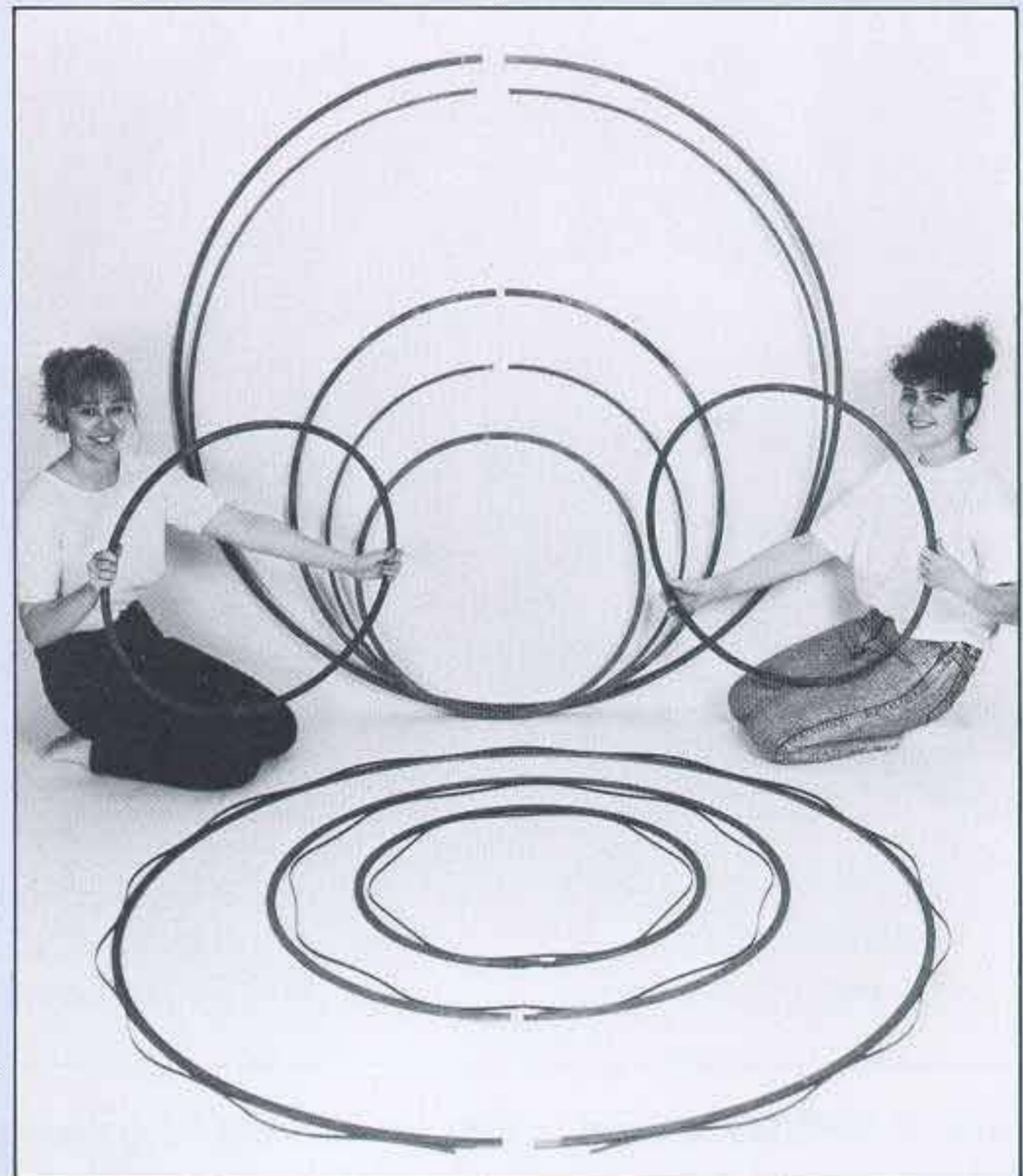
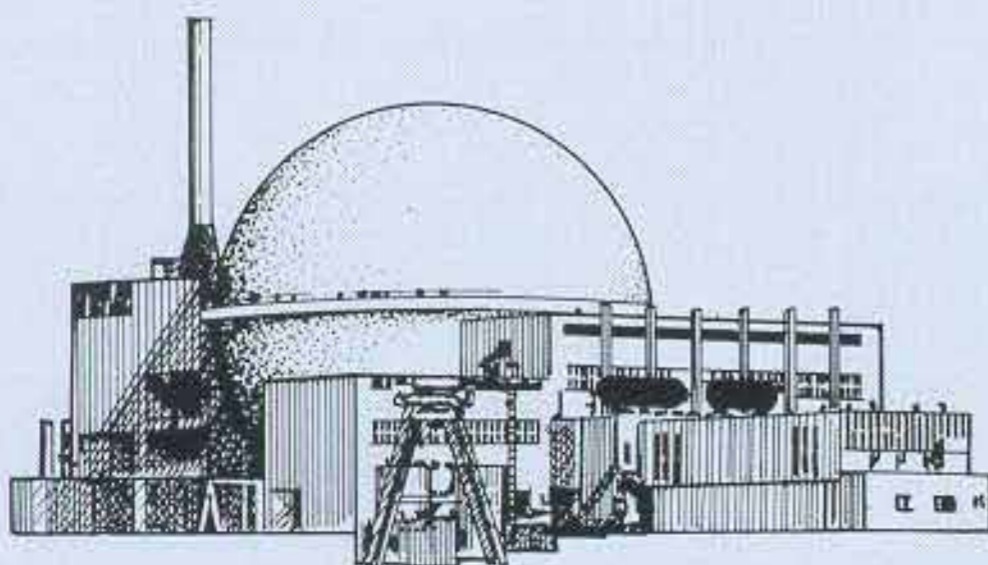
