1

W. Blum
European Trip 1935

3/26- Sheffield-
Sunshine met Mr Procter, Mgr of Canning Co, who took me in his car.
Bowkers. Visited Bowker's Job-Plating Shop - met Mr Arthur and Mr Leo Bowker. Job plating, mostly for other shops. Principally Ag, some Ni & Cr. Electro cleaner, mercury dip, Strike, plate @ 4 amp/ft², with moving cathodes. No bag on anodes. No spot plating. Take out when half deposited & scratch brush & replate. Use K salts, and brighteners. Remove carbonates with $Ba_2(PO_4)_3$. (Leer

effect of phosphate
flux introduced (?)
mostly heavy
plate @ 6-7 oz to a
spoons. Work mostly polished outside.
Direct Cr, 15
min at 1000° F, on
Ni brass flatware.
nickel + Cr on
heat reflectors etc.
Ni proprietary salts.
20 amp/ft². Cr also
from Canning (not
patented). Cr in
rotary tank also
1 stationary tank.
a little gold
plating inside
hollow ware do
manager for free Cr.
in Ag + for part of Nickel.

Walker + Halls

met mr a E Nicol, plater, and mr Slater, man. director. a large mfg plant for both flat ware + hollowware, sterling + plated. Some repair & replating work, especially on very old pieces of genuine Sheffield plate. many large tanks with oscillating cathodes. Separate cathode bars & rheostats + ammeter connection for each cathode rod to insure uniformity. mercury dip + strike + plate @ 4 amp/ft². Some white plate + some with brightener. no spot plating. much work for railroads & hotels and for

foreign shipments
mostly on spec-
ifications, e.g. 6 or
8 oz tea spoons.
considers 9 oz/gal
K_2CO_3 gives best
throwing power -
never removes
carbonate.

Large can flat-
ing tables - used
for fittings on Kings
Private Car.

analyzes for CN,
Ag and CO_3.

Univ Sheff.

Called at office of Prof. Andrews, who was on vacation. met Dr Thackeray, (friend of Sangar) Shown around by Dr Donald Havinghand, who is investigating effects of surfaces (for Inter. Tin Research) Saw very good equip, especially for ferrous research. Small rolling mill + drawing benches. numerous gas + electric furnaces. One very old high frequency furnace & one modern Ajax furnace, used for melts up to 3 lb. Very good x ray equipment & Coolidge Tube. (met. Vickers)

electrometallurgy lab, fitted with 8 V, 150 amp generator & storage batteries. 4 wire system runs around lab. about 6 - 30 gallon stoneware tanks and 6 gas heated enameled iron tanks. Evening classes held for platers.

Vacuum tube system for measuring photoelectric corrosion expts.

Projecting lantern for throwing image of opaque objects on screen.

Dr Glasstone not at his lab,

but called at his home, and had tea with Dr & Mrs Glasstone.

met Mr Mason of Stainless Plating Co.

met Mr Dobbs, Chief Chemist of Coofining Co

Dinner & theatre with Mr & Mrs Procter, Mr & Mrs Mason, and Mr Dobbs.

3/27 Sunshine Lucas-

Left Sheffield 9 a.m. in company with Mr Dobbs - arrived Birmingham 11.20 a.m., took taxi to plant of Lucas & Co, (esp. lamps) makers of motor parts. met Messrs & 10 members of Electrodeposition for tour through plant, esp. plating departments. 2 field automatics for Ni and 2 for Ni and Ag. Use air agitation for Ni baths. Mostly brass parts - alloy 0.0005 Ni - Cr plating in one circular rotary tank & one elliptical automatic about 30 ft long - Plate 3 to 4 mins in Cr, at 100° F &

100 - 150 amp/ft². Good bright finish - Ni first buffed. Buffing room clean & well ventilated - mostly women buffers - in white suits.

Reflectors plated with flash Ni and a few minutes Ag - then colored and finally lacquered with a special spray lacquer, slightly colored so as to compensate for yellow light & make white light.

Lunch at Queen's Hotel with E.R. Canning, Thos Canning, Mr Pope (a director of Canning) and

Mr Dobbs.

E.T.S. Then went to meeting of Electrodepn. T.S. at Watts Instr. Sat on platform with Hemicle, Allard, + speakers. Papers by C J & J Francis - Parker ~~and~~ (Morris Motors) and S Hemicle (consult) on Specifications. On request I then gave a summary of activities in U.S. on spec. for plating.

Adjourned for tea at White Horse Inn. There met many others, including Rothersall, Bannister

at eve. session paper by L. C. Bannister on Testing Electrodeposits. On request I then gave a summary of our exp. tests and showed cards, that were in very good condition.

The discussion was lively, pointed and good-natured. Brought out many points regarding exp. tests etc. At high regard was shown for our results and a vote of thanks given to me.

3/28- Sun-shine

Went to H Canning & Co Through lab with Mr Dobbs - Regular control for customers nickel with air agitation & filtration $NiSO_4$, $NiCl_2$, H_3BO_3 & (Na_2SO_4) for drying salts For Cr, 500 g/l CrO_3 & 4.5 g/l SO_4 for deco- @ 100° & +100 a/ft² ction. For heavy deposit, 250 + 2.5 at 450 + 150 amp/ft²

Through plant with Mr E R Canning. Buffs, brushes generators, automatic tanks etc. Also make buffing compounds, lacquers etc and cleaners etc Papers etc to Bureau.

Train at 1 PM to London - Lunch on train, guests of Mr Griffiths, Nat Ri Co.
Ar. London 3 PM -
To Chemical Club.
Saw arrival of Duke of Gloucester.
Met several visitors. Liebreich, Kohlschütter, Schlötter, Kennaged etc.
Evening, were guests at Annual Dinner of the Chemical Society - addresses & toasts etc. See program.

