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TARGET HANDLING DEVICE FOR TIME-OF-FLIGHT APPARATUS

Alexander Babin

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For Reference

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0 0 0 0 3 7 0 0 2 3 5

Preface

During the continuing program of beam-foil research at the Berkeley Hilac, the need arose for a device to allow rapid insertion of the targets into the beam line. A target, being extremely fragile (10 $\mu g/cm^2$), requires protection not only from mechanical damage but also from potential damage due to gas dynamics. A fully mechanical insertion device was desired that would, with high precision and smooth action, mate the target to a turntable mounted on a precision-driven rider in a vacuum exceeding 10^{-6} Torr.

The device and its application, shown in the accompanying photographs, has been developed and tested, and satisfies all these requirements. An especially valuable feature is the protective cover that slips over the target during manipulation. The entire device appears to be reliable and convenient, and usable for many years.

Robert W. Schmieder

0 0 0 0 3 7 0 0 2 3 6

TARGET HANDLING DEVICE FOR TIME-OF-FLIGHT APPARATUS*

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ABSTRACT

A mechanical device is described for holding and inserting a target foil and its protective cover into the beam line of a linear accelerator. The method of operation is graphically demonstrated.

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

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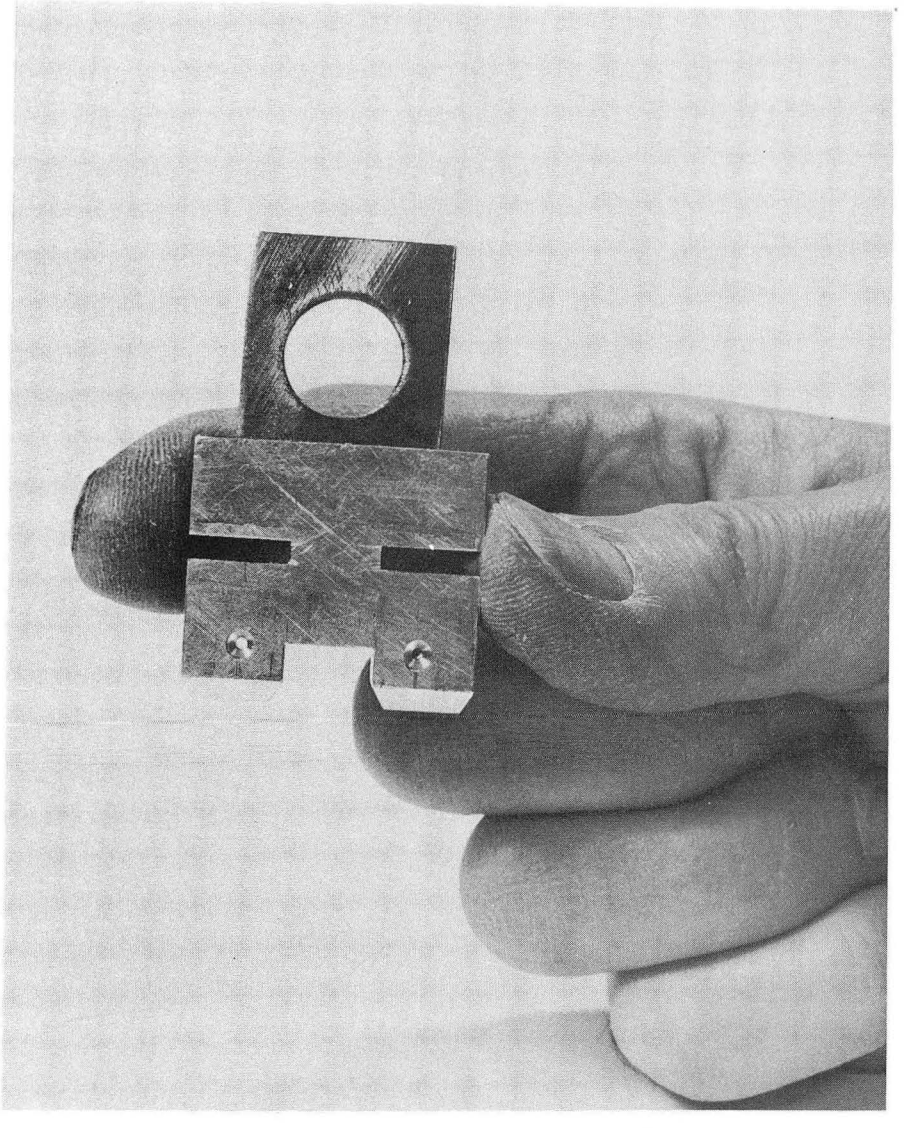
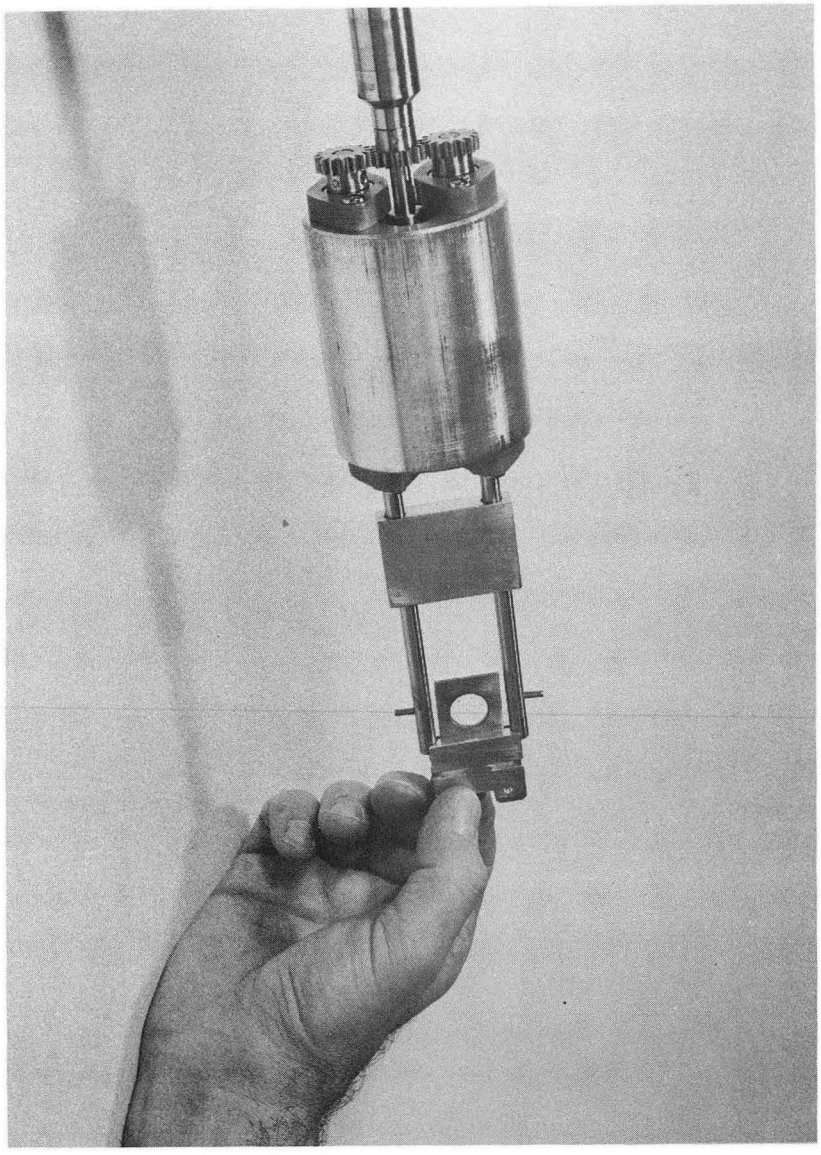


(XBB 722-1150)

Fig. 1. Target-foil holder is a rectangular tantalum plate 22.23×28.65×1.55 mm (0.875×1.128 ×0.061 inches) with a central hole over which a target foil is placed. The holder is clamped into a slot of a special aluminum block.



(XBB 722-1152)

Fig. 2. The target holder is inserted between two 1/4-in. diameter rods, which are part of the piston assembly. The target cover is in a raised position to show insertion of the target holder.