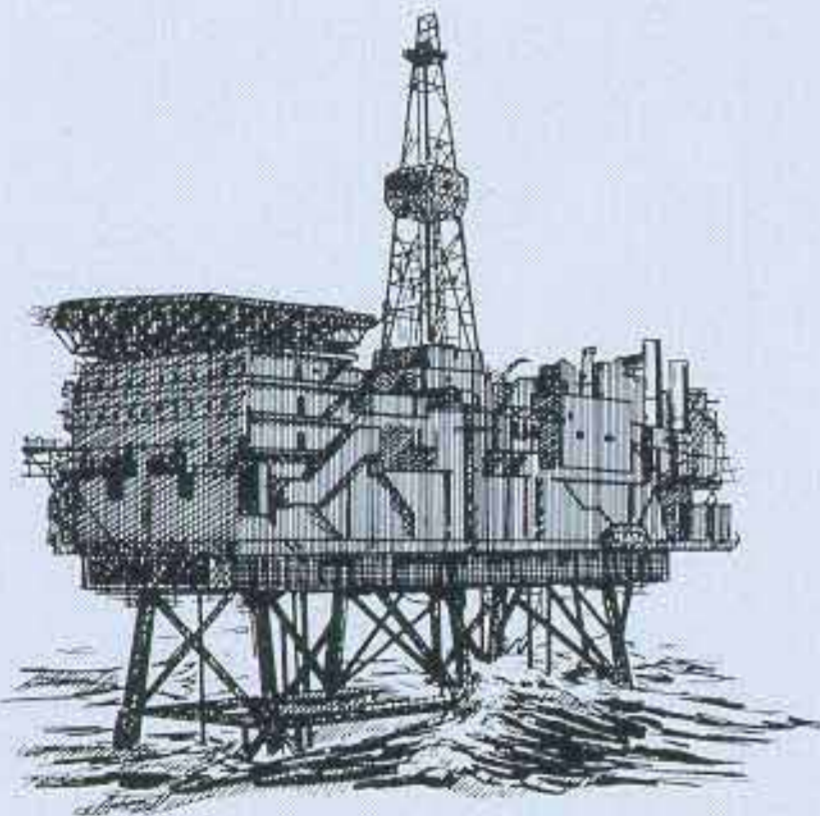