Faraday meet.

3/29
Cloudy
no
rain

10 AM - met in metallurgy hall of Imperial College. about 200 present including foreign guests - Patter introduced & stood up.

Papers on electron diffraction - Thomson, Finch, etc. lasted all day -

coffee at 11.30, lunch 1.15, tea at 4.15 - adj. 6 PM. Discussions quite lively & critical but good natured General impression that methods are useful, but not yet conclusive. Discussion of

absorbed & combined oxygen. Extra lines & dark lines. Visited labs of Fricke & Thompson.

Eve. Dinner of Faraday Soc. Informal - Responses for foreign guests by Max Schlötter ("dean"). Then went to Royal just to hear Lord Rutherford's "Friday night lecture" on recent discoveries and their effects. Semi-popular but highly interesting & wonderful demonstrations of with large

meter for counting
charges. Showed
accelerating effect
of paraffin & t
screening effect
of silver and
boron. Showed
activation of
silver and
fluorine.
Then had
tea with Sir Hugh
Bragg's apartment
met Dr Brode, Ca
now doing work
on cosmos rays
at Royal Inst.
Then showroom
exhibits by Sir
Robert Robertson.
Specially fine exhibits of Faraday.

Tuesday 30 c.

3/30 - meeting at 10 A M.
5 Papers on structure of electrodeposits presented & discussed together
Cloudy, no rain
Good discussion -
Principal point on our paper by Reinnger, re Brinell & scratch hardness - (Spoke slowly)
Papers of Kohlschutter, Schlötter, Siebreich & Reinnger in German.
For comments see program etc
meeting lasted till 5 P M including summary by Finch
then farewells, thanks etc - Chatted with Allard about specific.
Informal dinner for foreign guests by Dr & Mrs Mudock

then chatted till 10 PM -
met Hatschek (Herschel)
Trousted knows
Frölich, Borgman
& Brinkmann,
nears at Cambridge

3/31 Sunday - Trinity
met by WT Griffin
Taken along Strand
Parliament, Westminster
Horse Guards Buckingham Palace
Temple Church (Service
& singing) - London
Tower, Mint
Threadneedle St
old Cheshire Cheese
for lunch - (Samuel
Johnson + Chas Dickens)
Then on Rotherhithe
and in country
past Croydon, to

Griffith's home, Highclere at Kenley, Surrey. (took pictures) Then through Surrey to Oxted, then in Kent to Chiddingstone and Penshurst (old churches). Back for tea – Mrs Griffith, also Mrs Griffith Sr, Patsy (11) and Betty (9). From back to Charing Cross Station.

4/1 – Visited British Non-ferrous Metals Research Association. Saw Dr Harold Moore, Dir, & discussed plans of work on electrodeposition. About 1200 Hyberg spent at Woolwich, part by Good & part

by industry. Effort to get more support from industries. Firms must join whole assoc, dues based on working capital, not less than 25 £/yr — may be up to 2000 £/year.

Mr Brandt, development officer showed me exhibits based on work on electro-deposition. Also showed me work in progress on corrosion and on working of metals — Very good modern equipment, but not very extensive

Vickers metallographic microscope very comfact. Vickers Hardness tester with microscope attached —

Acton Lunch at Mond Ni Co with messrs W.T. Griffith W.C. Barclay, and Cooper, Mr Sam. discussed uses of nickel anodes of different types —

Then taken in car to Acton refinery met Mr Johnson, Capt Attenborough and Mr Papere. Showed me a flow sheet, similar to one in booklet, but with proportions included

for former materials.
Showed me through plant and laboratory. Showed me products in vault, 2 million $ of precious metals - mostly sold as sponge. Products handled in U S & England by Baker Co.
Discussed applications of rhodium & palladium plating

N. P. L.

4/2 Went to Kew Gardens with Mrs Blunn, left her there, took ~~bus~~ bus to Teddington. There met Sir Joseph Petavain, Director and Mr Christole, asst Sec. Discussed research at N P L and N.B.S. Then went to see Dr Cecil Desch, who showed me around metallurgy deft. Splendid equipment - Work on creep tests, structure of metals, electron diffraction, making pure Al_2O_3 crucibles, high freq. furnace surrounded by H_2O in quartz tube, foundry + rolling mill Had lunch with Dr Desch, then walked through gardens of Sir Jos, wonderful daffodils.

N.P.L. Then visited Dr Vernon, in chem. lab. of Dr Morgan, not directly a part of N.P.L. Saw fine exhibits of tarnished metals, esp. copper. Specimens produced in bell jars in controlled atmospheres at 25°C. Also saw "fogging" of Ni by SO_2; prevented by putting Cr in or on Ni. met Dr Bengough (on Fe)

R.A.E. Then taken by Mrs Desch about 25 miles to Farnborough. Beautiful ride, along Hankes and then South, by Virginia Water (Queen Eliz).

Called on Dr Sutton and Mr La Brog. Discussed methods of protecting Mg alloys against corrosion - (see small note book). Discussed throwing power, anodic oxidation of Al, salt spray test etc.

Returned to London on train. Eve to see David Copperfield.

Woolwich -

4/3 Went to Woolwich Research Dept. met Dr Hothersall, in charge of electrodeposition Mr Hammond, Mr Clark and (?) Dr Symes, head of metallurgy Dept. Saw fine exhibits of published work on nickel deposition adhesion of deposits, effects of impurities, hydrogen deposition, hot water test for tin coatings & nickel coatings. Roller large scale equipment for electrodeposition 200, 500 and 1000 amp. generators. Large tanks heated electrically

by heaters inside of lead pipes.
Saw Clark's tests on porosity of cad-mium coatings - ~~Saw~~ discussed arrangements of non-ferrous Research ass'n with Woolwich - About 1000 £/yr to pay services of one chemist & one assistant. Explained work at Bur Standards.