0 0 0 0 3 7 0 3 2 3 8

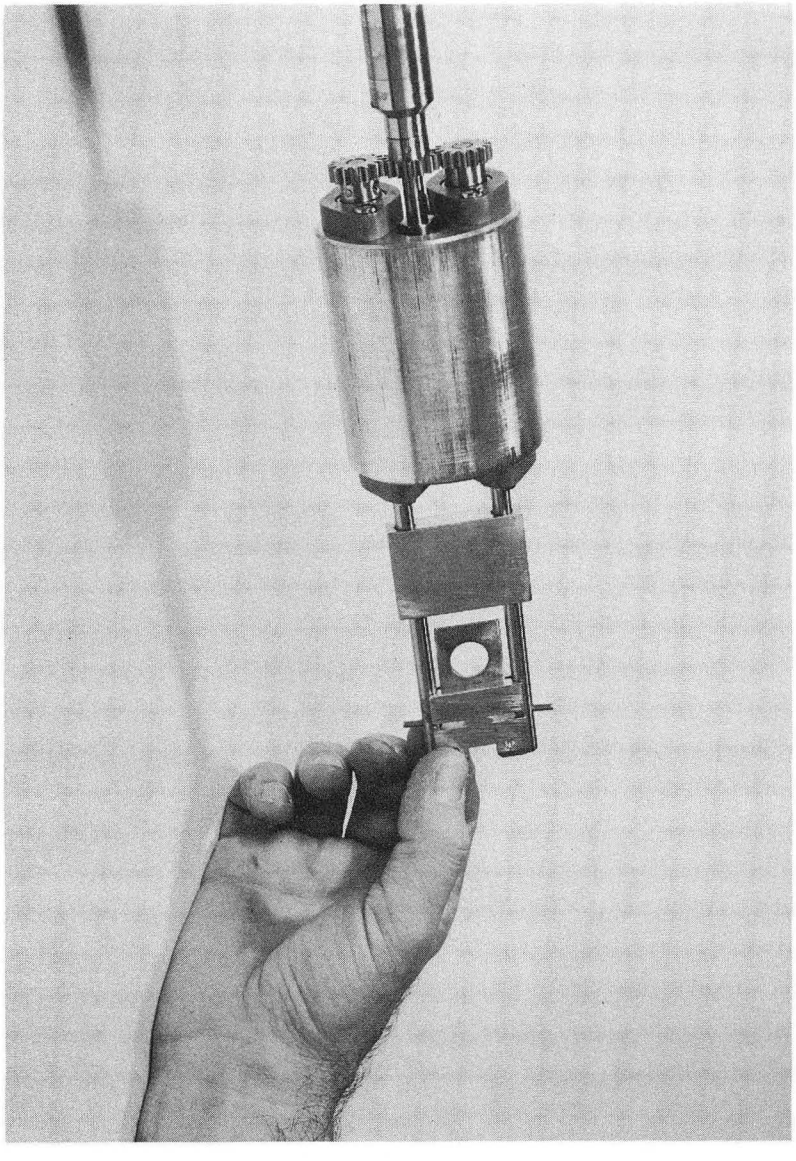


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Fig. 3. The slots in the target-holder block are lined up with the two pins in the shafts.

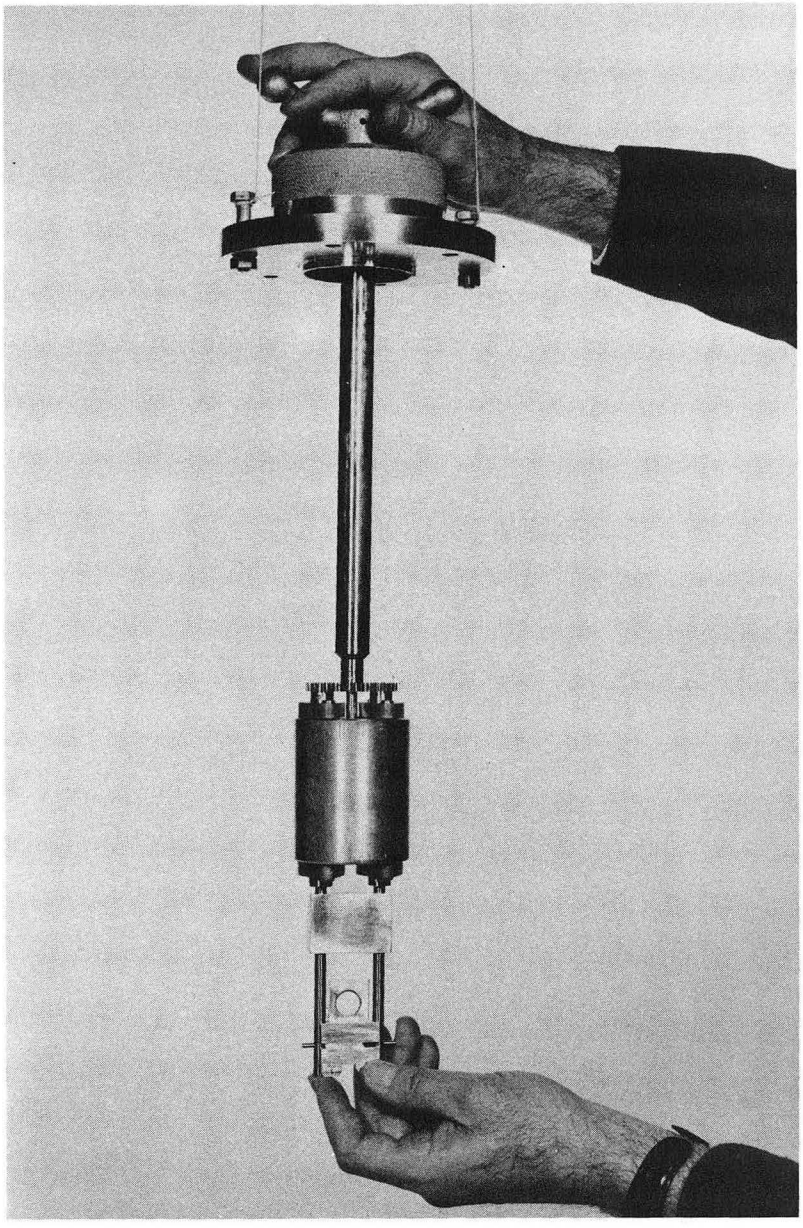

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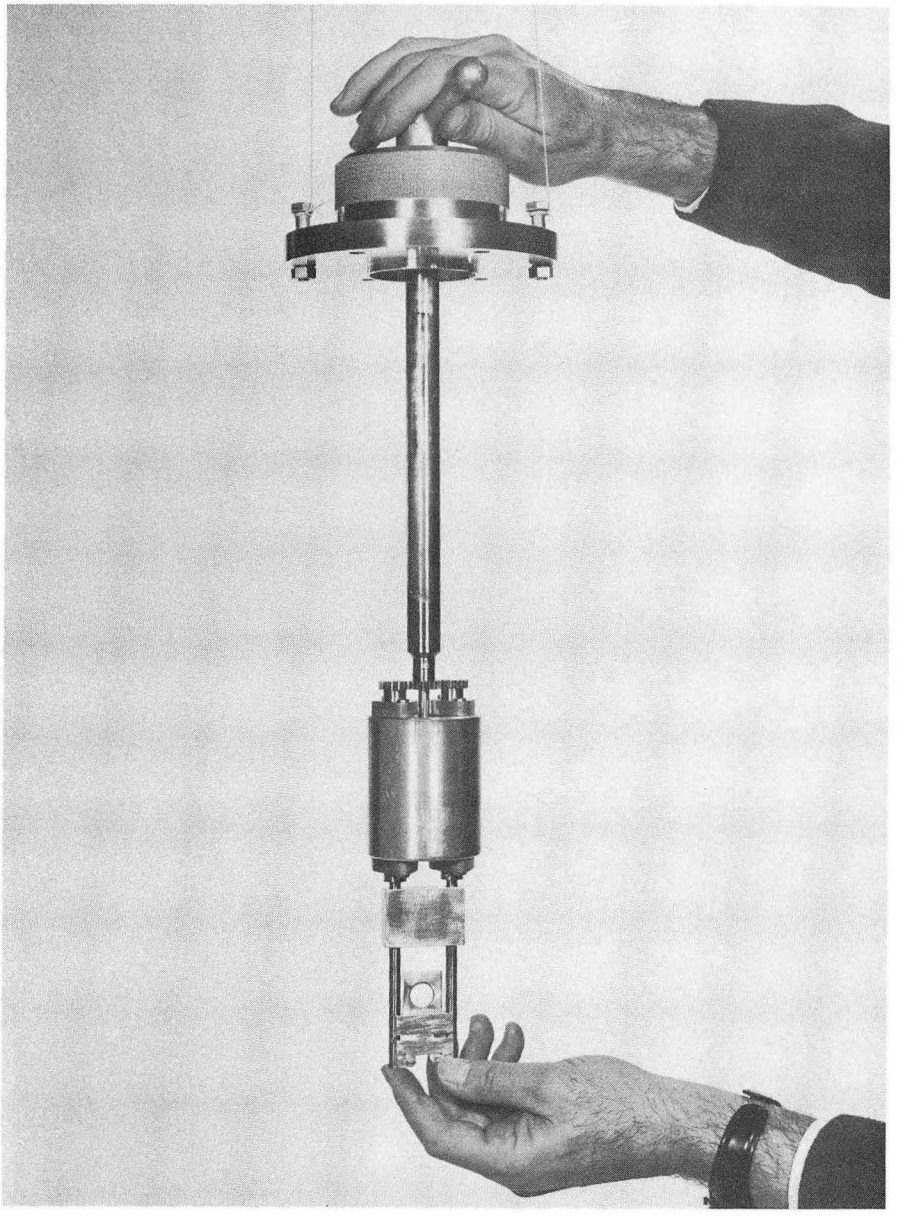
Fig. 4. Rotation of the shaft engages the pins in the slots.