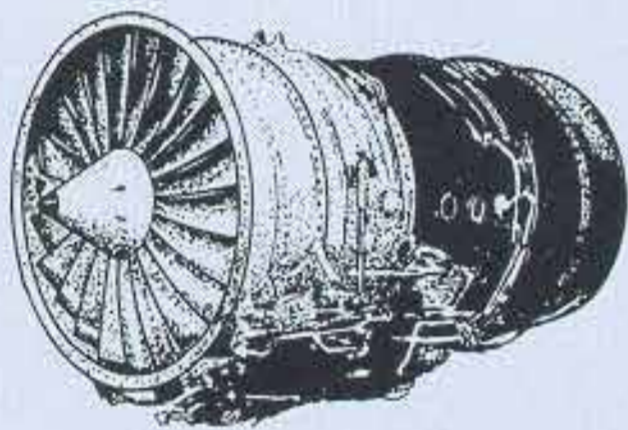
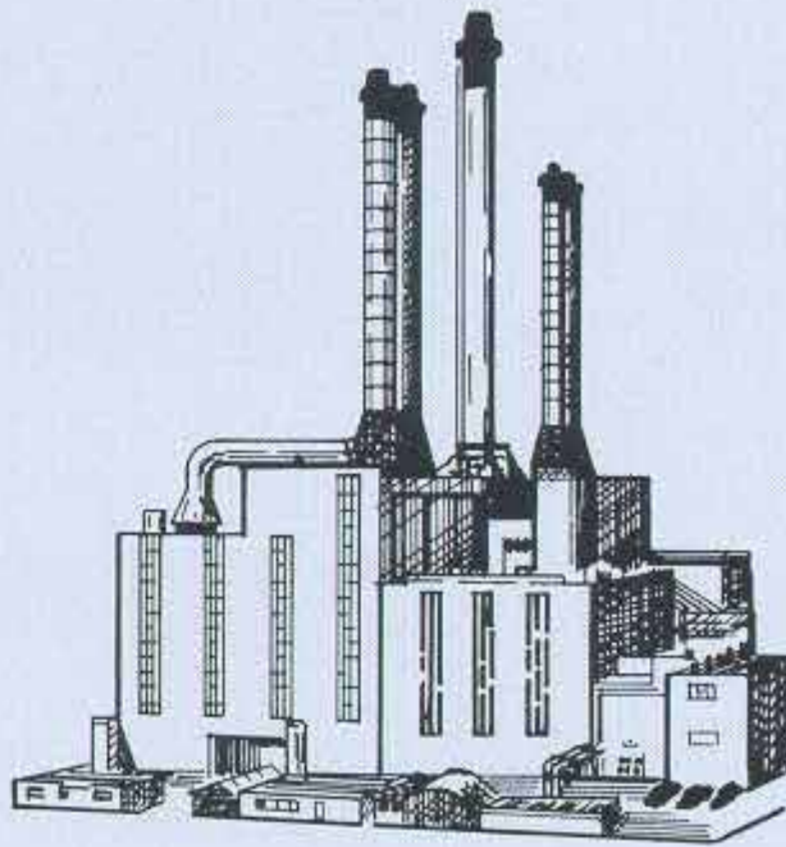