Royal Mint

Went to Royal Mint, met Mr H A C Newman asst Chemist (Dr Smith chief Chemist away). Saw melting of alloys in gas-crucible furnaces. Most silver coins are now 50 Ag, 40 Cu and 10 Ni. (Some silver for Palestine 720 Ag, 280 Cu, cut edge)

Some cupro-nickel pennies for West Africa, and brass 1/2 d pieces - Regular pennies are bronze.

Ingots rolled and annealed, blanks cut out, annealed, rolled in $H_2SO_4 + CrO_3$, "upset" and coined. Not much use of cr ou dies or collars.

Electrolytic section - money order plates etc by regular electro typing process. Stamp plates, flat, by rolling impressions in lead and making Ni electrotype,

backed with type metal, then cr plated.

Now also using steel plates transferred in sections, 2 rokes only, then cr plated

make master dies on plaster, waxed and graphited, silvered with Ag NO3 + P'solv; then deposit Ni and back with copper. Have not used Cr on surface. Pantograph cutting machine much like U S Mint.

Saw Jubilee medals for sale { silver ½ crown + 1 guinea gold 7 guineas + 50 guineas. Also special medals for King to give to notables, and to army + navy + civil service.

4/4

5 P.M. - Train to Cambridge with Dr R.S. Hutton - To his home as guest. At dinner met Dr & Mrs Mears, also Mrs Hutton (daughter of Dr Schuster), her daughter Audrey (a massage nurse) and Roy Dalton, nephew of Mrs Hutton; whose mother married son of Prof Whitehead at Harvard. Discussed organization of research and planning at Woolwich & at N.P.L. Standards.

Cambridge

4/5 Visited metallurgy Dept of Cambridge Univ with Dr Hutton. Space and equipment being rapidly expanded in 3 yrs Dr Hutton has been there.

Then visited H R Evans & saw expts on corrosion including Dr Mears work on "square drops" on steel also method of producing uniform scratch on metals. Constant temperature air bath (25°C) double walled with air heated and circulated ~~thro~~ between walls. Metal

living. Also a constant temperature room. Discussed mechanization of corrosion with Dr Evans - most cases are electrolytic.

Flew rode around with Dr + Mrs Hutton to see different colleges, the new Univ Library (Rockefeller) the "Backs" and also old villages of Grantchester and Trumpeting Byron's Pool, the thatched houses etc.

3 P.M. Tools "petrol rubber tired car"

Oxford

on L M S from Cambridge to Bletchley, then regular train to Oxford. Stay at Mitre Hotel, dating from 13 century

5.10 PM

4/6 Took car around in Oxford — saw principal colleges, and churches. Saw "Jesus, the Light of the World" in Keble College. Saw sepia colored windows in Magdalen College ("Maudlin"). Went in Church of St Peter of the East, @ 1100 AD. Tombstone — Feb 31, 1835.

- 1.28 PM Took train to
w 4.15 Newport — ~~Good~~

Newport

Went through tunnel 6 miles long under Severn River, met by Mrs D. Thomson later met Mr Thomson Mgr. of Painted Works of Baldwin Steel Co Christine (19) in 1st yr Hons Sci. at Kings College, London and David (16) in school at Cheltenham

4/7 - Went through plant with Mr Thomson Sunday repairs being made - 7 basic open hearth furnaces Use pig and scrap cast into 3000 lb billets → soaking pits → rolling mills - for sheet annealing in

pots, filled with gas for bright annealing. Chief products are sheet bar, blackle sheet, bright sheet and galvanized sheet, mostly corrugated afterward. Galvanizing - try to get smaller spangles, add Al - Better with very pure Zn - acid pickle + rinse leaves some yellow stain on sheets.

Then drove through South Wales - Lunch at Raglan in old Inn near Raglan Castle - Then drove over ridge into Wye Valley - See Tintern Abbey, and also old Roman Wall at

Bradford Tanks. Old Raglan Church.

Swansea -

Caerwent, near Newport

4.45 PM Left Newport
7 PM Arr Swansea -
Went to Metropole Hotel

4/8 - Went to Mond
Nickel Co at
Clydach, 7 miles
from Swansea -
Met Mr Herbert
Gibbon, Mgr.;
Mr ? Gibbon,
Plant Supt.; Mr
Haig, Asst Mgr
of Mond Co (London)
and Mr C M W Grieve
Chief Chemist.
Discussed applic-
ations of Co, and
also spec for Ni
salts - Visited
laboratories.

Shew saw mfr of nickel salts - Raw material is nickel matte from Canada @ 7 2% Ni, 20% S, bal Cu, Fe etc. Ground & roasted - Shew extract with dilute H_2SO_4 → $NiSO_4$ - Purify by cementing Cu with reduced Ni powder; & remove Fe with $Na(OH)_3$. Crystallize some rapidly to form fine crystals, centrifuged & dried. Other crystal slowly → large crystals - centrifuged. Small broken crystals separated. All equally pure. Only 0.003% Cu or Fe, no zinc. About 6.5 H_2O

copper sulphate made from residues after Ni removed by CO.

Roasted ore first reduced with producer gas, at high temp. Then CO passed over at @ 80°C to volatilize $Ni(CO)_4$. This is decomposed in towers through which nickel shot are circulated, while heated to @ 300°C. Produce daily about 27,000 lbs Ni besides Ni salts. (Some double salts w/ Ni & Cu). Water gas + producer gas

made from Welsh
anthracite Coal, ~~made~~
mined nearby (Reason
for location)

Called on Dr Ed-
wards Principal of
University College
at Swansea, but
he was at his home
& talked to him on
phone, & expressed
regret that I did not
get to see him in
short time available.