0 0 0 0 3 7 0 0 2 3 9



(XBB 722-1149)

Fig. 5. The pins are engaged.

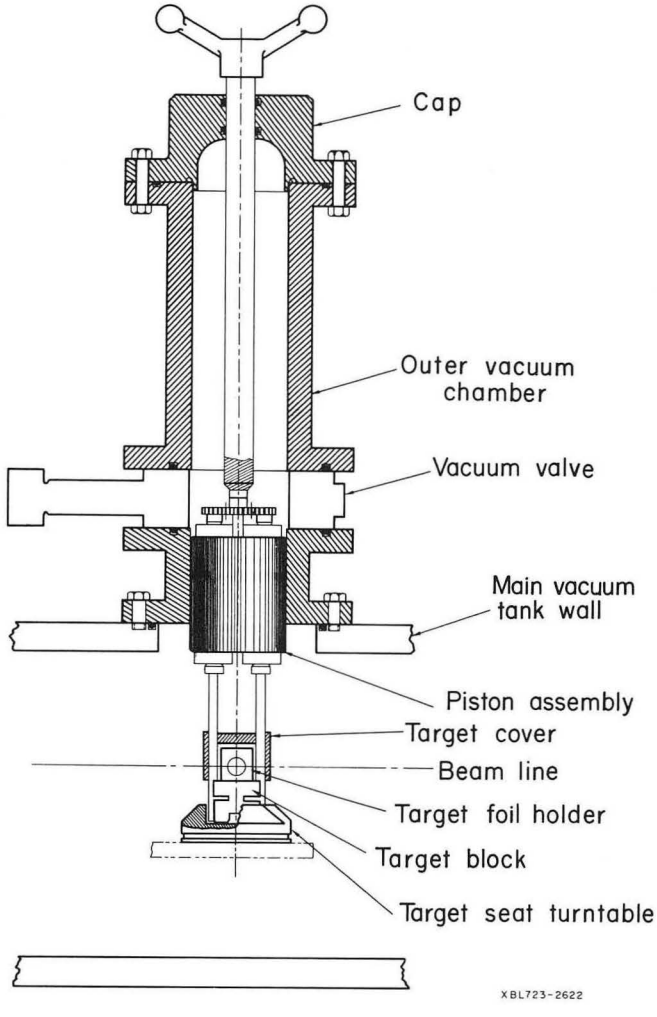
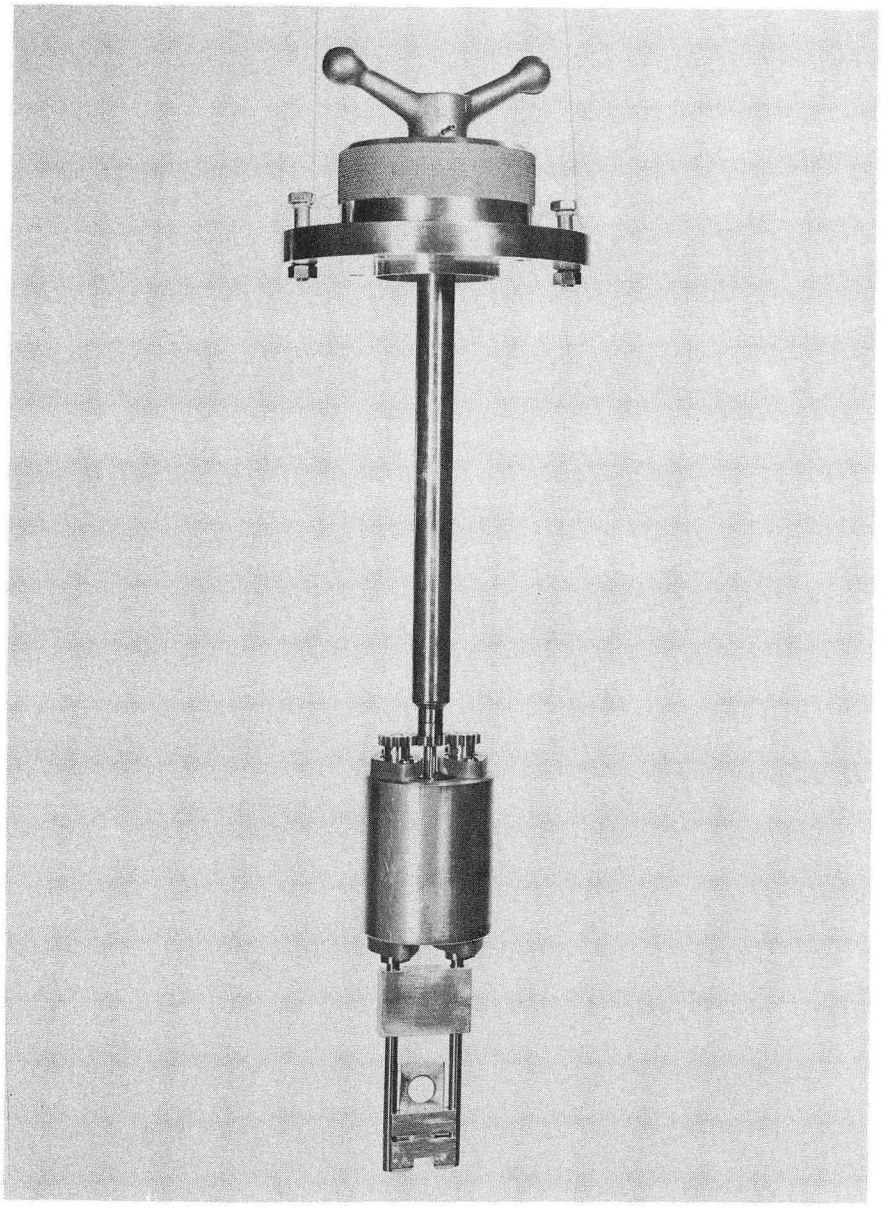
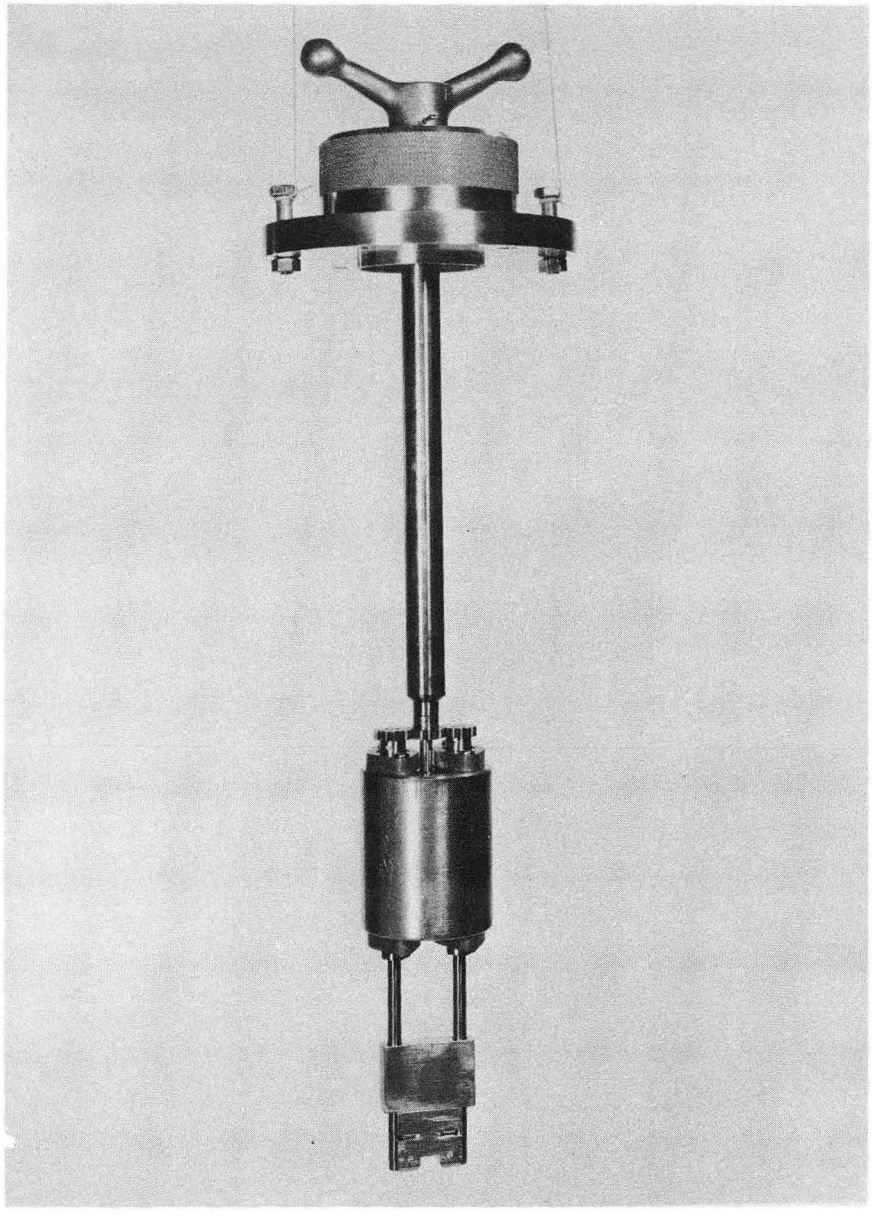


Fig. 6. A schematic drawing of the complete assembly.



