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ION-SOURCE POSITIONER

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ION-SOURCE POSITIONER

Roy F. Burton, W. Barclay Jones, and Charles A. Corum

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ION-SOURCE POSITIONER*

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With this device (Fig. 1), we can adjust the position of the ion source inside the vacuum chamber of the 60-inch cyclotron in order to obtain maximum beam current.

For in-out movement, a worm-driven screw slides the ion source shaft through a supporting seal plate. The vacuum seal is made by an "O" ring.

For left-right and up-down movement a horizontal slide plate in a vertical slide frame is used. These are also moved by means of worm-driven screws. The vacuum seal for this double slide arrangement is made by the slide plate moving across the surface of an "O" ring. The plate has bearing pads to maintain the required pressure to compress the "O" ring.

"O" rings were used for moving seals because of their practicality, availability, and minimum space requirements. They have proven quite satisfactory for maintaining the 2×10^{-5} mm Hg vacuum our cyclotron requires.

The movements of the ion source obtained with this mechanism are 1.250 inch of total travel in-out and left-right; and 0.750 inch up-down.

* Work done in part under the auspices of the U. S. Atomic Energy Commission.

Worm-gear reduction results in 0.0083 inch of travel per turn of worm in-out, and 0.0167 inch of travel up-down and left-right.

Remote positioning is accomplished by small electric motors in a "magnetic field-free" area. These motors supply power through cable drives to the worm-driven screws. Linear potentiometers, mounted on the different adjustments, accurately measure the movement. They are electrically connected to meters in the control room that indicate the ion-source positions.

This positioner supports the ion source through its slide plate arrangement in a level position.[†] No tilt can occur. Its independent movements keep the ion-source arc chamber parallel to the magnetic field at all times.

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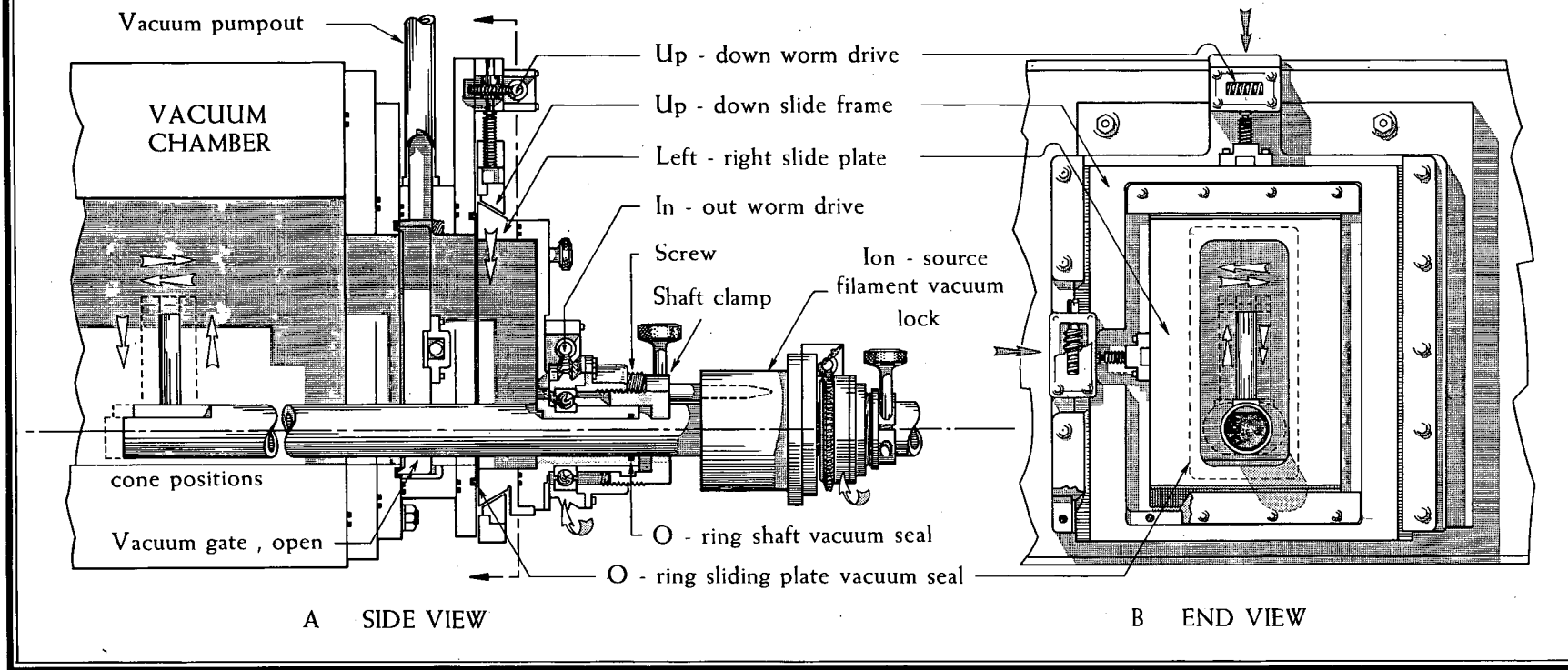
This positioner, designed by Charles A. Corum at the University of California, Berkeley, California, is similar in many respects to one in use at the 42-inch cyclotron at Los Alamos Scientific Laboratory, New Mexico. The authors wish to acknowledge the work of Edward Calhoon in assisting with this report.

[†] An earlier positioner was restricted in its design by a smaller opening in the vacuum chamber than now exists. This necessitated a gimbal arrangement where the ion-source shaft was pivoted about a point outside the vacuum chamber to obtain up-down and left-right movement. This permitted the arc chamber to be tilted as much as 7° off the magnetic field lines. The in-out position was adjusted by varying the location of a stop that determined the ion-source shaft length. All these adjustments at that time were done by hand.

LEGEND

Fig. 1. Ion-source positioner.

ION SOURCE POSITIONER



MUB-282

Fig. 1

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