

Lawrence Berkeley National Laboratory

Recent Work

Title

IMPROVED PARTING TOOL FOR SPARK EROSION OF METALLURGICAL SPECIMENS

Permalink

<https://escholarship.org/uc/item/81z0x94c>

Authors

Brown, Arthur E.
Nolder, R.L.

Publication Date

1962-05-01

University of California

Ernest O. Lawrence Radiation Laboratory

TWO-WEEK LOAN COPY

*This is a Library Circulating Copy
which may be borrowed for two weeks.
For a personal retention copy, call
Tech. Info. Division, Ext. 5545*

Berkeley, California

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor the Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or the Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or the Regents of the University of California.

UNIVERSITY OF CALIFORNIA

Lawrence Radiation Laboratory
Berkeley, California

Contract No. W-7405-eng-48

IMPROVED PARTING TOOL FOR SPARK EROSION
OF METALLURGICAL SPECIMENS

Arthur E. Brown and R. L. Nolder

May 1962

IMPROVED PARTING TOOL FOR SPARK EROSION OF
METALLURGICAL SPECIMENS

by

Arthur E. Brown* and R. L. Nolder

The conventional technique for spark-eroding sections of single-crystal metallurgical specimens for metallographic study employs a parting tool, which is the cathode of the spark-erosion system, held in close proximity to the specimen, which serves as the anode of the system. In the Servomet¹, a typical spark-erosion machine, the specimen is fixed in an adjustable chuck and the parting tool is attached to a servo-controlled mount. The servo system maintains the work gap at its optimum value by sensing the dielectric breakdown voltage across the work gap. The cutting rate of the process, for a given work surface, is largely a function of the intensity and the frequency of the spark discharge, which in turn are dependent upon the storage capacity and time constant of the selectable R-C elements in the power supply.

When a parting tool of the blade type is used for cutting a specimen, energy dissipation is confined to the knife edge of the tool during the initial cutting period. As the work progresses and the tool depth increases, the energy dissipation occurs not only at the cutting edge but also along the sides of the tool, which is necessarily proximate to the cut faces of the specimen. The cutting rate thus decreases considerably as the tool depth increases, and the energy lost on the cut faces of the specimen heats the work excessively.

*Sr. Electronics Technician, Inorganic Materials Research Division.

- 2 -

A more efficient parting tool has been devised (see sketch) for use with the Servomet, where the blade-type parting tool is replaced by a tensioned wire that is transported across the specimen fast enough to preclude wire breakage for the selected erosion rate. The cutting wire (A), supplied from a spool (B), is transported over guide pulleys (C) by the motor-driven transport mechanism (D). A tensioning device (E) permits optimum wire-tension adjustment. The entire assembly is carried by the servo-controlled tool mount (F).

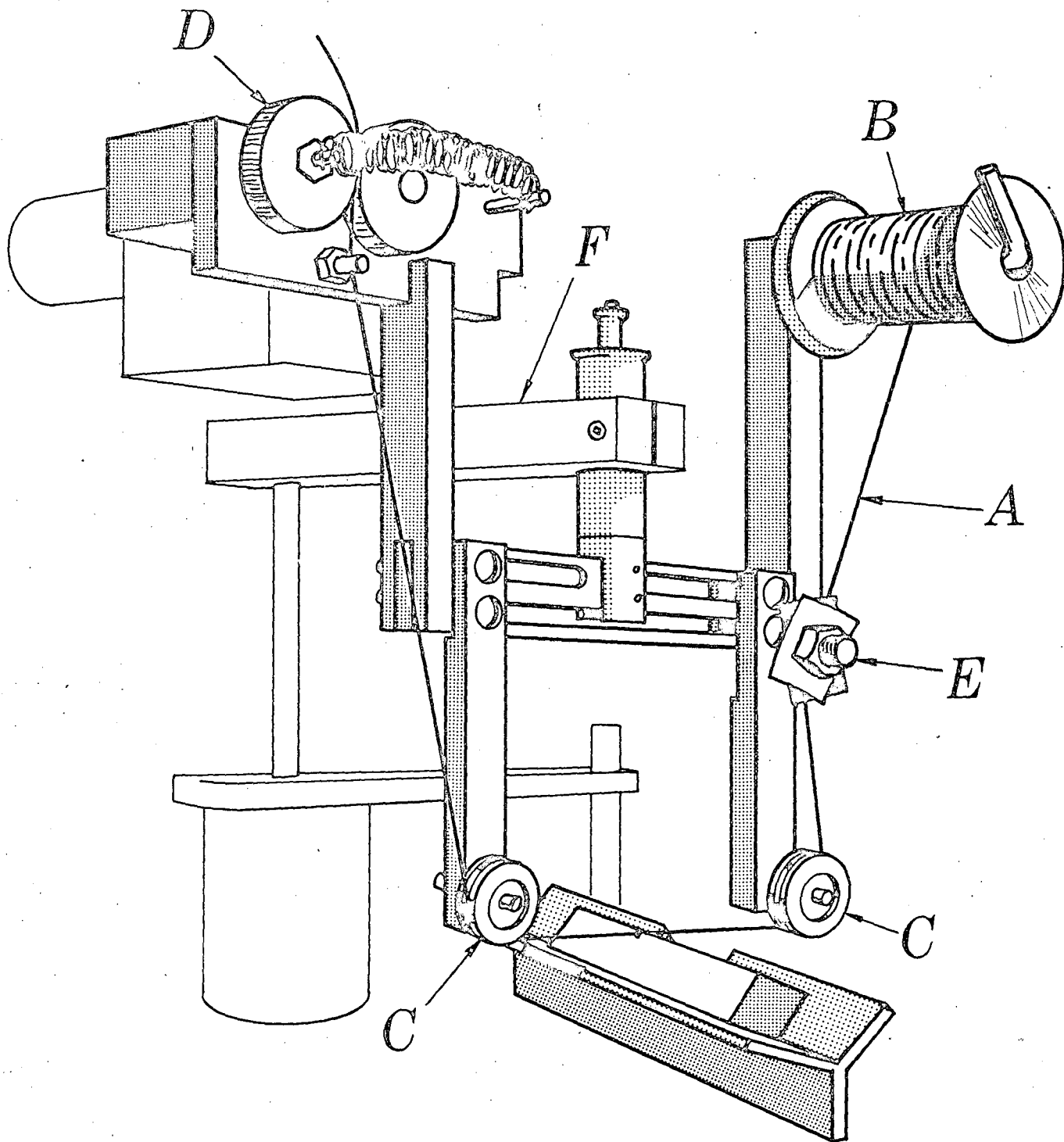
An experimental model of the moving-wire parting tool has been built, and preliminary testing suggests that the new tool will provide significant improvement in cutting speed, along with reduced specimen heating and less frequent fouling of the work gap.

Reference

1. Metals Research, Ltd., Cambridge, England.

Sketch Caption

Experimental Moving-Wire Parting Tool.



MU-27002