(XBB 722-1140)

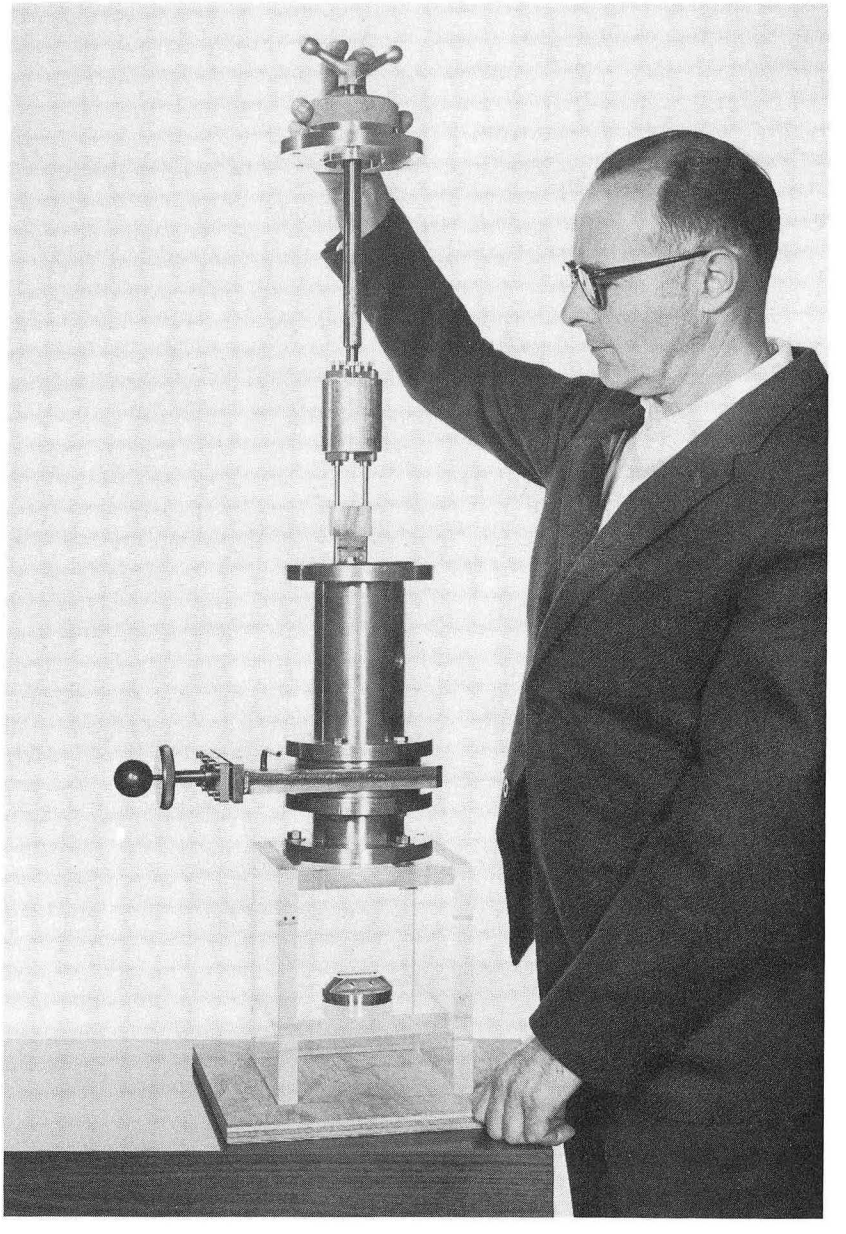
Fig. 7. Target is now firmly held in piston-rod assembly.



(XBB 722-1141)

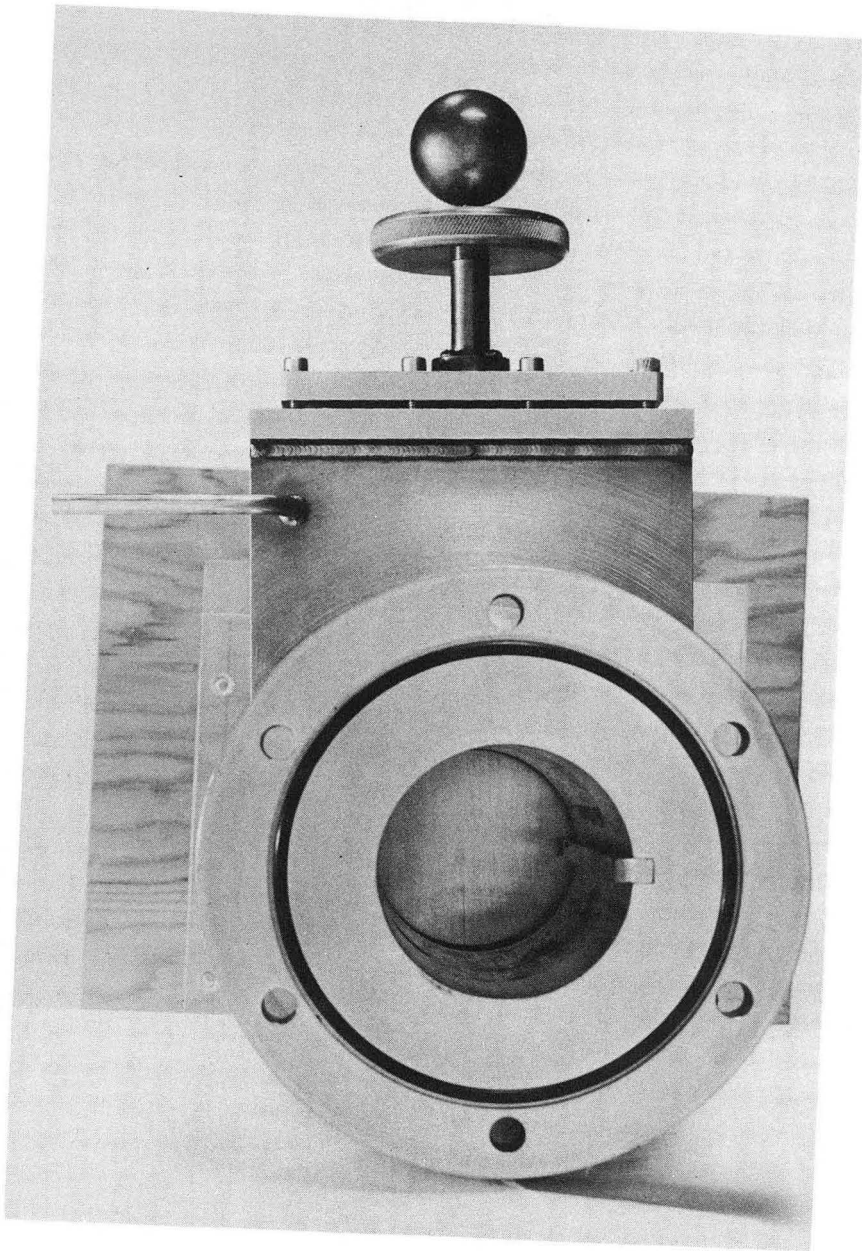
Fig. 8. The aluminum shroud is lowered over the target to protect it against air currents.

