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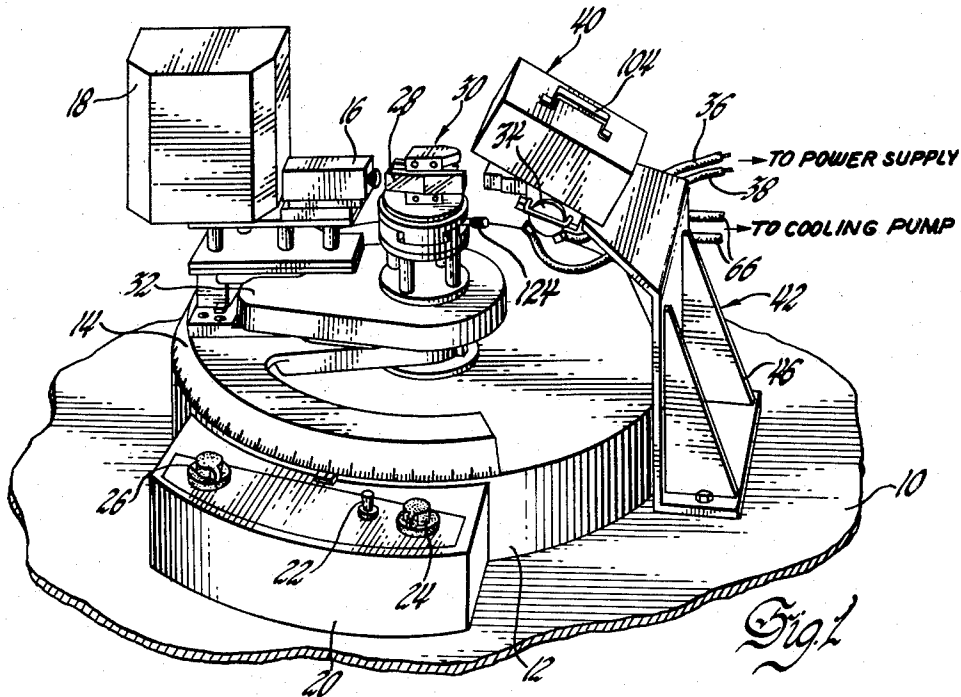
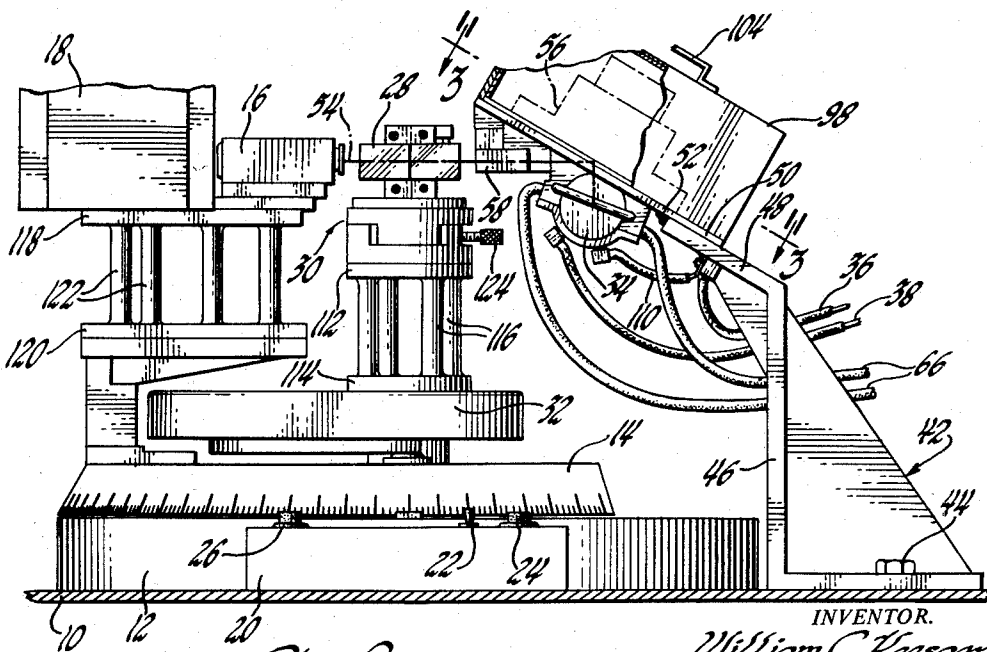
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SPECTROMETER SPECIMEN HOLDER