# LARGE DIAMETER METAL SEALS

FOR HOT  
&  
EXTREME CONDITIONS



- Sizes to 6ft 3ins (1900 mm) Dia. in regular production
- Larger Diameters Possible
- Temperatures in operation up to 800°C (1470°F)

FOR USE IN:

- Power Stations
- Steam Turbines
- Gas Turbines
- Special Purpose Rigs
- Liquid Metal Cooled Reactors
- Chemical Industry
- Food processing

Approved suppliers to many major companies world wide, in the following industries:

Aero Engine Manufacture

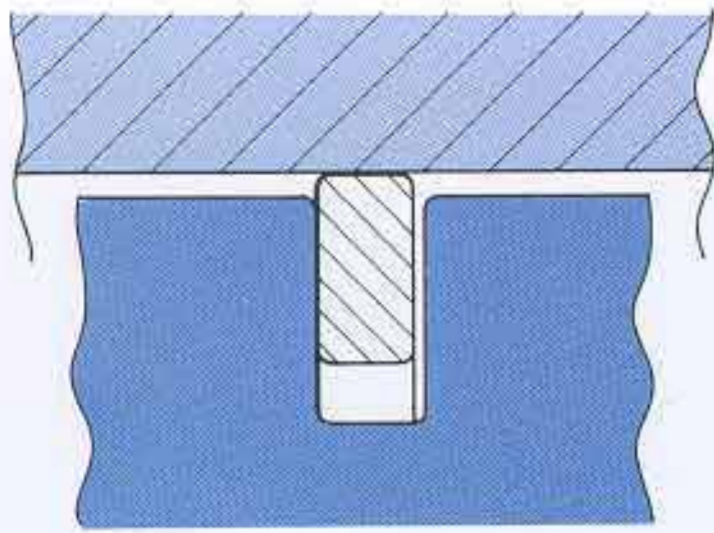
Power Generation - Steam and Nuclear

Oil, Gas and Chemical Production

## CROSS

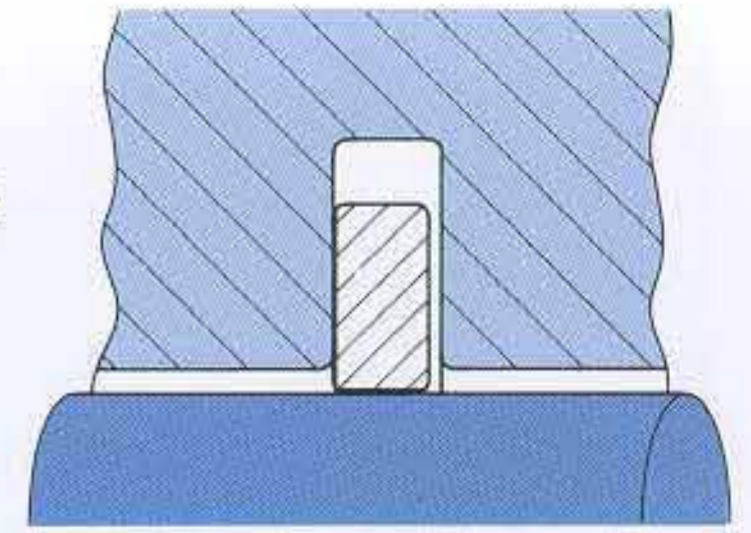
CROSS MANUFACTURING Co. (1938) LTD

# SEAL DESIGN

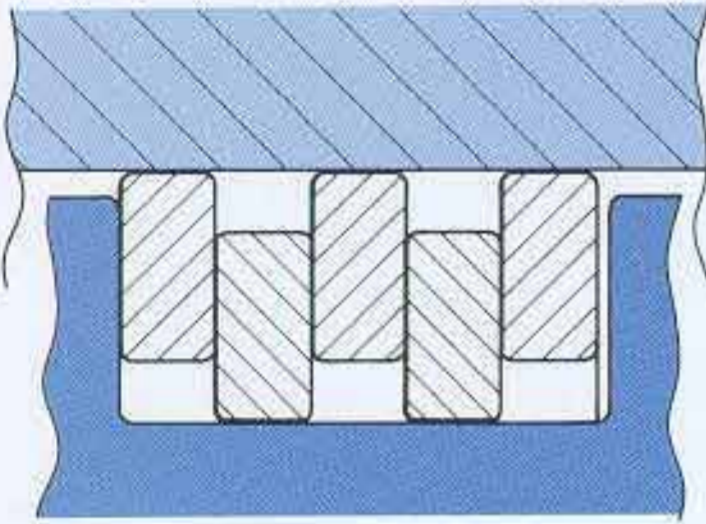


SINGLE  
OUTSPRINGER

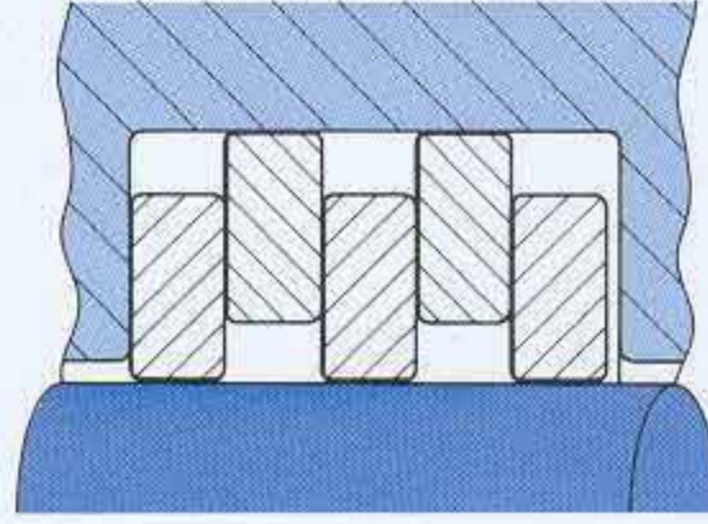
SINGLE  
INSPRINGER



