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DEPARTMENT OF MINES AND RESOURCES

BUREAU OF MINES

CANADA

FILE COPY

Ottawa, November 1, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1948.

Metallurgical Examination of Samples of German Aluminium Products.

(Copy No. 4.)

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German Aluminium Products.

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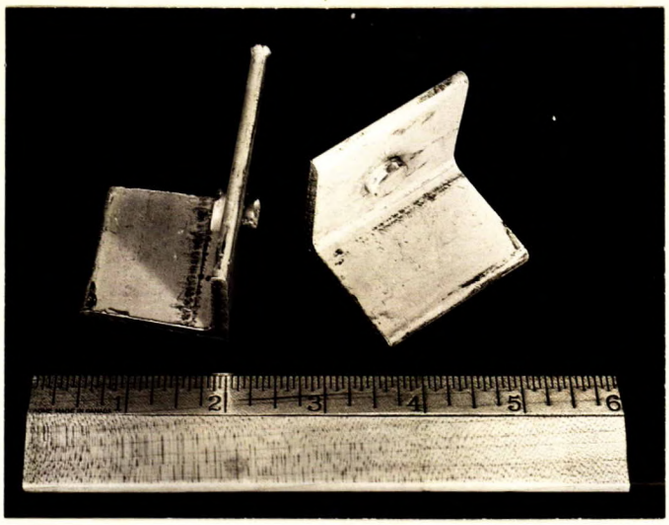
Material Obtained:

In October of 1945, a number of samples of fabricated aluminium alloy products were received by mail from Dr. G. S. Farnham, chief metallurgist of these Laboratories, who was at the time on field work in Germany, with the request that they be examined metallurgically.

Figures 1 to 5 show samples as received.

(Continued on next page)

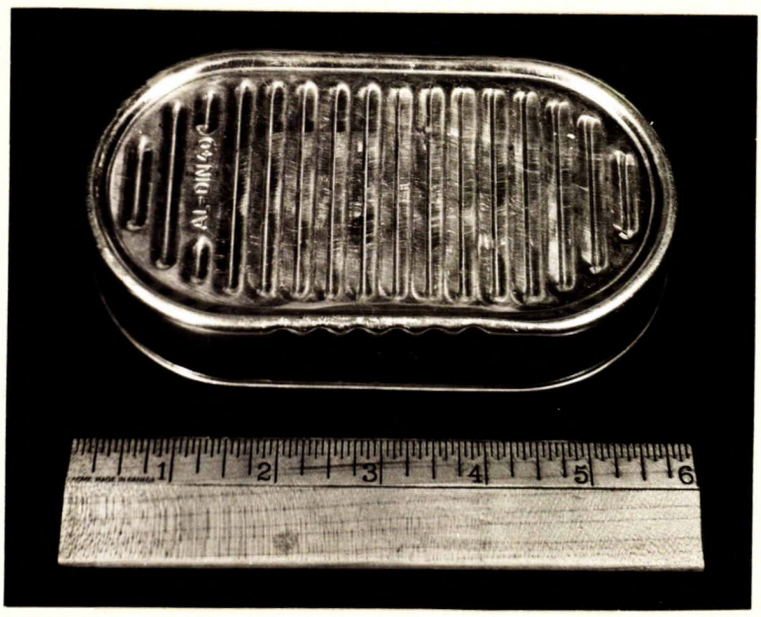
Figure 1.



CLAD DURAL EXTRUSION.

-

Figure 2.



ALUMINIUM FISH CAN.

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Figure 3.

ALUMINIUM CUP.

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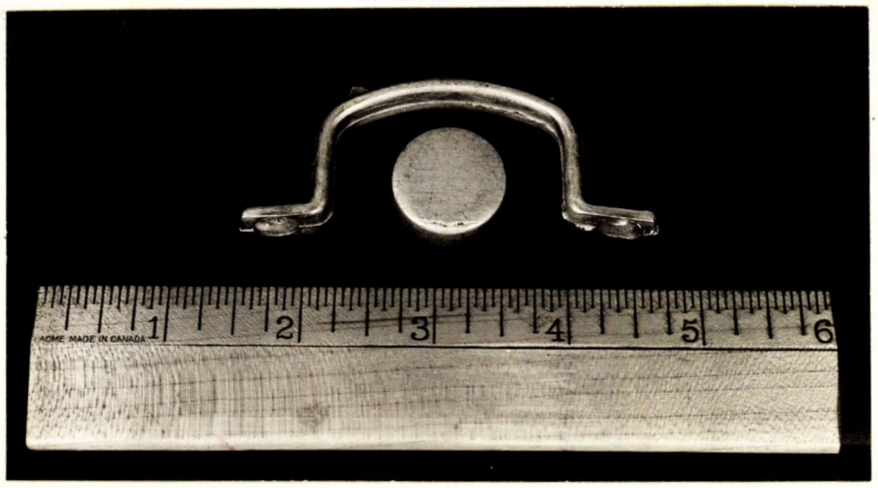
(Material Obtained, cont'd) -