0 0 0 0 3 7 0 0 2 4 1



(XBB 722-1146)

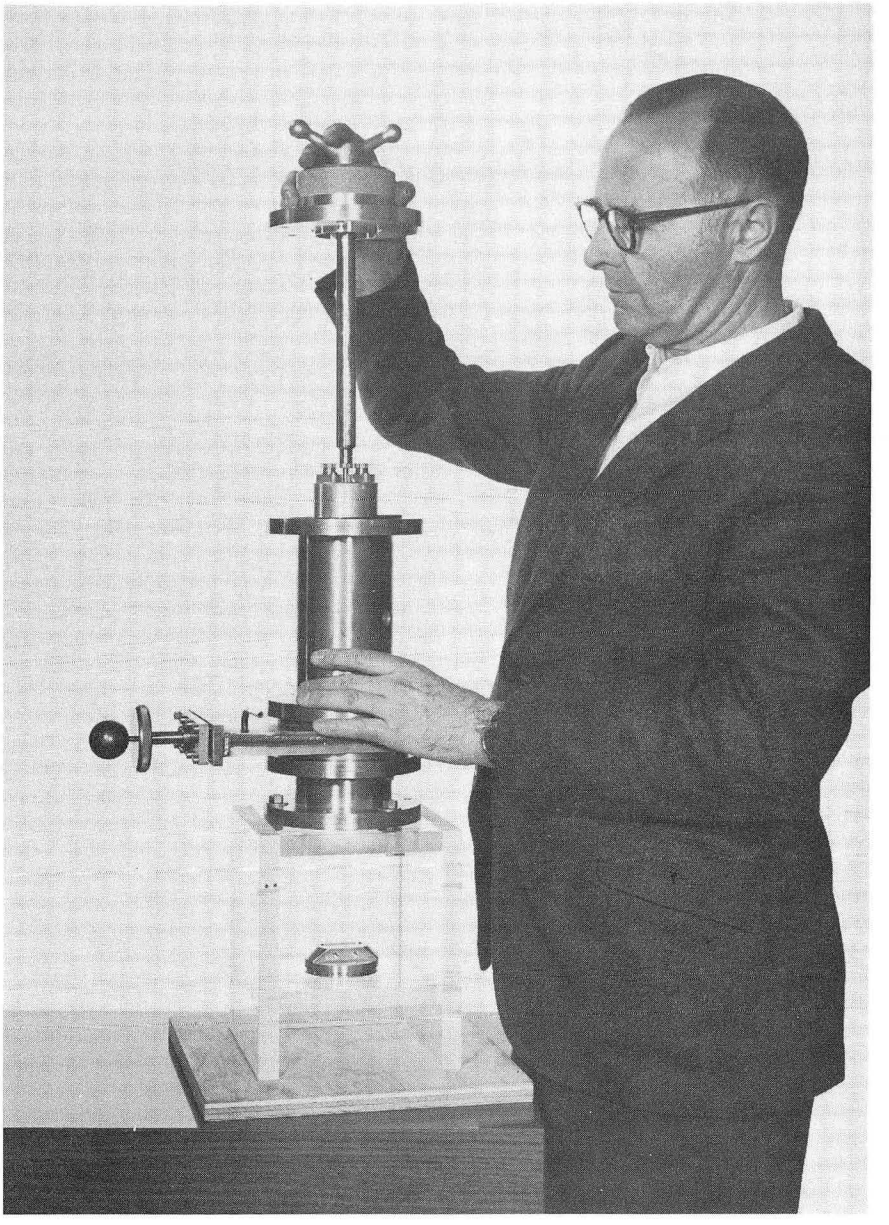
Fig. 9. Complete piston assembly is now ready for insertion in outer vacuum chamber open to the atmosphere, which is attached to a vacuum tank (simulated in plastic). The piston assembly must be properly aligned with the key in the outer vacuum chamber, as shown in the next photo. The valve to the inner chamber is closed.



(XBB 722-1142)

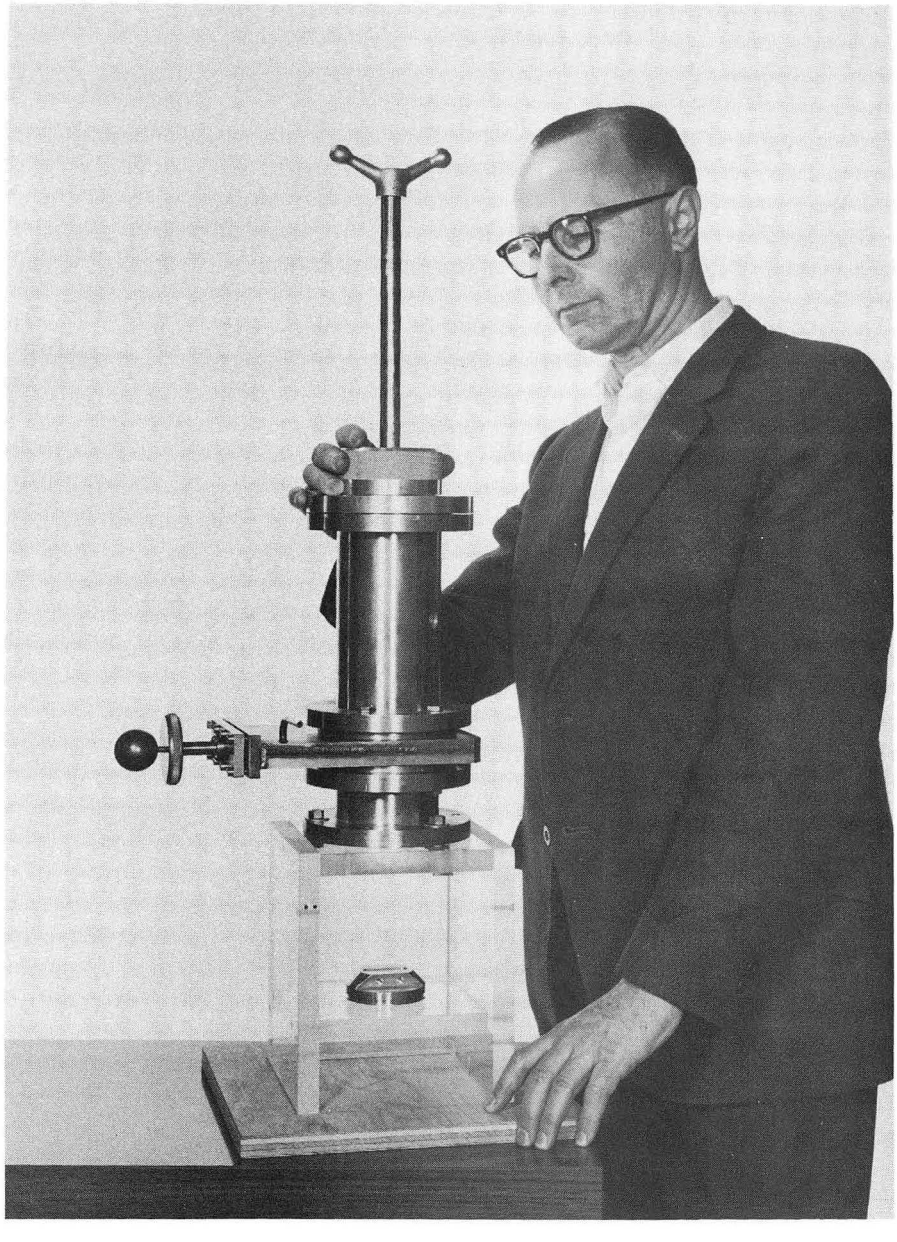
Fig. 10. The inside of the outer chamber with valve closed.

0 0 0 0 3 7 0 0 1 4 2



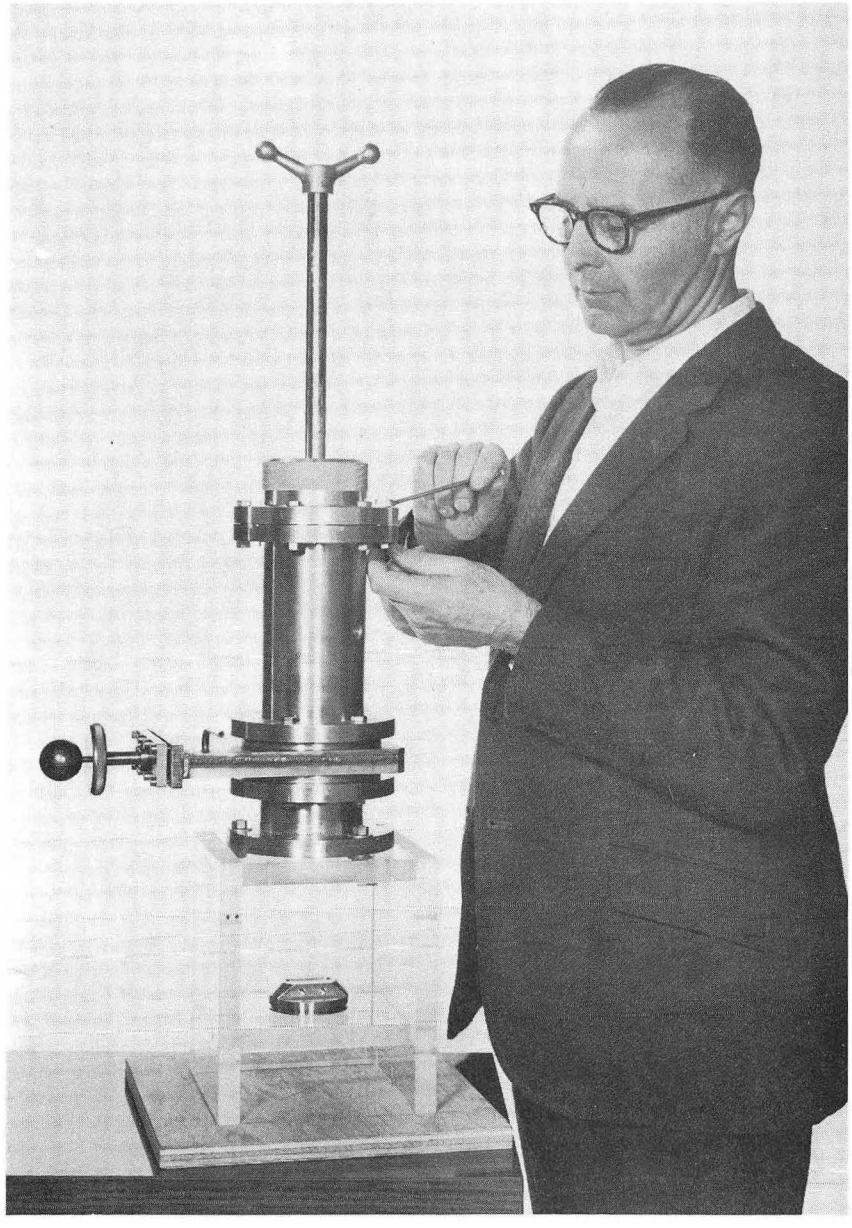
(XBB 722-1144)

Fig. 11. The piston is lowered into the chamber.