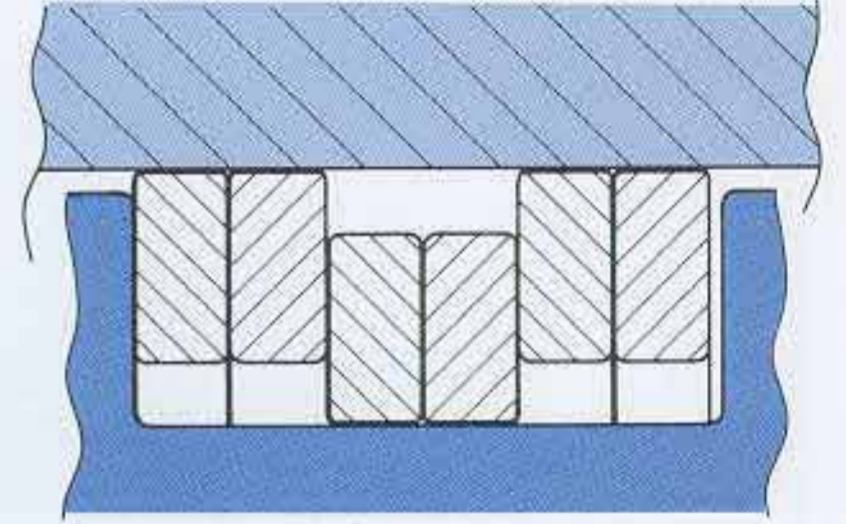
## RING PACKS



3 OUTSPRINGERS &  
2 INSPRINGERS  
To seal on a bore

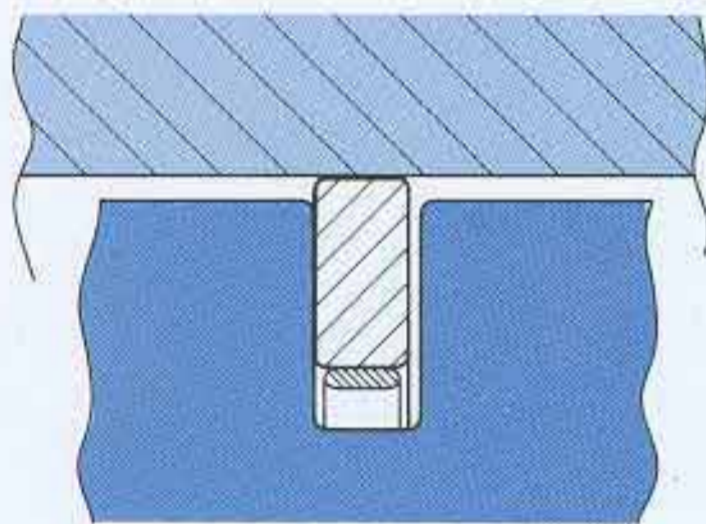


2 OUTSPRINGERS &  
3 INSPRINGERS  
To seal on a shaft

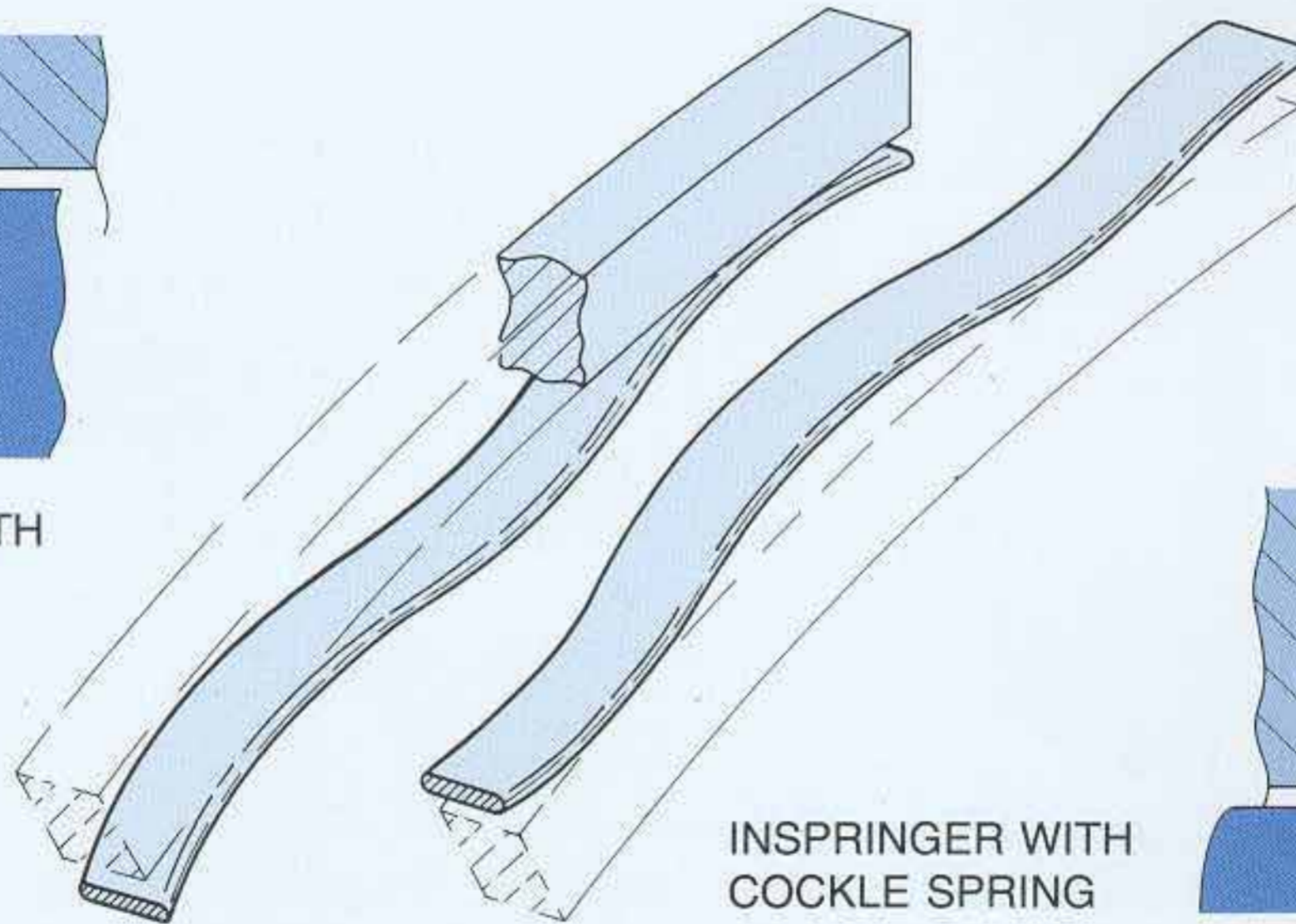


A PACK MADE UP OF  
PAIRS OF INSPRINGERS  
& OUTSPRINGERS

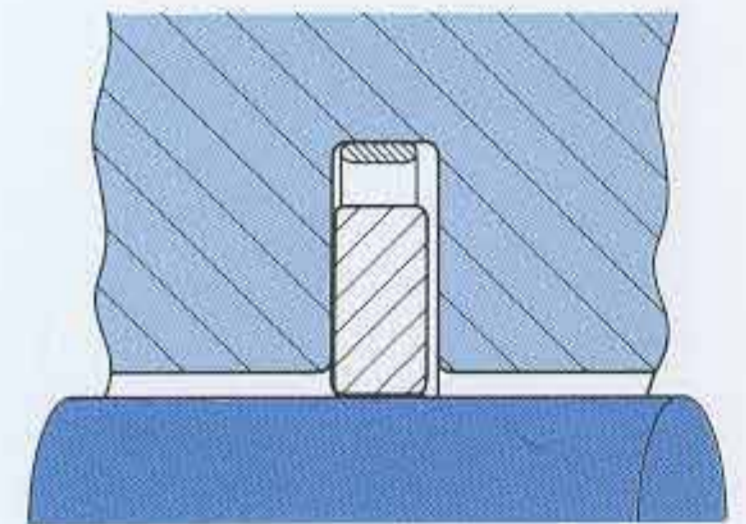
COCKLE SPRINGS; used to hold the Sealing Ring against the sealing dia.