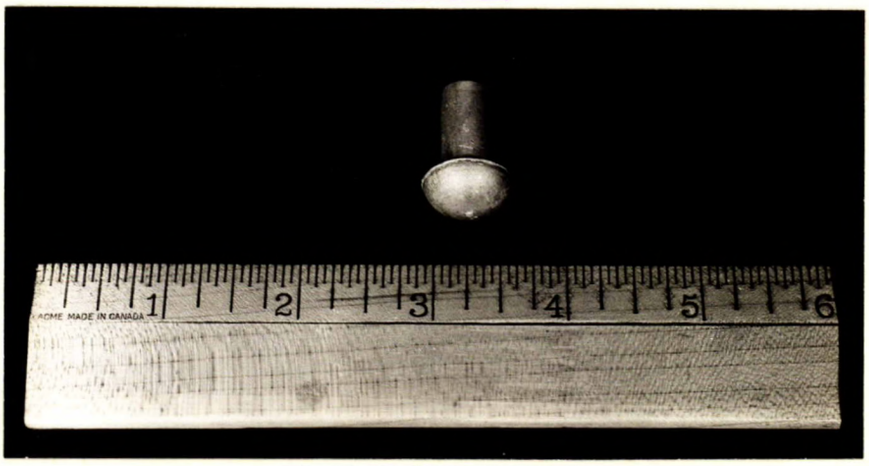
Figure 4.



DIE CAST ALUMINIUM ALLOY BRACKET
AND PURE ALUMINIUM SLUG.

-

Figure 5.



CLAD DURAL RIVET.

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Microstructure:

Figures 6 to 9, following, are photomicrographs at X100 magnification showing interesting features of the structures of these components. No special features of fabrication were noted in the microstructures except the prevalence of cladding on the dural components.

(Continued on next page)

(Microstructure, cont'd) -

Figure 6.

X100, Keller's etch.

SECTION THROUGH CLAD DURAL
EXTRUSION CONTAINING DURAL RIVET.

-

Figure 7.

GRAIN SIZE TRANSITION ZONE
AND CLADDING ON DURAL RIVET SHANK.

-

(Microstructure, cont'd) -

Figure 8.

X100, Keller's etch.

SECTION THROUGH SEALING JOINT
OF ALUMINIUM FISH CAN.

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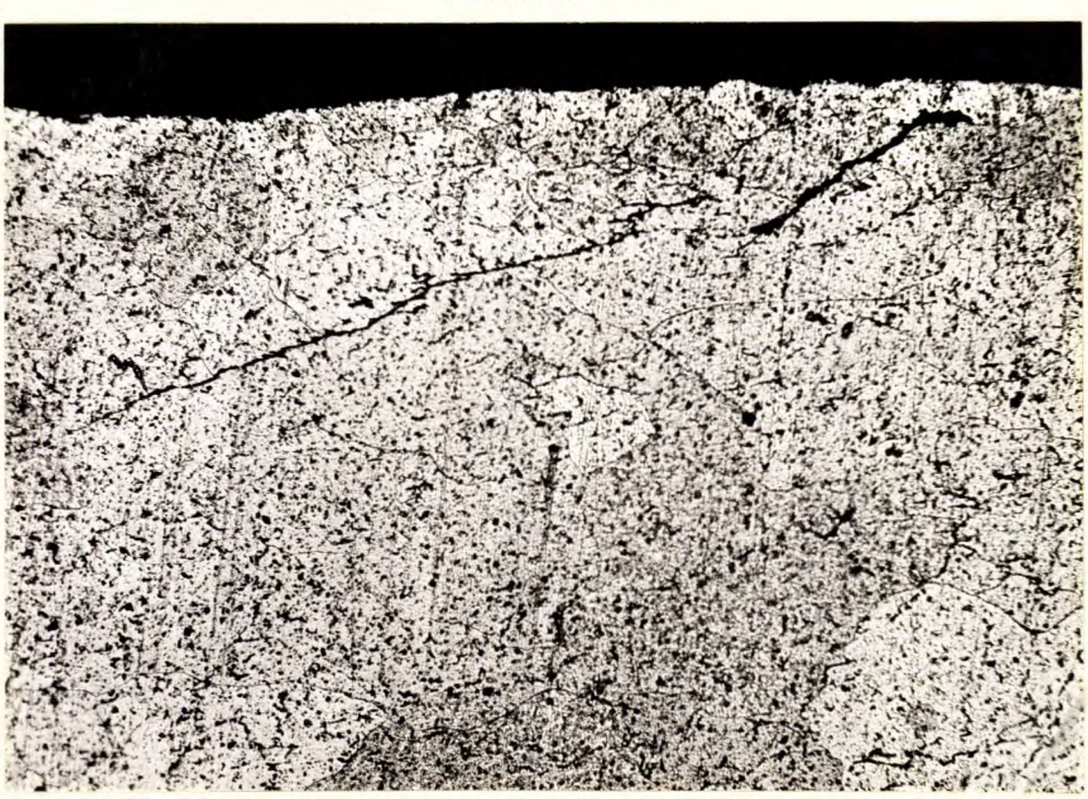
Figure 9.