Went on tram to
"Mumbles" saw
pier & lighthouse
& construction of
new main sewer
through rock -
Fine views of harbor
Then to Bath

@ 4 PM
& 7 PM

On Leave.

4/9/35 Spent morning at Bath, saw Cathedral & old Roman Baths.

left 11.57
ar 1.12 Then to Salisbury, saw Cathedral. Drove out to Stonehenge, passed tombs of Sir Oliver Lodge & Lady Gray.

so 4.32
ar 6.11 To London.

Printing Plate.
Nickeloid

4/10/35 — Visited Nickeloid Electrotype Co. Heat over plant with Mr Miller. Large plant, but many small orders. Wax molding about like U.S. Lead molding done of founders type with cuts. Now experimenting with Al sheet covered with a gum, somewhat similar to Jenkins process, but not yet practical. Much interested in Jenkins, left him samples etc. also trying celluloid. Also turned lead for Ni, plain lead for Cu

molding

Effects Coating Graphite

Silvertone not mentioned.
Tried Watson-"metla" flong, coated with metal powder, not very sales.

Stereotype	mold music scores in plaster, not cr out stereo, but uses Ni over Cu, Cu.
Copper -	deposited in rotary tanks with solution containing phenolsulfone.
nickel	in small tanks not agitated.
Cr -	Chromium about as usual - Every cracking of plates with Cr in use - ? Too hard or too thick nickel.
Tin -	Experimenting with Sn plating on back of shells - promising, but not yet convinced (Partridge).

mach. machinery very modern, largely American. Claybourne, Hoe etc.

Still has one of two original lead molding presses made by Dr Albert in 1906. now used for curving copper anodes. (Used are special deoxidized (?) and form almost no sludge).

Went to lunch at Rotary Club with Mr Muller + Mr Hopkins, head of their engraving dept.

Waterlow & Sons.

met Mr Russell Palmer, Mng Director & had interesting chat, especially on counterfeiting ("Forgeries") of Chinese notes. Mr Rose highly regarded by this Co.

Went through currency plant with Mr S. G. Clifford Chief Chemist. Total plant for all printing has 6000 employees.

currency printed on rotary presses from curved plates for 30 subjects, about 0.04 inch thick

Plates wiped with cloth on successive rollers.

Originals molded to form negatives by
(1) Electrodeposition
(2) Casting (?) metal
(3) Pressure (not lead)

Plates made of copper in regular bath at 40°C & 40-50 amp/ft² no addition agent. solutions agitated method of separation not disclosed. Separated plate appears to have Fe on surface (not Ni).

The plate after grinding is

plated on back with Fe to prevent plating of back in Cr bath. Fe later removed by HNO_3.

Cr deposited at 40°C, 150 amp/ft², 250 g/l, 100:1 ratio. Gold 1 hour = about 0,000 8 inch, confirmed by weighing plate before & after plating.

Good bath for testing paper, inks etc. Foils made at plant (also make carbon paper & typewriter ribbons.

Electrodeposition T.S

Trip to Paris -

4/11/35 Left London 9 a.m. for Paris, via Newhaven and Dieppe. Very rough crossing! 3½ hours. Mrs B very sick and most everyone, but I escaped - Beautiful ride in sunshine from Dieppe to Paris. Arr 6 P.M. To Hotel Vouillemont.

Univ Paris -

4/12/35.

Luncheon given by Dr Marie at La maison des Polytechniciens, 12 Rue de Poitiers, Paris 7.

22 French electrochemists present and 2 other ladies beside Mrs Blum. (List of guests separate).

A very informal luncheon. At conclusion Dr Marie made a short speech of welcome (in French) and I responded briefly in English.

Copy kept.

Thus arranged schedule for

four days of following I made with Dr Bailey & others.

Then went to l'Ecole Pratique des Hautes Etudes (part of Sorbonne or Univ of Paris). Taken around Electro-Chemical laboratories by Dr N Thon, with whom I discussed theories of polarization, passivity etc.

Discussed with M Guerillot exfts on cd + Zn deposition & diffusion of deposits.

Dr Jacquelon copper deposition etc.

Dr Trombe on

electric furnaces including melting of metal in vacuo by cathode rays. & electrolysis of fused rare earth chlorides spec. of La, Ce etc obtained as alloys with Cd, & latter distilled off.

also deposition of Cu on Fe by displacement in fused salts.

Madame Foëx-Ringer on Weston cell &c (Vinal & Brooks).

Dr Marie on work in general.

4/13	a.m. General view of Paris in taxe with Mad. Billiter. Went in notre dame & Louvre - P.M. - Ride on buses to Bastille. Eve - Opera - Don Juan.
4/14	Ride with Mr. & Mrs. Morris to Versailles & St Germain.
4/15 -	With Mr. Thom, Jacquet & Guerrilot to Maulevrier (near Paris) Plant of Déman Co. Met Director Mr Friedeberg and shown around by Mon Genin, Mr Renard (who expects to come to Nashua next Oct) Saw casting of plates, assembly into batteries, making boxes etc.

Marchal lamp works

4/15	At Amer Embassy - got salary + expenses to date -
4/15	Lunch with Chauvin Ballay, & Jacquet - Then with last 2 to "Projecteurs Electriques Marchal, who make about 800 head lamps/day - Shown around by mgr, M. Bailly. Brass - polished auto, flash Cu in cleaning & flat dip in 10% HCl, then 7 min in Ni at 5 amp/dm^2, 50°C. 400 g/l $NiSO_4$, 25 $NiCl_2$, 25 H_3BO_3, pH 5.3 (

agitate with air - filter contents - Straight line with knock, but not quite.
Depolarized Ni anodes bagged.