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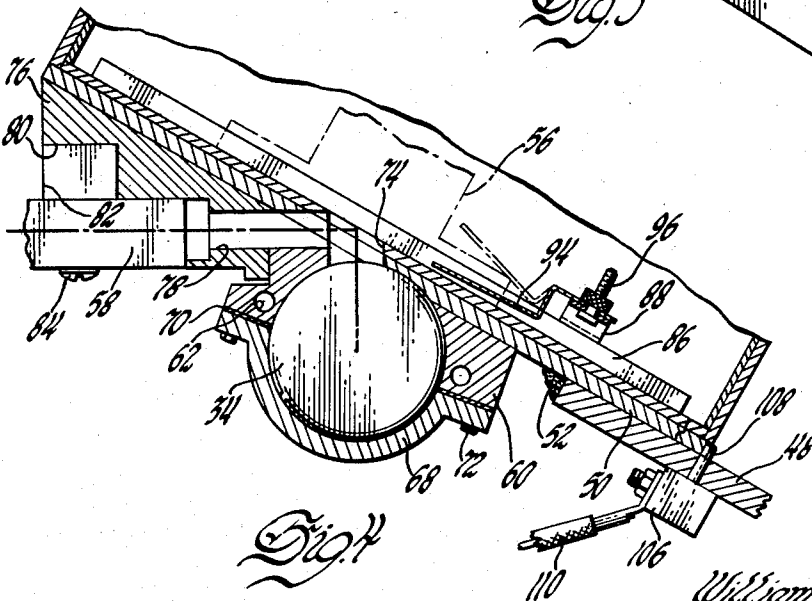


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SPECTROMETER SPECIMEN HOLDER

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5 Claims. (Cl. 250—52)

This invention relates to spectrometers and more particularly to a bulk specimen holder for a spectrometer in which the size of the specimen to be analyzed is not restricted by the equipment.

In generally available spectrometer apparatus a means is provided for holding a specimen to be analyzed in a proper relation with respect to the emitting tube and the analyzing crystal and target. In conventional equipment the specimen holder is designed for small specimens, restricting the use of the rather expensive apparatus to analyzing parts of a small nature, or making it necessary to cut up and destroy larger parts in order to get a specimen small enough to fit in the specimen retaining apparatus. For example, a large gear which is to be analyzed by spectrometry and which is too large to be retained in the apparatus, must have a portion cut from it small enough to fit in the spectrometer specimen holder, thus destroying the gear for any further use.

The device in which this invention is embodied comprises a specimen receiving table mounted over the emitting tube and above the remainder of the spectrometer apparatus. The table is not limited to the size of the part to be analyzed, as long as the part can be placed over a central port in the table through which the emitted rays may be deflected. Pedestals are provided for the spectrometer analyzing crystal mounting and for the target mounting in order to properly align the crystal and the target with the ray emissions. With a device of this kind it is not necessary to cut up and destroy production parts in order to obtain a sample of a size to be readily analyzed. Thus, a much more economical operation is provided and one that makes the specimen mounting much more accessible to the equipment operator. Greater versatility is also provided, and increased adaptability to production processes.

In the drawings:

Figure 1 is a perspective view of a typical spectrometer showing the addition of the specimen table and mounting pedestals.

Figure 2 is an elevational view of the device shown in Figure 1 showing the location of the various parts.

Figure 3 is a plan view of the mounting table of Figure 2 taken substantially along the line 3—3 of Figure 2 and looking in the direction of the arrows.

Figure 4 is a side view of the mounting table of Figure 2 with parts broken away and in section and taken substantially along the line 4—4 of Figure 3.

