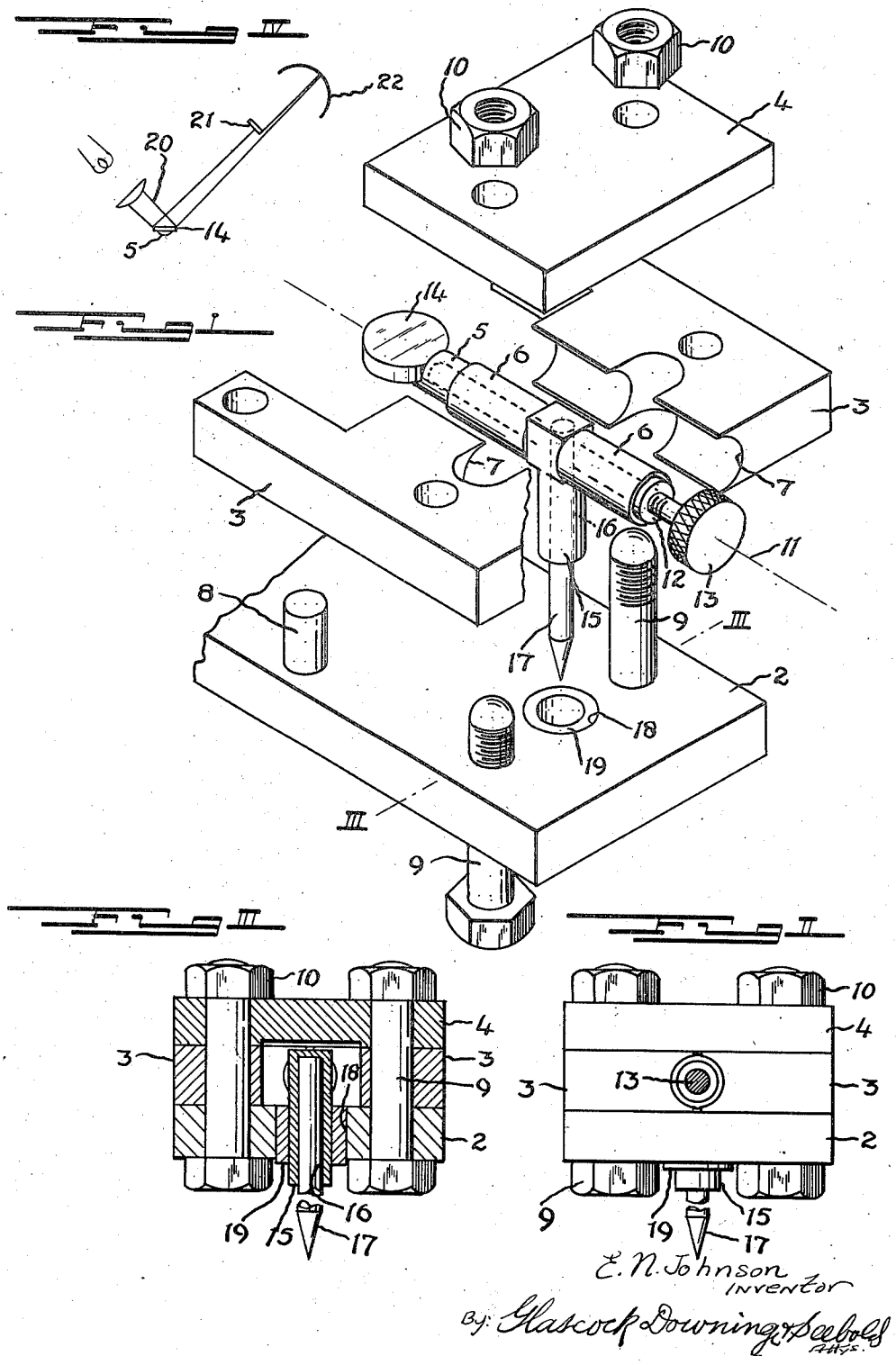
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PHOTOELECTRIC SOUND PICK-UP

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PHOTOELECTRIC SOUND PICK-UP

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The present invention relates to sound pick-ups of the kind in which the oscillating stylus-carrier carries a mirror whereby a beam of light is oscillated correspondingly with the stylus and in turn actuates a photo-electric cell.