Cr 2 min at 12 amp/dm², 45°C, 300 g/l CrO_3, 2.5 N_2SO_4.

Reflectors - Ag dip - Plate 12 min in Ag at 0.3 amp/dm².

Later at Ni office, discovered bright Ni with Bolley. Best results with aberration (very little) at pH 6.5, 50°C & 2-5 amp/dm².

Andre Darlay -

4/16 Called on Mr Darlay at his apartment, and also met Mr Marcel Boss, who speaks English well. As Mr Darlay does not speak English, the conversation was carried on through Mr Boos.

After discussing general conditions prevailing in the trade, we discussed the translation of the book. Mr Darlay explained his plan for publishing about 20 fasicules, to be subscribed in advance. I then o

quired as to what advantage there would be in that plan instead of subscribing for the bound volume in advance. At most there would only be a little difference in cash.

Mr Darlay said it would be necessary to have about 500 subscriptions to pay the royalties & publication expenses. He proposed publishing in "Galvano" a table of contents of the book in French, and asking those inter-

ested to subscribe. We will therefore take no definite steps toward a translation till we is assured of support, and will advise the publishers accordingly.

4/16 May 1 Had lunch at Amer. Embassy, with Dr & Mrs Billiter as our guests, and also Mrs Tyroler, ass't to Miss McCann in the Nis. Office of For & Dom Com

Renault

July 6

Visited Renault plant on island in Seine, in company with Messrs Billiter, Ballay, Jacquet, Pierson etc. Shown around by mr Longchamp, Engineer, and mr Galbrun, chemist. Plant employs ≥3000 people. Produces ≥300 cars per day, in addition to large trucks and large motor driven cars for use on railroads. Enormous buildings. Die castings. Clean kerosine and then plate in full automatic,

installed by Mealor
Electro cleaner (vaca)
copper cyanide strike.
Ni in high sulphate
2-3 amp/dm², 45°C
15 min, air agit,
filter, Rolled Ni
anodes - Rubber
lined tanks.
Cr plate @ 2 min
~~Ni~~ 15 amp/dm², 45°C,
250 CrO_3, 2.5 H_2SO_4.

Ni on Al - @ Ballay
Etch in boiling
$FeCl_3$ soln.

Brass on steel prior
to coating with
rubber - @ 70 cm, 30°

small or moderate sized parts in auto-

Plating on steel

Trichlorethylene

Electro - $NaOH$, Na_3PO_4 anodic pickle in H_2SO_4, 5 z° Be.

Plate 10 min, cu cn, 2.5 amp/dm²

Then 30 min in $CuSO_4$, 3 amp/dm².

Buff copper

Then give 10 min Cr cu and 30 min Ni at 3.5 amp/dm², in warm soln.

Buff Ni

Cr with full auto - no current for first 15 sec allow articles to heat up.

All rinses agitated with air.

Bumpers & radiator shells in large tanks, not automatic, except shells in cu & Ni semi.

automated soldering bumpers (Devine Co) -

Plate bumpers Ni, cu, a (Engelhard) Ni intermediate buff, buff Ni, then Cr

Plate radiators cu Cr, cu (acid) Ni buff Ni, then Cr.

Saw forming presses & assembly line. Also mfr. of rail cars, steel frame covered with Al & painted. 12 cyl, 300 HP Diesel engines.

4/17 First went to Clichés Union, 4 Rue d'Uzès, but found this is only their office. Then went to Est. Gillot, met André R. Laurent, Director, who was very courteous & made telephone arrangements for my visits.

Gillot

-rue de la Grotte.

Then met Marcel Perrin, Supt, who showed me around their engraving plant. (Their electrotyping is at another plant). He explained that printing is being largely done by offset - no derived plates

used for ordinary
printing - Few
long editions.

Drager. Then went
to plant of Drager
(46 Rue de Bagneux
very large printing
plant. Saw Mr
Macdonald an
Englishman in
charge of their
engraving &
electrolighting,
but he said
they had nothing
new & he feared
he could not
get permit to come
to take me in.

Had lunch with
Mr Perrin at
La Coupalat on
Mount Parnassus.
He said the only
thing new in
Germany in electro-
lytic was the
use of celluloid
molds, being devel-
oped by Siemens in
Hamburg. They
expect to try it
and promised to
write to Hinsdale.
Discussed general
industrial situation.

Michel They went to
office of Michel
Freres. Mr Michel
took us in his car
to their electro.

by Jung plant about 3 miles out of Paris. Small plant with no special equipment or methods. also stereotyping. They also etch & engrave small deposited copper cylinders for intaglio printing

reproduction collotype

also have a small modern plant for depositing large copper cylinders for rotogravure. Polish with agate during deposition & then degrease afterward. Only

collod-

deposit 0.15 mm
cu (2 hours, rotating
⅓ immersed) - and
use once and
then strip off
from Ni plated
adherently on
cylinder, does not
tarnish.

L'Illus-
tration

Then went to
L'Illustration's
new modern
printing plant at
Boulogne, about
7 km Northeast of
Paris. Arranged
through L. Fasquel.
Met Richard, Supt
of plant (who speaks
English) was away,
and I was shown
around by his secy,

Mlle Brunet, who speaks English fairly well (3 mos at Berlitz)

Electrolytic plant entirely modern, but not using high speed deposition. 2½ hrs for 0.3 mm. Lead mold mostly include regular type forms, but use duly ½ frames on type parts. mold in a Swiss machine (by Fischer) only a little use of mold

Only a small amount of dr plates make both flat & curved plates.

Oxidize wax

5 amp/dm²

Their rotogravure plant for cylinders is very modern & complete - Horizontal lathes - 3 cyl. immersed - 2 min in 70 hours. no additional agents.

Then saw photo engraving, press rooms, binding &c & got copies right off the press.