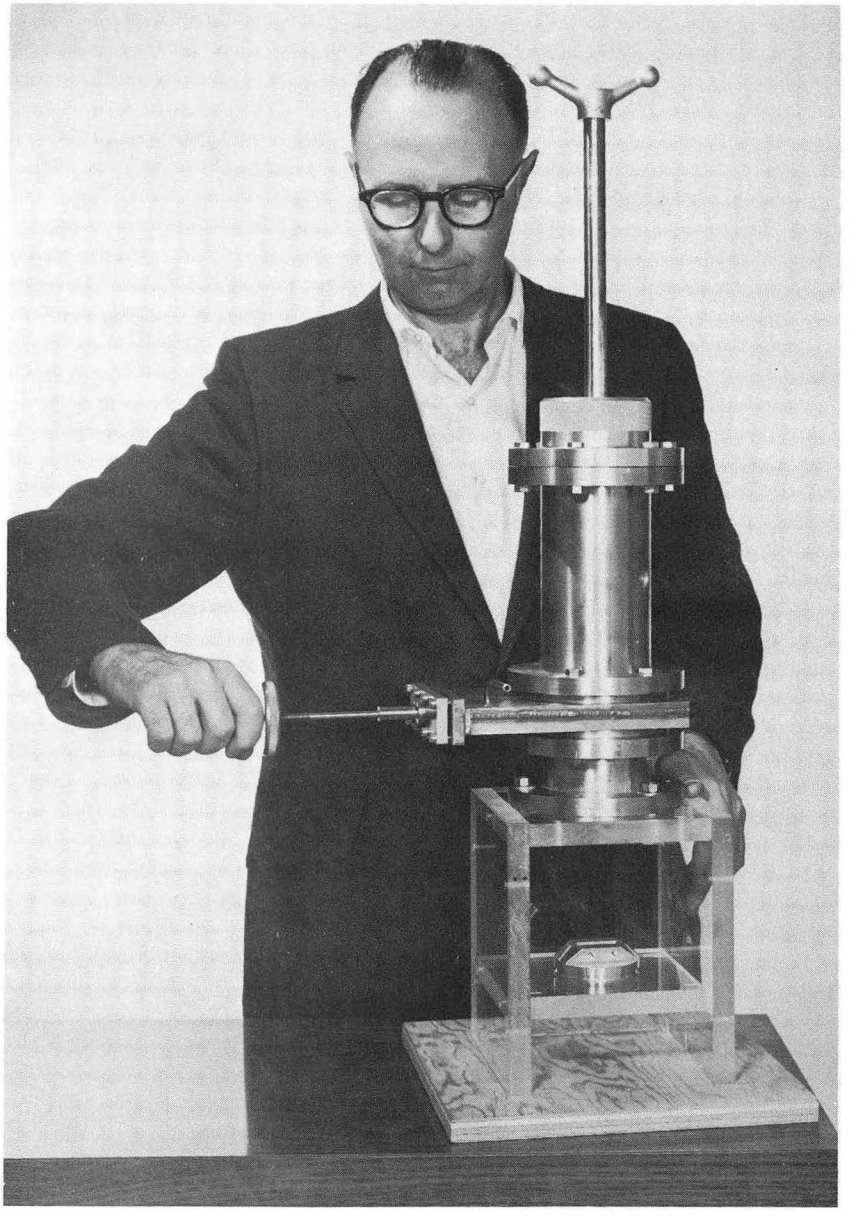
(XBB 722-1145)

Fig. 12. The target is lowered to the closed vacuum valve and the top cap is lowered onto the top of the outer chamber.



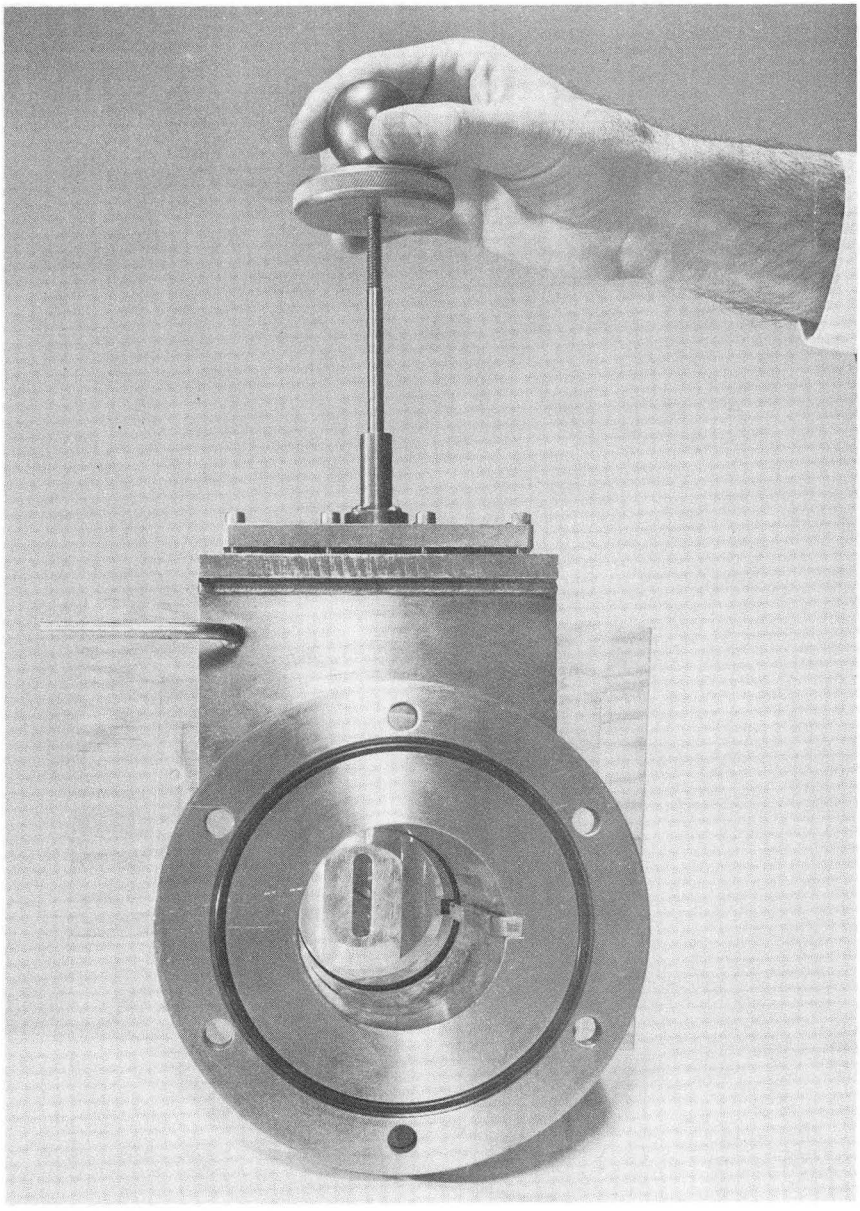
(XBB 722-1154)

Fig. 13. O-ring-equipped flanges are now bolted together and the outer chamber is ready to be evacuated.