The object of the invention is to provide a stylus carrier for such a pick-up which has notably small mass and moment of inertia and in which the centralizing force can be made low enough to permit the stylus to follow the sound track with extreme accuracy.

According to the invention there is provided a stylus carrier comprising a spindle mounted on the tone arm to oscillate about its axis and comprising also means to secure a stylus in a position perpendicular to said axis, a mirror on said spindle, and means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

The means for securing the stylus may comprise a socket arranged between the ends of the spindle, rigid with and perpendicular thereto, and a clamping screw entering one end of the spindle. The centralizing of the stylus carrier and its damping may be effected by separate means, but conveniently there is provided a hole in the tone arm through which the stylus socket extends and there is compressed within the hole and around the socket a sleeve of material such as rubber which acts as a spring to centralize the carrier and also as a damper for absorbing its kinetic energy.

The means for mounting the spindle may comprise rubber sleeving on the spindle, opposite rigid half bearing members forced on to the sleeving to compress it, and means to fix said members in the compressing position. Said bearing members may be pivoted to the tone arm and swung about their pivots to bring them into compressing contact with the sleeving. The half bearing members are surmounted by a cap plate, and bolts serve to position the half bearings in their sleeve-compressing position and to clamp said cap plate and said members to the tone arm.

The invention further comprises the separate stylus carrier as hereafter described.

An example of the invention is shown in the accompanying drawing, in which:

Figure I is a dismembered view of the end of the tone arm and the parts associated therewith.

Figure II is a end view of Figure I with the parts assembled.

Figure III is a vertical cross section on III—III, Figure I.

Figure IV illustrates the operation of the device.

2 indicates the end of the tone arm; 3, 3 half bearing members for the stylus carrier; and 4 a cap plate by which said members are secured to the tone arm.

The stylus carrier comprises the spindle 5; the ends of which are adapted to act as the journals of a rubber bearing and are fitted with the rubber bearing sleeves 6, 6. The members 3, 3 are formed with half round grooves 7 which engage and compress the sleeves 6, 6. To facilitate such compression and the accurate positioning of the stylus carrier, the members 3, 3 are pivoted on pins 8 projecting up from the tone arm. The members 3 are first swung apart on said pivots sufficiently to admit the spindle 5 and its sleeves 6. They are then pressed towards one another sufficiently to compress and grip the sleeves and are there held by the fitting bolts 9 which pass through the tone arm, said members and the cap 4. The parts are finally secured by the nuts 10. The rubber sleeves 6 permit the spindle to oscillate to the necessary extent about its axis 11, without material lateral displacement from said axis. One end 12 of the spindle is bored and screw threaded to receive the stylus clamping screw 13. At the other end, and near to the axis 11, there is rigidly fixed the mirror 14 by which a light beam is deflected.

The stylus carrier further includes the stylus socket 15, which is rigid with the spindle and projects at right angles to the latter. Said socket is formed with a bore 16 to receive the stylus 17; said bore 16 intersecting and extending upward beyond the bore for the clamping screw 13 so that the stylus bears against the wall of its socket both above and below the clamping screw.

The socket 15 passes through a hole 18 in the tone arm. Compressed in said hole and around the socket is a sleeve 19 of rubber or other material capable of functioning as a spring to centralize the stylus and as a damping medium to dissipate the kinetic energy which the stylus carrier and the stylus continually acquire when the pick-up is in operation.