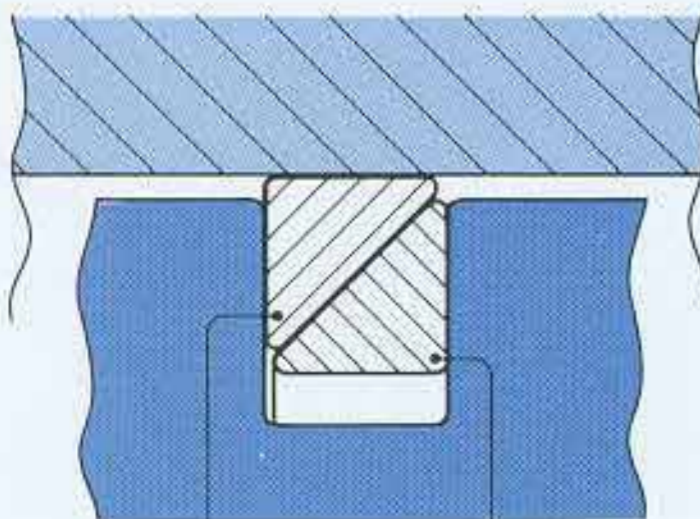
OUTSPRINGER WITH  
COCKLE SPRING



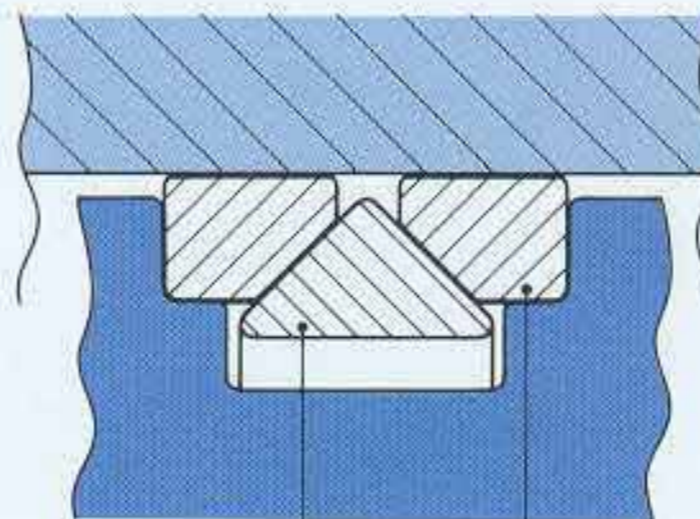
INSPRINGER WITH  
COCKLE SPRING



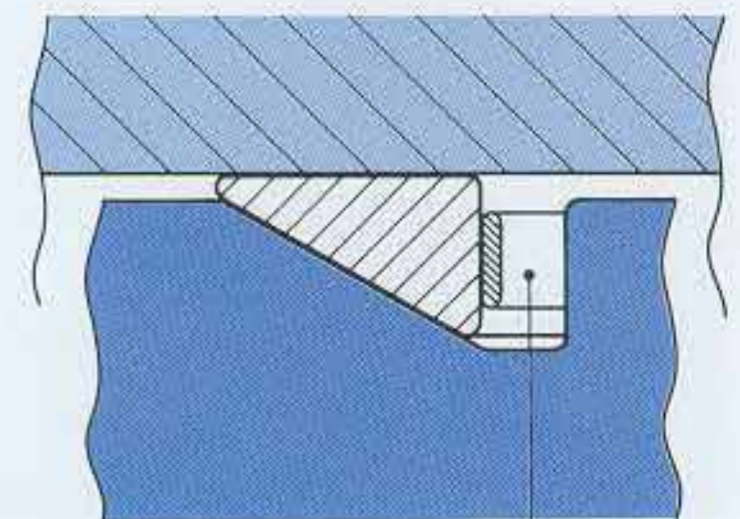