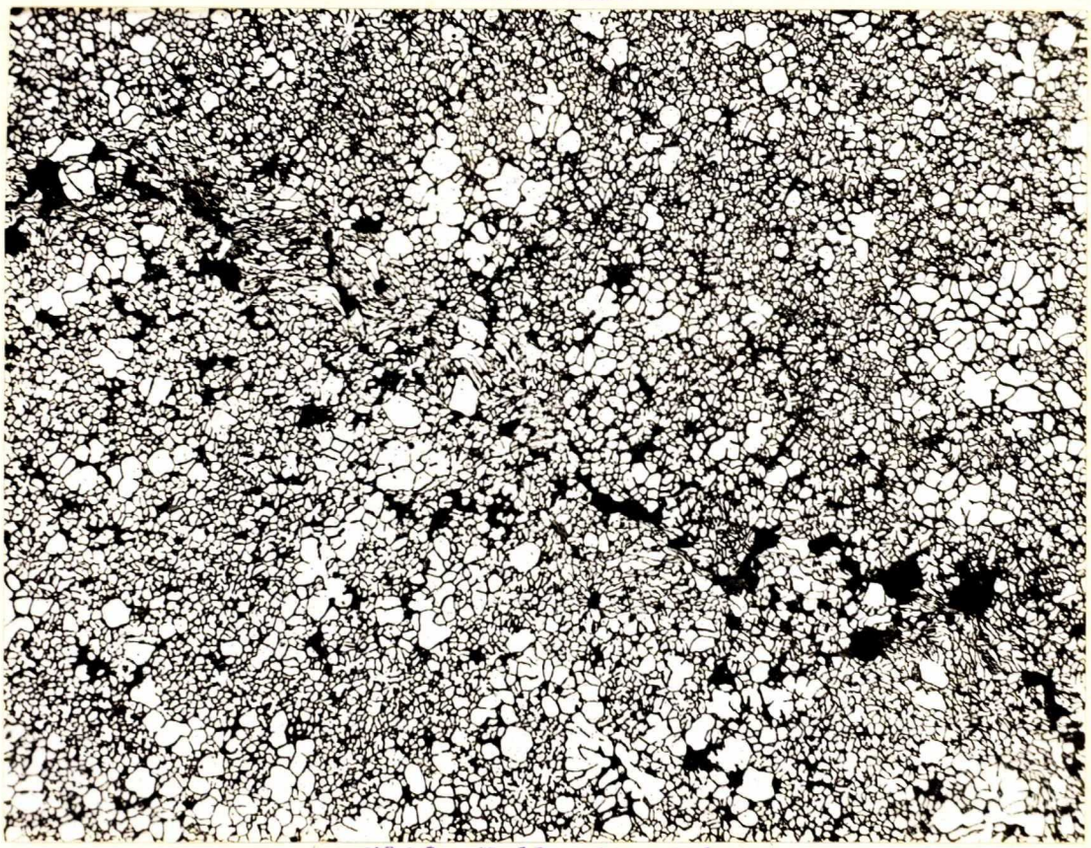
X100, Keller's etch.

SECTION THROUGH SURFACE LAP
IN ALUMINIUM SLUG.

-

(Microstructure, cont'd) -

Figure 10.



X100, Keller's etch.

STRUCTURE OF ALUMINIUM ALLOY DIE CASTING.

Chemical Analysis:

The analyses as determined by these Laboratories are as follows:

Aluminium Extrusion
Sample

	Cu	Fe	Si	Mg	Mn	Ti
		-	Per	Cent	-	
Dural extrusion (cladding removed)	3.05	0.63	0.58	*	0.81	
Rivet (cladding removed)	3.77	0.46	0.43	1.18	*	0.02
Fish can	Nil.	0.33	0.07		Trace.	
Aluminium cup	0.04	0.34	0.13		0.02	
Die casting	0.55	1.08	1.97			0.02
Aluminium slug	0.02	0.31	0.20		0.01	

* Sample insufficient.

The low copper content of the dural follows later German practice when copper was extremely scarce. The

(Chemical Analysis, cont'd) -

magnesium content in these alloys, although not determined, is probably in the order of 1-1½ per cent. These alloys are probably in the heat treated and aged condition. The analysis of the die casting appears somewhat unusual but the sample size is too small to allow checking.

Remarks:

The cladding of extrusions and rivets, while known for some time, represents a refinement in technique of aluminium fabrication which has not been practiced so far in this country. The probable reason for this modification is to overcome the low corrosion resistance resulting from the artificial ageing or precipitation heat treatment used to improve the mechanical properties of these low-copper durals. This practice has not been generally followed in this country, although considerable experimental work has been done during the war on 24S-T alloy. The aluminium fish can, while not economically competitive with tinned steel, has been used to encourage national aluminium industries (originated in Norway).

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