In use, the parts are assembled as indicated in Figures II and III so that the stylus carrier can oscillate about its axis 11, subject to the centralizing and damping effect of the sleeve 19. It is thus oscillated by the stylus following the laterally cut sound track of a gramophone record. A stationary beam of light 20, Figure IV, is di-

rected onto the mirror 14 and by it is oscillated correspondingly with oscillations of the stylus. The oscillating beam after modulation, as by a fixed cut-off 21, is caused so to influence photo-electric apparatus 22 as to produce electric oscillations which in turn are converted into sound.

It will be noted that a large proportion of the mass of the stylus carrier is concentrated about the axis 11 and therefore has a low moment of inertia. The only members of which the moment of inertia is significant are the stylus 17 itself and the stylus socket 15. The moment of inertia of the latter is however very small; and the centralizing and damping force can consequently be made small so that the stylus readily follows the full lateral range of the sound track without materially tending to oscillate the tone arm itself.

I claim:

1. In a photo-electric sound pick-up the combination with a support, of a stylus carrier comprising a straight spindle mounted in the support to oscillate about its longitudinal axis and comprising also a transverse stylus socket, the spindle having an axial bore intersecting the stylus socket and screw threaded to receive a stylus clamping screw, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, and means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

2. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket; a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, and means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

3. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also means to secure a stylus in a position transverse to said axis, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, rubber sleeving on the spindle, opposite half bearing members forced onto the sleeving to compress it, means to fix said members in the compressing position, and further means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

4. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis, and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, rubber sleeving on the spindle, opposite half bearing members forced onto the sleeving to compress it, means to fix said members in the compressing position, and further means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

5. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also means to secure a stylus in a position transverse to said axis, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, rubber sleeving on the spindle, opposite half bearing members which are pivoted on the support and are swung about their pivots to compress the sleeving, a cap plate, bolts serving to position the half bearing members in sleeve compressing relationship and to clamp said cap plate and said members to the support, and further means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

6. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, opposite half bearing members which are pivoted on the support and are swung about their pivots to compress the sleeving, a cap plate, bolts serving to position the half bearing members in sleeve compressing relationship and to clamp said cap plate and said members to the support, and further means whereby the carrier is elastically centralized and its kinetic energy is absorbed.

7. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, and means which bears on the socket at opposite sides in the direction of its oscillation whereby the carrier is elastically centralized, and means whereby its kinetic energy is absorbed.

8. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, rubber sleeving on the spindle, opposite half bearing members forced onto the sleeving to compress it, means to fix said members in the compressing position and means which bears on the socket at opposite sides in the direction of its oscillation whereby the carrier is elastically centralized, and means whereby its kinetic energy is absorbed.

9. In a photo-electric sound pick-up, the combination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, the support having a hole through which the stylus socket extends, and a sleeve compressed into the hole and around the socket, said sleeve being of material having elastic and energy-absorbing properties.

10. In a photo-electric sound pick-up, the com-

bination with a support of a stylus carrier comprising a spindle mounted on the support to oscillate about its axis and comprising also a stylus socket rigidly extending transversely from the spindle which is bored at one end to receive a clamping screw for securing the stylus in said socket, a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis, rubber sleeving on the spindle, opposite half bearing members forced onto the sleeving to compress it, means to fix said members in the compressing position, the support having a hole through which the stylus socket extends, and a sleeve compressed into the hole and around the socket, said sleeve being of material having elastic and energy-absorbing properties.

11. A pick-up stylus carrier comprising a spindle, a stylus-receiving socket integral with the spindle and extending transversely therefrom, the spindle having an axial bore extending from one end to intersect the stylus socket and screw threaded suitably to receive a stylus clamping screw, and a mirror rigid with the spindle and having its reflecting surface approximately in a plane including the spindle axis.

12. The carrier claimed in claim 11 in which the stylus-receiving socket is positioned at about the centre of the length of the spindle and the external surface of the spindle from said socket to its ends is a plain cylindrical journal surface of uniform diameter.

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