Telephoned & found he was out of town. Expressed regrets.

Through our Person, Tried to see Mogenus but unsuccessful

Repoursseau-
10 Rue Danton, Levall

4/18 Visited the bumper plant of Repoursseau, in company with Dr Ballay, Dr Guerillot and Dr Jacquet. Conducted by Louis Espenal, Supt

Bumpers of very varied shapes and sizes, made of 0.25 C steel formed cold - not heat treated. 350 sets/day

Clean electro in NaOH + NaCN anode pickle in H_2SO_4
no Cu coat.
Deposit Ni at 55°C, 7-10 amp/dm²
15 min, = @ 0.02 m
air agitation, filter

Reefol anode + bags.

Brass similar cycle except Hel dip instead of anodic pickle. Plate 3 minutes.

Polish N°, then clean kerosene only before Cr. CrO_3 : H_2SO_4 100 : 1 45°C, @ 25-30 amp/dm² 6 mins, = 0.002" Cr.

Backs of bumpers painted with Al paint.

Also paint licence no on bumper before received + stable paint.

4/19	Left Paris 8.42 A Ar Metz 1.12 P Lv Metz 6.13 P Ar Saarbrucken 8 P
4/20	Lv Saarbrucken 10-50 Ar Homburg 11.30 A Lv " 11.40 " Ar Haldweiler 11.50 A
4/21	Haldweiler
4/22	Lv Haldweiler auto Ta Lv Homburg 7.40 A Ar Ludwigshaven 9.08 Lv " 9.35 Ar Mainz 10.41 Lv Mainz (Bastel) 11.43 Ar Niederbrahmstein 2.05 Lv " (boat) 4.49 Ar Mainz 9.05

4/23 Left main 9.47 a.m. for Russelsheim. Presented letter to mr W. G. Guthrie plant mgr of Opel Works, from E R Isbell, Mgr of Gen Motors Exp Corp. mr Guthrie is an American, who has been at Opel since 1930. I met with him mr Cunningham, visitor from GM, Detroit. Also met mr Helmuth Baier, in charge of all personnel of Opel, who took me around and to lunch. He has been in USA once, and speaks English

fairly well.

The plant now makes about 10,000 cars and 15,000 bicycles per month, and employs 18000 persons.

The Bullard drum process is used to clean and pickle heat treated gears. They are cleaned electrolytically in NaOH, pickled cathodically in HCl + Pb, and deposit of Pb removed by reversal in NaOH. Requires 12 to 14 minutes for entire process, and gears are very clean

Bicycles The plating of bicycle parts is done as follows -
Clean electrolyt.
Pickle in 5% H_2SO_4
Plate in Ni (nickel) in full automatic plant. 32° C and 1 amp/dm², no air agitation.
Deposit about 0.012 mm
Cu plate at 42° C
~~autos.~~ and 15 to 20 amp/dm² for 3 to 4 min.
Plates plated manually.

autos. Radiator shells -
Clean trichlor, liq and vapor. Alk. cleaner
then CN copper in conveyor, 25° C and 2.5 amp/dm². About 0.015 mm Cu -
Buff, clean trichlor, plate 50 minutes

in nickel at 2.5 amps/dm². about 0.0025 mm Ni.
Buff Ni
Cr plating all manual, except one small circular rotary table for small parts under conditions as above
Brass parts plated similarly with nickel & chrom
Bright nickel (Pfanhauser) has been used successfully on brass but not on steel.

Bumpers are plated manually
nickel - 5 min
acid Cu 12 "
nickel 35 "

The steel parts are tested in salt spray 5% NaCl at room temp. for 72 hours.

Cast nickel anodes are used (depolarized rolled being tried.

pH of Ni baths = @ 5.4 (uncorrected?).

At lunch met several of staff, many of whom speak English; and Mr Palmer, from Detroit, one of the directing staff.

Frankfurt

4/24 Visited nickel information Bureau and met Dr W Fahlbert, who speaks English well. He introduced me to Dr B. Trautman who is interested in the electrodeposition of nickel.

We discussed together the results of the exposure tests, & the specimens I had with me.

Dr Trautman then took me to J Gulil & Co, where we met Mr Gulil who showed us the plant. It is a

N. Jersey Bell.

Gulil & Co Electroplaters

small plant that does only the electrotyping with no fit. They do not overdeposit wax molds. Copper deposited slowly, 2 to 8 hrs. at 2 to 4 volts, about 0.12 mm in 2 hrs.

Both lead & wax molding and stereotyping.

For nearly a year they have used celluloid for molding both type & half tones up one forme. The shed celluloid is a special preparation made by "Permadoid

Werke Paul Meissn
a Gs, Leipzig C-1.
It is more expen-
sive than wax
molding, but no
much more tha
lead.

The celluloid
is molded in a
press heated by
gas. Then coate
with graphite
& deposited as
usual in copper
baths.

Then Dr Frank
mann took Mrs
Blum & me to
lunch at the
"Schwarze Stern"
in the old
part of Frankfurt
& showed us about

Left 2.40 PM, ar Leipzig 6.30

Langbein Pfanhauser

4/25 met Dr W Pfanhauser,
Mr Würlser,
Mr Matthes'
Dr E Krause
Dr Elsner
Dr Herrmann

(also met Mr Rabinowitz from Moscow, Russia buying plating equip.).
Plant employs 800
Saw equip for depositing copper on rotogravure cylinders, rubbing under solution with agate thin coating over Ni (treated with CrO_3) remove after one printing.

Ballard process

Manufacture of generators, all synthone commutator up to 8000 amp.

Saw barrel for Cr plating small parts, & obtained samples.

Saw bath, stannate, allow NaOH to decrease, reduce anode corrosion & oxidizes Sn^{II} to Sn^{IV}.