Referring more particularly to the drawings, a conventional spectrometer apparatus is shown in Figure 1. The apparatus is mounted on a suitable support, such as a table 10, and consists generally of a base 12 having the sliding arcuate scale 14 suitably mounted and geared thereon. As in conventional spectrometer apparatus, a means is provided for rotating the scale 14 and such means are generally placed within the base 12. Mounted on the scale 14 is a collimating tube 16 which passes the emitted rays to the preamplifier assembly 18, from which the signals are passed to suitable receiving apparatus. A

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control box 20, located on the table 10 adjacent the base 12, contains the controls for the motivating means, consisting generally of an on-off switch 22, a manual or automatic control 24 and a speed control 26.

5 An analyzing crystal 28 is secured in a mounting illustrated generally by the numeral 30, the mounting being suitably secured to the arm 32. The arm 32 is geared with respect to the scale 14 such that rotation of the scale also imparts rotation to the arm 32 and the crystal mounting apparatus 30.

10 An X-ray tube 34 is mounted adjacent the machine and has suitable electric leads 36 and 38 from a power supply. The specimen mounting assembly, illustrated generally by the numeral 40, may be mounted either on the machine base 12 or on the table 10 and is secured over the X-ray tube 34.

As may be seen in Figure 2, the bracket assembly 42 is illustrated as being secured to the table 10 as by bolts 44. The bracket extends upwardly as at 46 and angularly as at 48 in order to secure the mounting table 50 in an optimum position over the X-ray tube 34. The table 50 may be welded, as at 52, to the supporting bracket extension 48.

25 In referring to Figure 2, it may be seen that the X-ray emissions from the X-ray tube, illustrated by a dashed and dotted line 54, are emitted from the X-ray tube 34 through the table 50 and deflected from the specimen 56. The deflected rays pass through a beam tunnel 58 which passes the desired emissions to the analyzing crystal 28 and from there to the collimating tube 16 and the amplifier assembly 18.

30 The X-ray tube 34 is secured in a cooling jacket 60 which has passages 62 formed therein and on either side of the tube. A U-shaped portion of copper tubing 64 connects the passages 62 at the end of the X-ray tube 34 to allow circulation through the jacket. Coolant fluid is supplied to the passages 62 by the conduits 66 which connect with a suitable cooling pump. A bottom portion 68 of the cooling jacket is secured to the cooling jacket 60 with a suitable gasket 70 therebetween. The entire assembly is secured to the specimen table 50, as by bolts 72.

35 A port 74, referring to Figures 3 and 4, is formed centrally of the specimen table 50 and located directly over the X-ray tube 34 such that emissions from the X-ray tube will pass directly through the port 74. The specimen 56 to be analyzed, is placed over the port 74 to receive the direct emissions from the tube. In order to accommodate the conventional beam tunnel 58, which sorts out the undesired X-ray emissions deflected from the specimen 56, a stepped block 76 is secured to the underside of the specimen table 50. An opening 78 through the block 76 allows passage of deflected emissions to the beam tunnel 58. A step 80 is provided in the block 76 to receive precision spacer blocks 82 to properly set the beam tunnel 58. The beam tunnel and the spacer blocks are secured to the block 76, as by bolts 84.

40 In order to securely hold the specimen 56 on the upper side of the table 50, a clamping assembly is provided which consists of side rails 86, secured to the upper side of the table 50, and the sliding cross arm 88. The rails 86 are of box-like construction with a longitudinal slot in the top surface to receive T-bolts 90, or the like, which secure the cross arm 88. The rails are secured to the specimen table by bolts or machine screws 92. A spring clip 94 is secured to the cross arm 88 by a bolt 96 and may be placed over a portion of the specimen 56, as shown in dashed and dotted lines in Figure 4, to retain the specimen in the proper position over the port 74.

45 In order to prevent stray X-ray emissions from passing to the atmosphere, a cover 98 is hinged to the table 50 by hinges 100. The cover 98 has the inner surfaces thereof lined with lead 102, or some suitable emission

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absorbing material. The cover is adapted to close over the specimen table 50 and is actuated by a handle 104.

As a safety precaution, and to prevent X-ray emission from the X-ray tube 34 when the cover 98 is open, a pair of micro-switches 106 are secured in the mounting bracket 42 in such a position that the actuating arms 108 are directly beneath the lower edge of the cover 98. The switches 106 are electrically connected in the X-ray tube circuit by wires 110, such that when the switches are opened there is no electrical current flowing to the X-ray tube 34. The switches 106 are set so that the final closing of the cover 98 energizes the circuit to the X-ray tube and permits emission to begin.