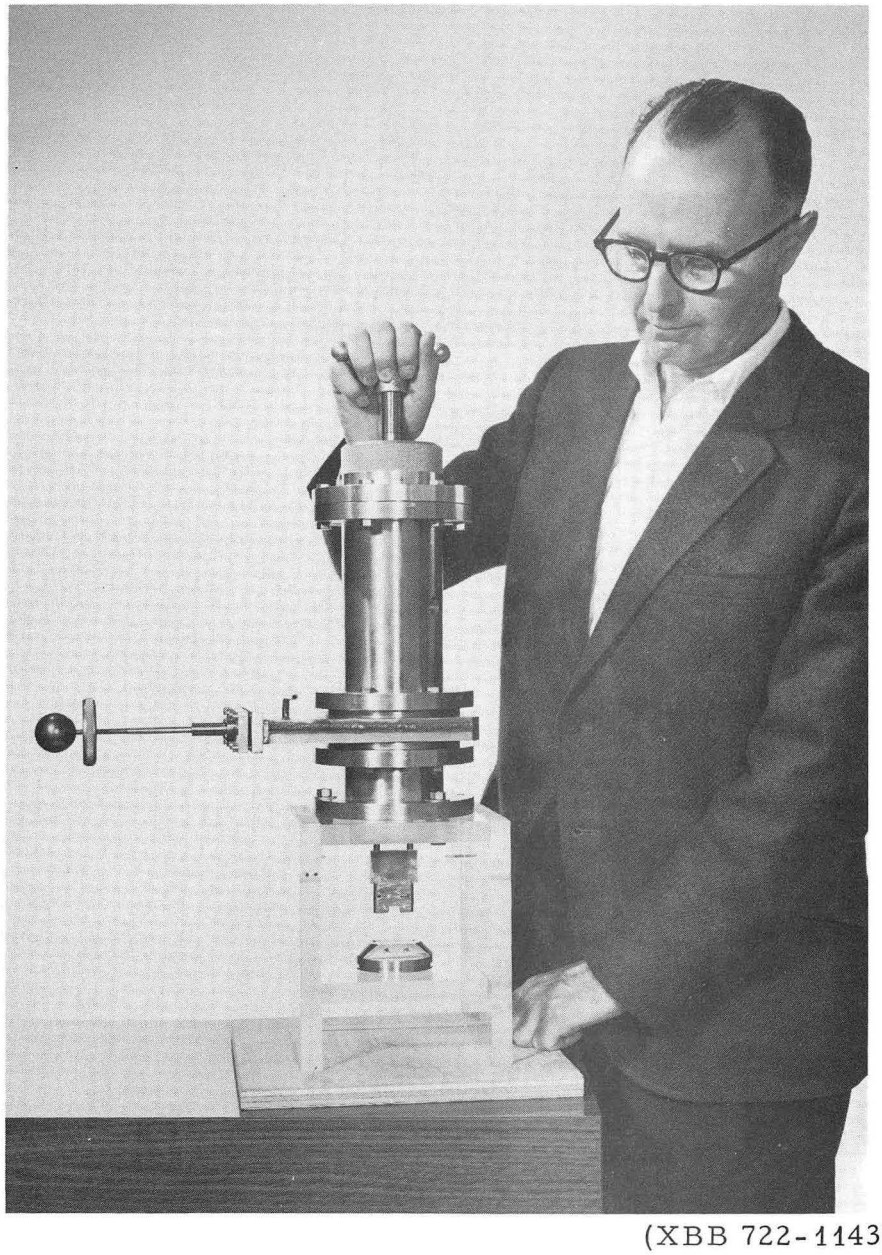
(XBB 722-1156)

Fig. 14. After evacuation, the valve is opened.



XBB 722-1155)

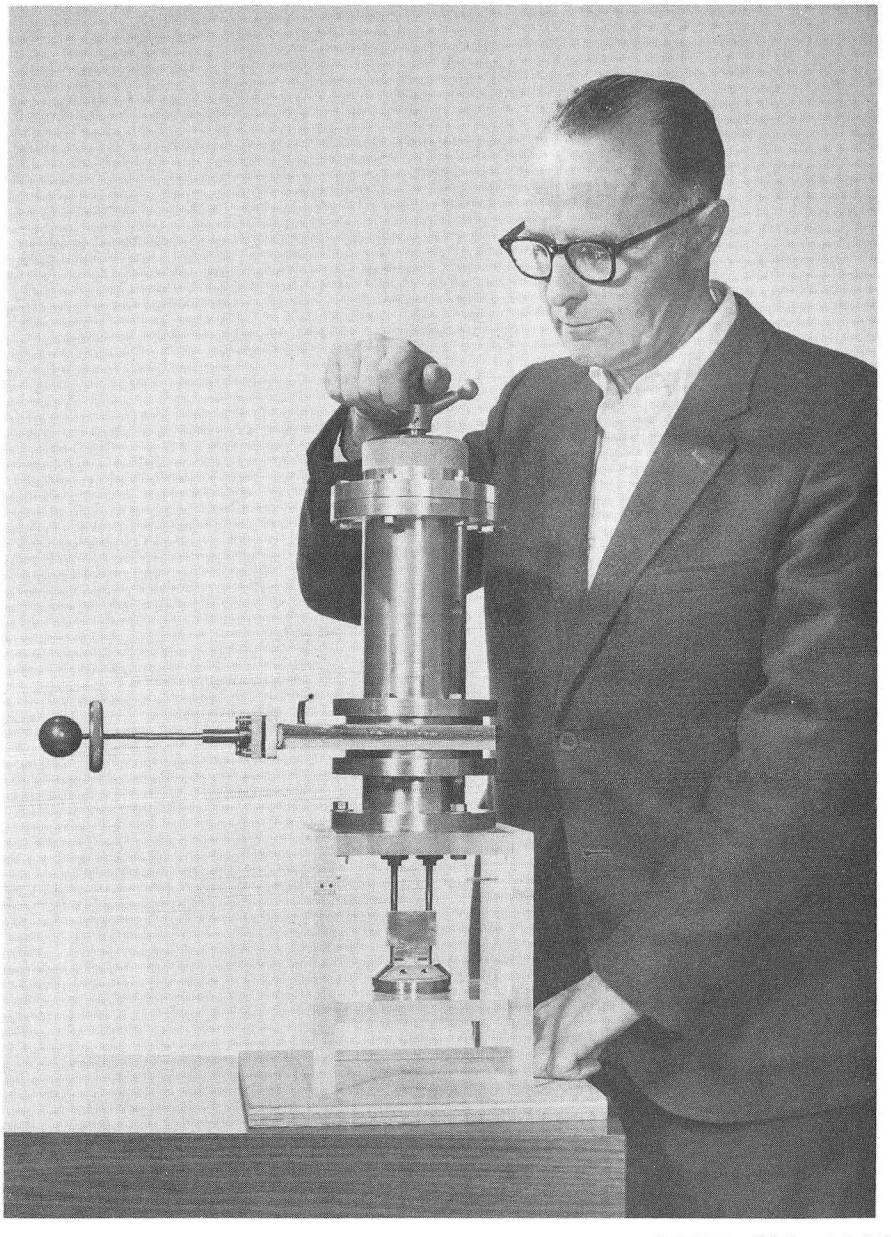
Fig. 15. A view through the open valve showing the piston key and alignment with target seat. The key continues below the valve to control piston shaft rotation.



(XBB 722-1143)

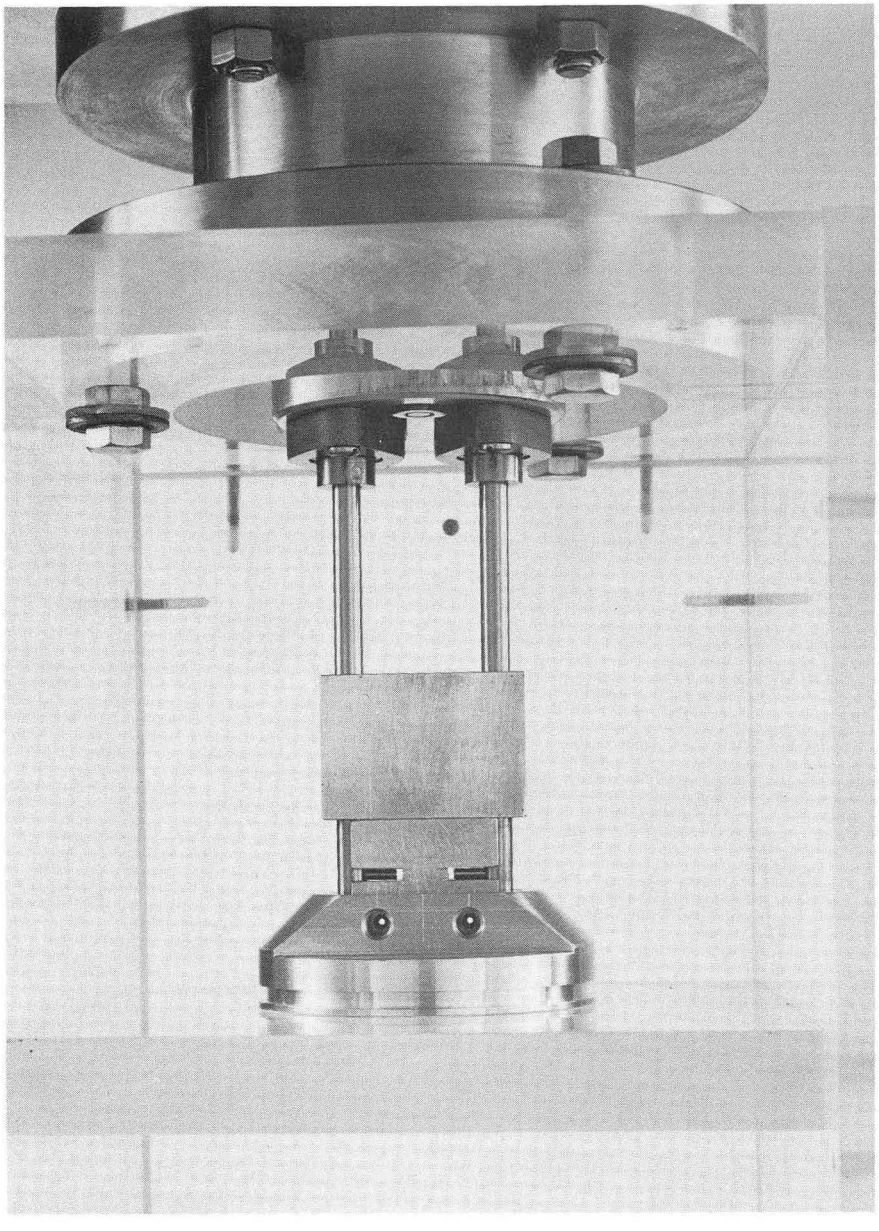
Fig. 16. The target can now be lowered into the main vacuum chamber,