Electrolytic cleaning tank with overflow for scum etc.

Plate sheets with Ni, Cr etc on large scale automatic polishing before & after plating.

Saw "sulfate meter" for Cr, based on C.D. at which a break in curve

occurs, accuracy
about ±10%.
Rapid deposition
of Fe on wires.
Up to 40-50 amp/dm²,
up to 0.075 mm -
No polishing required.
Manufacture
of Ni flake for
Edison batteries -
deposit Cu + Ni in
successive layers
on ~~at~~ a band about
30 cm wide & several
meters long -
100 layers each Ni + Cu.
Cut & separate as used.
Use 15,000 Kg Ni flake
per year in France
& Germany
Ni - Cd battery.
Anodic oxidation
Al in H_2SO_4, 10 V -
dyed etc.

also in $H_2C_2O_4$.

Apparatus for vacuum deposition of Au & Ag on glass, paper, cloth, fur etc. also used to remove gases from Ni prior to Cr.

Deposit Au & Ag etc on porcelain after burning Ag or Pd on.

Small plant for instructing men in plating.

Cu tanks lined with pure glass. arnico, no lead - Pb-Sn better than Pb-Sb for tank linings.

Use Pb-10%Sb for anodes.

Buffs made all from new cloth. Cut with a rotary knife -

Discussed exposure tests etc.

Also discussed bright Ni baths - Sahg. Pfann. sold to Ni & Sabin for amer. rights.

Mfr cu CN + $Zn(CN)_2$ Ag CN and double Cyanides.

Mfr electrical instruments & switchboards, rheostats -

Lunch with Dr Pfanhauser + Mr Mathes Trip to Rockaway etc

Heinz Wiessner.

4/26 With Mr Matthe[ws]
visited plant of
Wiessner, & met
Heinz Wiessner,
who has been in
Amer twice: once
last fall.
We discussed
especially mold-
ing in celluloid
& he gave me
samples etc.
Saw process
carried out -
Celluloid 0.8 mm
moisten with
petroleum ether
&rubber when dry ~~and~~
brush graphite
on surface. Then
warm on sepa-
rate gas heated
plate, use newspaper & felt. mold, cool
separate, and

again brush with graphite, deposit in copper or nickel. avoid high temp in bath for wood cellulose.

advantages - mold type - good impressions, no building up required - mold harder + not easily scratched - can use molds over for coarse halftones, not fine halftones.

disadvantages - Fire hazard of celluloid + of petroleum ether. Shrinkage specific. to prevent use on color work. costs slightly more than lead and

has no salvage valu
Use special cellulo
made by Dermatoid
Co of Leipzig.

Heisner has a
new molding
process, still
confidential.

Use slow copper
deposition over
night to save
cost on current-
no air agitation.

Wax forms are
built up with
flame instead
of hot iron.
Use small bi
tanks.
"Hand" stereotyping
claim better

Mr Matthes (L. PCo) said they have installed circular Faules for electrotypes in Munich, Dresden & Buenos Ayres -

Cr not used much on electrotypes for plants in Germany mostly for rotogravure & stereotypes plates.

Pox Co (Amsterdam) has a new process of offset printing (Asbest) that makes use of plated coatings.

4/36 Geisicke and Devrient – Print money, stamps etc for foreign countries. Met Mr Helmberger, formerly of Reichsdruckerei. He was not permitted to take us through plant, but he showed us exhibits of work. Discussed use of Cr V i on printing plates – never had success with Cr at Druckerei. Stamps there printed by surface printing Ni electrolytes.

4/27 met Dr O. Bauer director, & Dr Arnt. We discussed protective value of plating and especially the sample plates from exposure tests, in which they were much interested. They stated they had no plating facilities and the specimens prepared for them at Bremen were far less uniform. Their book for Cr in Auto Ind is being translated into English by Dr Barclay to be published by Ed Arnold Co.

Then met Dr E Seidl, who discussed his brief visit to Wash about 1929. He invited Mrs Blu & me to dinner on Sunday.

Am Embassy

Saw Mr Lee 1st Secy at Am. Embassy, who had ar- ranged with Gen Sor. Office for all my visits to Gov Lab & P Lands.

4/27 Following request of L S B, I visited the Institute für Boden Wasser und Luft Hygiene at Berlin Dahlem, with card of introduction from Dr Bauer to Dr H Klut. Mrs Dr Arnt accompanied me.

Dr Klut introduced us to Dr L V Haase, who discussed briefly stream pollution. He said there were no general laws, as these were largely local regulations, depending on conditions. He furnished

me (for SM) copies
of 2 numbers of
"Klein Mitteilung
on analysis of
sewage etc.
also referred to
"abwasserreinigung
by H. Bach -
2nd Edition - 1934
Oldenburg, München

"Taschenbuch
der Stadtentwässerung
K Imhoff, 1925
Oldenburg München

"Untersuchung des
Wassers"
Splittgerber und
Motte -
Urban & Schwarzen
berg - Berlin

"Vom Wasser" Vol 8, 1

4/28 Dr E Seidl sent his chauffer to hotel in mercedes car, to take us to his home for dinner. There met Mrs Seidl (a sculptor) their daughter Renate (13) (another daughter is away at school) Dr O Bauer; and Rev + Mrs Guertler (metal. at Tech Hoch. at Charlottenburg) - beautiful home & garden.

Reichsanstalt

4/29 Visited Physikalisch Technische Reichsanstalt at Charlottenburg. met Dr Henning who was very courteous and insisted to be remembered to Dr Briggs, Dr Vinal & others at Bureau

As Dr Von Steinwehr was away till June 1 talked with Dr A Schultze and Dr Greenhill about the work on the current balance as requested by Dr H L Curtis. They prefer to have Dr Von Steinwehr write directly to Dr Curtis, and then comment

were purely informal
They stated that the
measurements at
Potsdam were not
yet completed, but
it is hoped to finish them in June.
There was no change
in dimensions in
three months.

