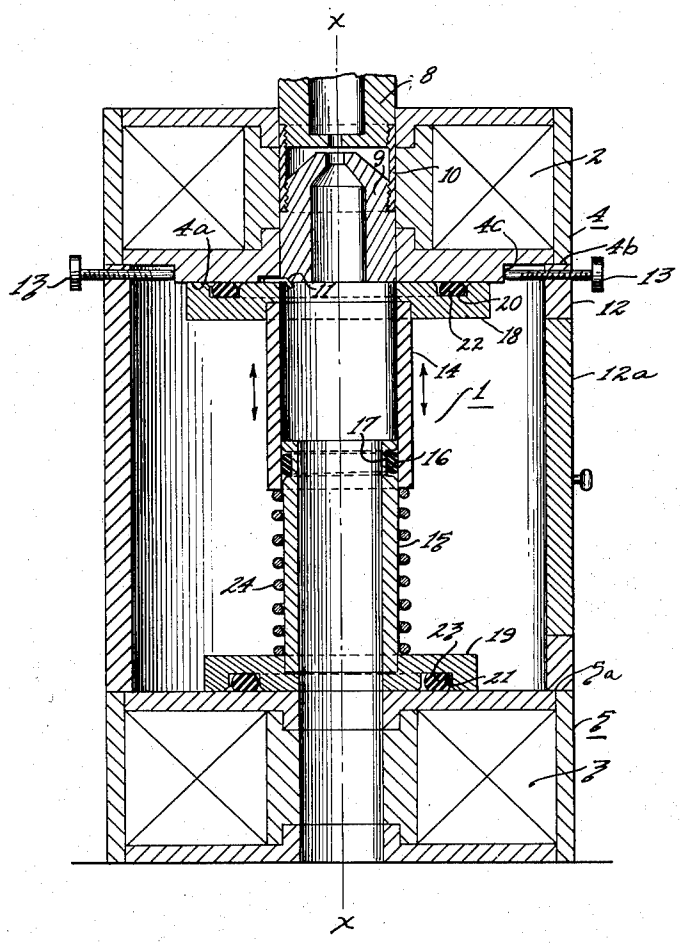
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DEMOUNTABLE VACUUM-TIGHT SEAL

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DEMOUNTABLE VACUUMTIGHT SEAL

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This invention relates to demountable vacuum-tight seals for high-vacuum apparatus and will be described as applied to an electron-optical instrument wherein the seal, when assembled, forms part of a conduit through which electrons pass from one lens chamber of the instrument to another and, when disassembled, permits access to the interior of said chambers for the purpose of cleaning the same or aligning or replacing the lens elements therein.

The principal object of the invention is to provide an improved vacuum-tight seal of the general character described, and one characterized by the ease and rapidity with which it may be assembled and disassembled without the use of a wrench or other tool.

Another and important object of the invention is to provide a demountable vacuum-tight connection between the various compartments of an electron-optical instrument and one which shall provide magnetic and electrostatic shielding of the space between the said compartments.

The accompanying drawing shows, in vertical section, so much of an electron-optical instrument as is necessary for a complete understanding of the present invention. Here the demountable joint of the invention, which is indicated generally at 1, forms part of a vacuum-tight conduit having an electron-optical axis x—x along which electrons travel from an upper source (not shown) through the magnetic focusing fields provided by a pair of electromagnets 2 and 3 to a lower target (not shown). The magnets 2 and 3 are contained in toroidal shape brass housings 4 and 5, respectively. The central bore of one or both of these magnet housings may contain a pair of pole-pieces 8 and 9 mounted in predetermined spaced relation as on a collar 10. This pole-piece assembly 8, 9, 10 is shown maintained within the bore of the upper housing or conduit member 4 by a small pivoted finger 11 on the lower face 4a of the said member and is removable as a unit (e. g. to facilitate cleaning) when the joint 1 is demounted. In the instant case the space between the upper and lower conduit members 4 and 5 is fixed by the length of a cylindrical pedestal 12 which rests upon the upper major face 5a of the lower member 5 and upon which the lower rim portion 4B of the upper member 4 rests. The upper conduit member 4 has a sliding fit on the pedestal 12 and this permits a limited degree of lateral movement which may be applied to the said conduit member, for purposes of alignment, by a number (preferably three) of adjusting screws 13 which extend

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through the pedestal into contact with a dependent rim 4c surrounding the lower plane face 4a of the said conduit member.

The pedestal 12 upon which the upper conduit member 4 rests is provided with a door 12a through which access may be had to the demountable joint 1 of the invention. This joint comprises an expansible-contractible assembly of two telescopically arranged hollow cylinders 14 and 15 which is rendered vacuum-tight about its inner circumference by a gasket 16 seated in an annular groove 17 adjacent to the inner end of the cylinder 15 of smaller diameter. The free end of each of the cylinders 14 and 15 terminates in an outwardly extending flange 18, 19 respectively, and each flange is provided on its outer major surface with a circular groove 20, 21 within which an annular gasket 22, 23 is received. The overall length of the telescopic cylinders 14, and 15, when in their illustrated extended condition, is at least as great as the distance between the two axially aligned conduit members 4 and 5 which they serve to connect. The oppositely located flanges 18 and 19 on the cylinders 14 and 15, and the gaskets 22 and 23 thereon, are urged into intimate contact with the end faces 4a and 5a, respectively, of the spaced apart conduit members 4 and 5 by means of a helical spring 24 which is wrapped about the outer surface of the smaller cylinder 15 so that it exerts its biasing force in opposite directions against the inner end of the larger cylinder 14 and against the top major surface of the flange 19 of the small cylinder 15. Obviously, to remove the joint 1 from its position between the conduit members 4 and 5 it is merely necessary to push the upper cylinder 14 down against the force of the spring 24 and to remove the telescoped assembly, whereupon all parts of the interior of the conduit are accessible for cleaning.

When, as in the instant case, the joint of the invention forms part of a conduit through which electrons (or other elementary electrically-charged particles) travel, the telescopic cylinders 14 and 15 and the flanges 18 and 19 thereon, may be constituted of soft iron or equivalent (ferromagnetic) material capable of shielding the interior of the conduit from stray magnetic and electric fields capable of deflecting or otherwise altering the path of the electrons within the circuit.

It will now be apparent that the present invention provides a readily demountable vacuum-tight seal and one especially adapted for use in connection with electron-optical instruments.

What is claimed is:

1. A demountable joint for connecting two spaced apart electron-conduit members mounted in spaced relation along a common axis, said joint comprising an expansible-contractible assembly of two telescopically arranged hollow cylinders adapted to surround said axis in the space between said conduit members, said hollow cylinders being constituted of a ferromagnetic material whereby they comprise a magnetic shield for electrons in their journey between said spaced apart electron-conduit members.

2. In an electron microscope including a column portion, a section of said column forming a chamber bounded by end faces, an access opening for said section, and a door for said opening, the improvement consisting of a collapsible unit in said chamber and forming a portion of the electron channel of said column, said unit comprising at least two telescopically arranged hollow cylinders having an expanded length at least as great as the distance between said end faces and a collapsed length such that the unit is capable of passing through said opening, the free

ends of said cylinders having annular flanges adapted to be presented to said end faces.

3. Apparatus according to claim 2 wherein a gasket is disposed between the inner and outer cylinders of said unit to provide an air-tight seal between the cylinders.

4. Apparatus according to claim 3 wherein said cylinders are composed of ferromagnetic material.

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