In order to accommodate specimens of a size larger than may be retained within the cover 98 it is possible for the machine operator to actuate the micro-switches 106 with the cover open. However, for safety purposes, it is preferred that the switches be operated only by the cover 98.

To place the analyzing crystal 28 in its proper vertical relation with respect to the beam tunnel 58 a pedestal is placed between the arm 32 and the mounting 30. The pedestal consists of upper and lower plates 112 and 114, connected by a plurality of columns 116. Similarly, the collimating tube 16 and the amplifier assembly 18 are raised to the proper vertical level with respect to the beam tunnel 58 and the analyzing crystal 28 by a pedestal consisting of upper and lower plates 118 and 120 connected by a plurality of columns 122. The usual crystal tuning knob 124 is provided in the mounting 30 for fine adjustments of the angularity of the analyzing crystal 28.

It may thus be seen that a specimen mounting assembly for a spectrometer has been shown which does not limit the size of the specimen to be analyzed and does not require that the specimen be taken from a larger part, destroying the usefulness of the larger part. It is not intended to limit the invention by the foregoing description but only by the scope of the appended claims.

I claim:

1. A holder for a bulk specimen to be examined in an X-ray spectrometer having an X-ray tube and an analyzing crystal and a target and comprising a table having a port therein, means supporting said table in angular relation over said X-ray tube, cooling means for said X-ray tube secured to the underside of said table, beam tunnel retaining means secured to the underside of said table and adjacent said port, a cover hingedly secured to said table to enclose the upper surface of said table when a specimen is placed thereon, and switch means adjacent said table and operatively connected to said X-ray tube and actuated by said cover to prevent X-ray emission by said X-ray tube when said cover is in an open position.

2. The holder set forth in claim 1 which further includes clamping means on the upper surface of said table to retain a specimen thereon in the correct position over said port.

3. A holder for a specimen to be examined in an X-ray spectrometer having an X-ray emitting tube, an

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analyzing crystal and an emission counter and comprising a specimen table having an X-ray port located substantially centrally therein, a bracket mounted adjacent said spectrometer and supporting said table in spaced angular relation over said X-ray tube, a cooling jacket surrounding said X-ray tube and secured to the underside of said table adjacent said port therein, a beam tunnel mounting block secured to the underside of said table to retain a beam tunnel in position to transmit X-ray emissions from said X-ray tube when deflected by a specimen placed over said X-ray port, a lead-lined cover hingedly secured to said table to enclose the upper side of said table when a specimen is placed thereon, and a switch secured to said bracket adjacent the edge of said cover and operatively connected to said X-ray tube and actuated by said cover to prevent X-ray emission from said X-ray tube when said cover is in an open position.

4. A holder for a specimen to be examined in an X-ray spectrometer having an X-ray emitting tube, an analyzing crystal and mounting, and an emission counting tube and mounting and comprising a table having a port centrally disposed therein, means for mounting said table over said X-ray tube such that emissions from said tube pass through said port, clamping means on the upper side of said table for retaining a specimen in analyzing position over said port, and switch means adjacent said table for allowing X-ray emissions from said X-ray tube only at the will of an operator.

5. A holder for a specimen to be examined in an X-ray spectrometer having an X-ray emitting tube, an analyzing crystal and mounting, and an emission counting tube and mounting and comprising a table having a port centrally disposed therein, means for mounting said table over said X-ray tube such that emissions from said tube pass through said port, means for retaining a beam tunnel adjacent the underside of said table and adjacent said port therein, first pedestal means for supporting said analyzing crystal and mounting and raising said crystal and mounting to the correct vertical relation with respect to said table such that X-ray emissions from said X-ray tube deflected from said specimen will impinge on said analyzing crystal, second pedestal means supporting said emission counting tube and mounting and placing said tube and mounting in a proper vertical relation with respect to said analyzing crystal, clamping means on the upper side of said table for retaining a specimen in analyzing position over said port, and switch means adjacent said table for allowing X-ray emissions from said X-ray tube only at the will of an operator.

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