0 0 0 0 3 7 0 0 2 4 3



(XBB 722-1147)

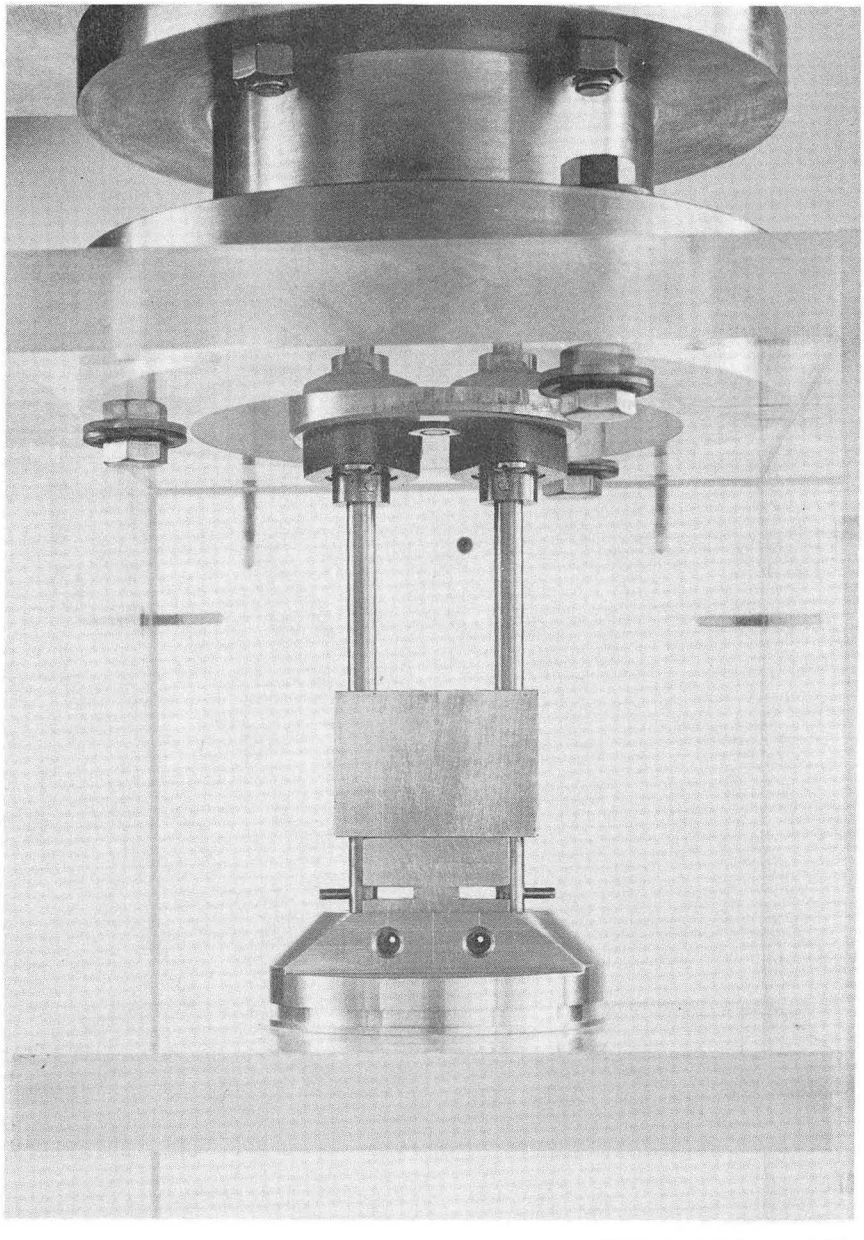
Fig. 17. --and inserted into target seat in small turntable.



(XBB 722-1139)

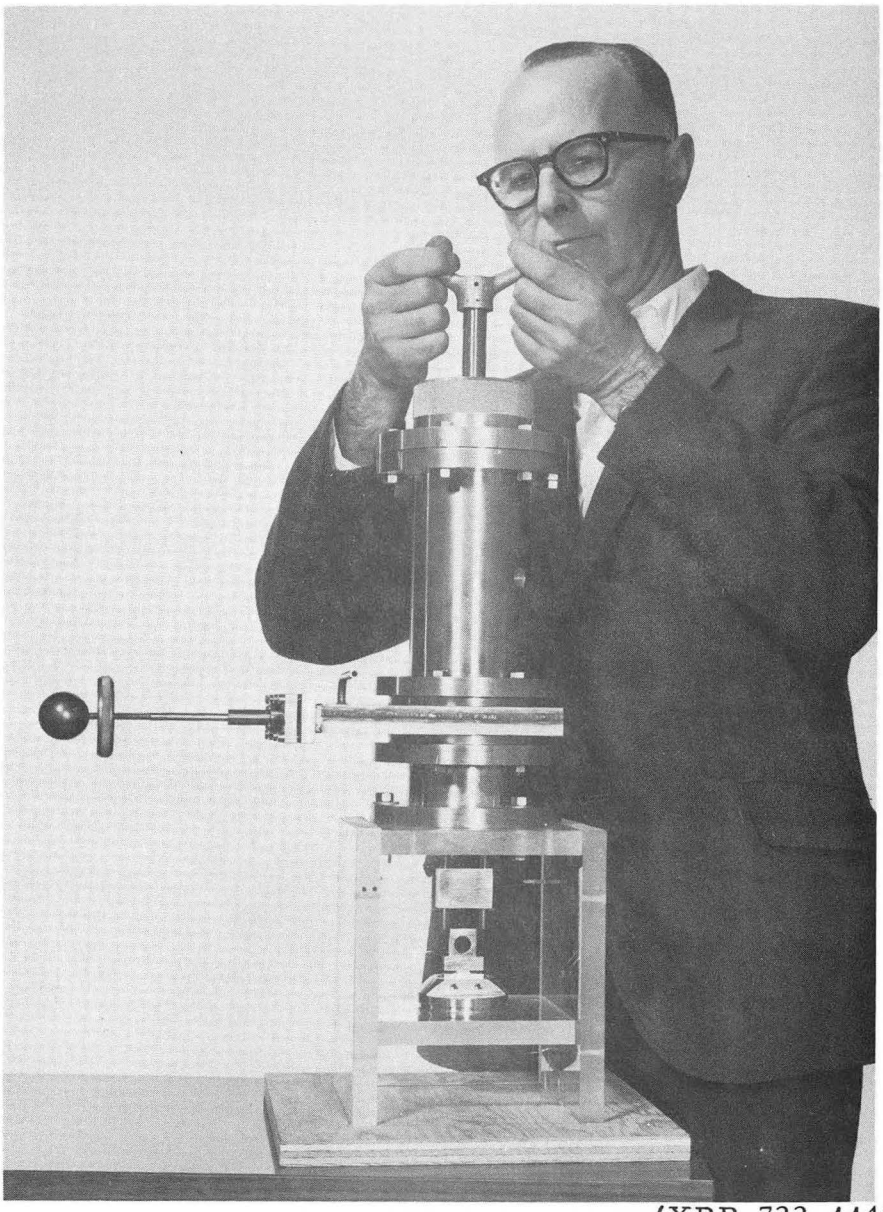
Fig. 18. The target is in position and ready for release.

0 0 0 0 3 7 0 0 2 4 6



(XBB 722-1138)

Fig. 19. Manual 180° rotation of outside handle disengages pins from the target block.



(XBB 722-1148)

Fig. 20. The shroud and shafts can now be withdrawn into outer chamber.

(XBB 722-1157)

Fig. 21. Valve can be closed isolating main vacuum chamber, and leaving target in position for exposure to the beam.

To withdraw the target, this entire procedure is followed in reverse sequence.

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