They consider
their weighings are
accurate, but the
corrections for dimensions and positions
of ~~the~~ coils are still
uncertain. Considers
same uncertainty in
Curtis' measurements.

They are not
yet ready to give even
preliminary results

They showed
me the room

where weighings are made, the current balance etc. The room is in basement (same as Dr Ure used) and kept at approximately const temp. about 18-21°C. H_2SO_4 is kept in the balance case.

Reichsausschuss für Lieferbedingungen.

4/30 I conferred with Mr. Lösch (Geschäftsführer) and Fritz Heide (Referent), especially about the U.S. + German specifications for silver plated tableware. Also discussed general specifications for plating, e.g. in Britain industry.

They furnished me copies of many of their specifications.

Reichsdruckerei

4/30 I was met by Herr Ulse, Abteilungsvorsteher who explained that Director Heusel was away. He introduced me to Herr Grigoleit, Abteilungsinspektor, who took me through the plant. He recalled Mr Hall & Mr Carter and showed me their signatures in the guest book.

In their electrolytic plant they make both intaglio plates for printing money and also surface

plates for printing stamps and regular books & papers.

The regular copper bath contains only $CuSO_4$ + H_2SO_4 and about 0.5 amp/dm² is used, the plates being about 1 mm thick. air agitation

For rapid copper deposition they use bath with phenolsulfonic acid, and 1.5 amp/dm². This is used only after initial coat in regular copper.

The original steel plate is plated with thin Ni to prevent attack

in copper baths, and to permit separation.

The copper plates are curved and then coated with about 0.001 mm of iron in a cold iron bath (Lang. Pf.) containing $FeSO_4$ and "conducting salts" (probably NO_4Cl) - called "steel" bath. "Covered" rapidly with iron, using 5 V, and then reduced to 1 V for 40-60 min. Deposit very smooth and fairly hard.

At intervals (7000 impressions?) the plates are

stripped rev (1-10) H_2SO_4 and replated with iron. Curved plates less often. Total production from Fe plated plates up to 400,000.

Cr is sometimes used on steel & is deposited from a ferrous bath at 45° C and 20 amp/dm²

Cr not considered as good as Fe on copper. Claim Cu is etched in Cr bath.

Printing money on both rotary and flat presses. (Latter like B E P)

The plates are
wiped first with
a dry cloth &
then a wet
cloth, with
no hard polishing

The under
design on bills
is printed ~~by~~
by surface printing

4/30 Met Mr Erich Waldau who explained that they have only a small plant, depositing only Cu, on both lead & wax molds. Lead molding in sections.
Copper baths cold, slow deposition 4-5 hours, largely at night, with a clock arrangement to turn off current.
Have had no experience with celluloid, but consider it OK for special purposes, advised

visiting plant of Ullstein, at Tempelhoff. Too late that day, May 1 a holiday, and due in Amsterdam on May 2. Advised that I have a very large plant, with rotating tanks for coffee, installed by Max Schlotter.

5/2 Visited Enschedi in morning & met Mr Francis? Enschedi and Mr de Weert. After general discussion, and learning that I could see Dr Aten in afternoon, they toole us to flower show "Flora", and advised my visiting them next day.

Then called on Prof A H Aten at Univ Amsterdam as he is in charge of both electrochemistry (mornings) and analytical chem (afternoons) he has had little time for research in recent years. He discussed

the papers of the Faraday Soc. and theories of the structure of metals.

His son, A. H. W. Aten Jr, is on a Nederland-American fellowship at John's Hopkins, working with Prof Rice on isolation of radicals.

Joh. Enschedé & Sons - Haarlem

5/3

Was shown around by Dr de Heer, Chemist. The plant and firm have been in operation for over 200 years (Note - Haarlem claims that printing was discovered by Laurence Koster, to whom a statue is erected in their market place).

They make their rotogravure cylinders by the Ballard process in S.P. equipment. The steel cylinder is plated with nickel, which is polished. To permit separation of subsequent copper deposit, it

is either treated with a Agcd solution to produce a very thin silver fitm, or else is made anodic a few seconds in the copper bath.

The copper is deposited in a L.P. solution containing a proprietary addition agent, which includes Cr^{+++} salt and some colloid. The cylinder is $\frac{1}{3}$ immersed, & copper is deposited up to 20 amps/dm², giving 0.1 mils in 4 hours or at lower C.D. over night. Surface is burnished with

agate either above or under solution.

This copper layer is very smooth & requires very little polishing. It only used once & then is stripped off & replated.

Query? Occasional need to remove defective Ni layer from steel cylinder. $NaNO_3$ strip?

Cr The cylinders are plated with Cr, completely immersed & rotating, in glass lined tank (water glass cement) - double walled for heating.

Ni is plated from $NiSO_4$, H_3BO_3 and NaF. pH 6.2 to 6.4 - mixed cast & rolled anodes.

electro-plates. Flat plates are reproduced from cu originals. cu treated with Ag film for separation (no iodid treatment) Plates about 2 mm thick.

Then cu plated.

Steel plates are hardened & then cu plated for long runs.

The currency (for banks in Holland & Dutch possessions) are printed either on a flat bed press with cu & subject plate. Printed sec exactly with 4 clothes- Units 5000 sheets/day

Also use regular

4 plate press that prints about 7000 sheets/day.

The underlay on currency is printed on an offset press.

The stamps are printed rotogravure except high denominations are intaglio

The life of the intaglio plates is reduced by the presence of both engraved and etched lines.

Laboratory for chem analyses & microscopic exam etc. make own pigments.