TRIANGULAR SECTIONS; used in special applications



High Conductivity Copper  
Spring Steel

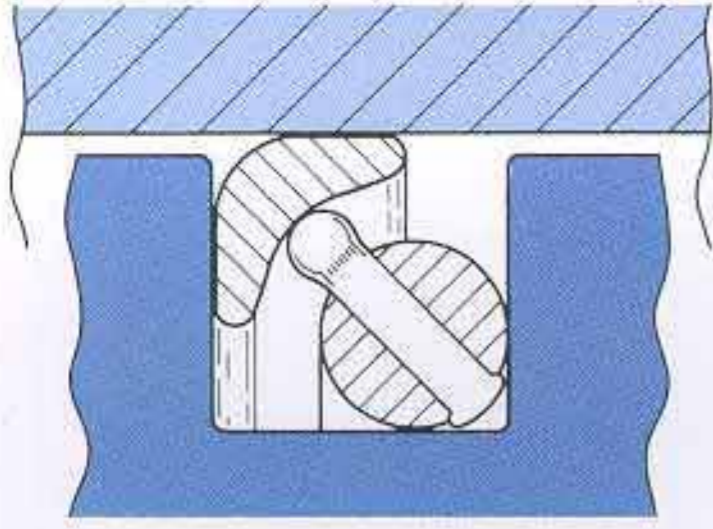


Stainless Steel PTFE

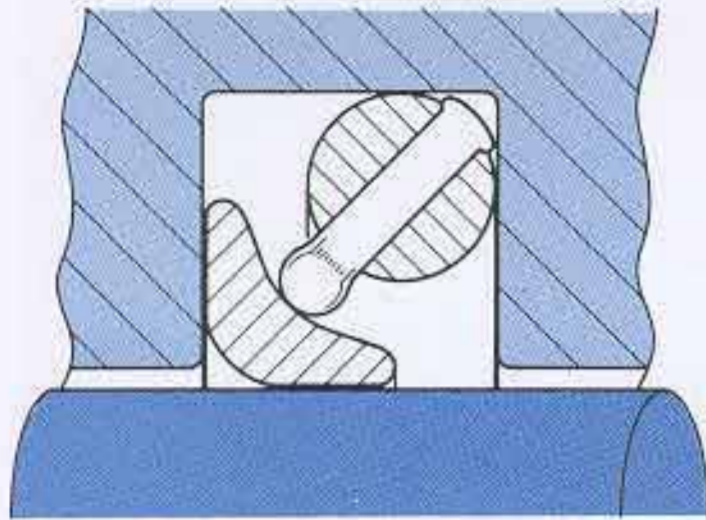


GASKET

Cockle Spring  
Pushing Axially

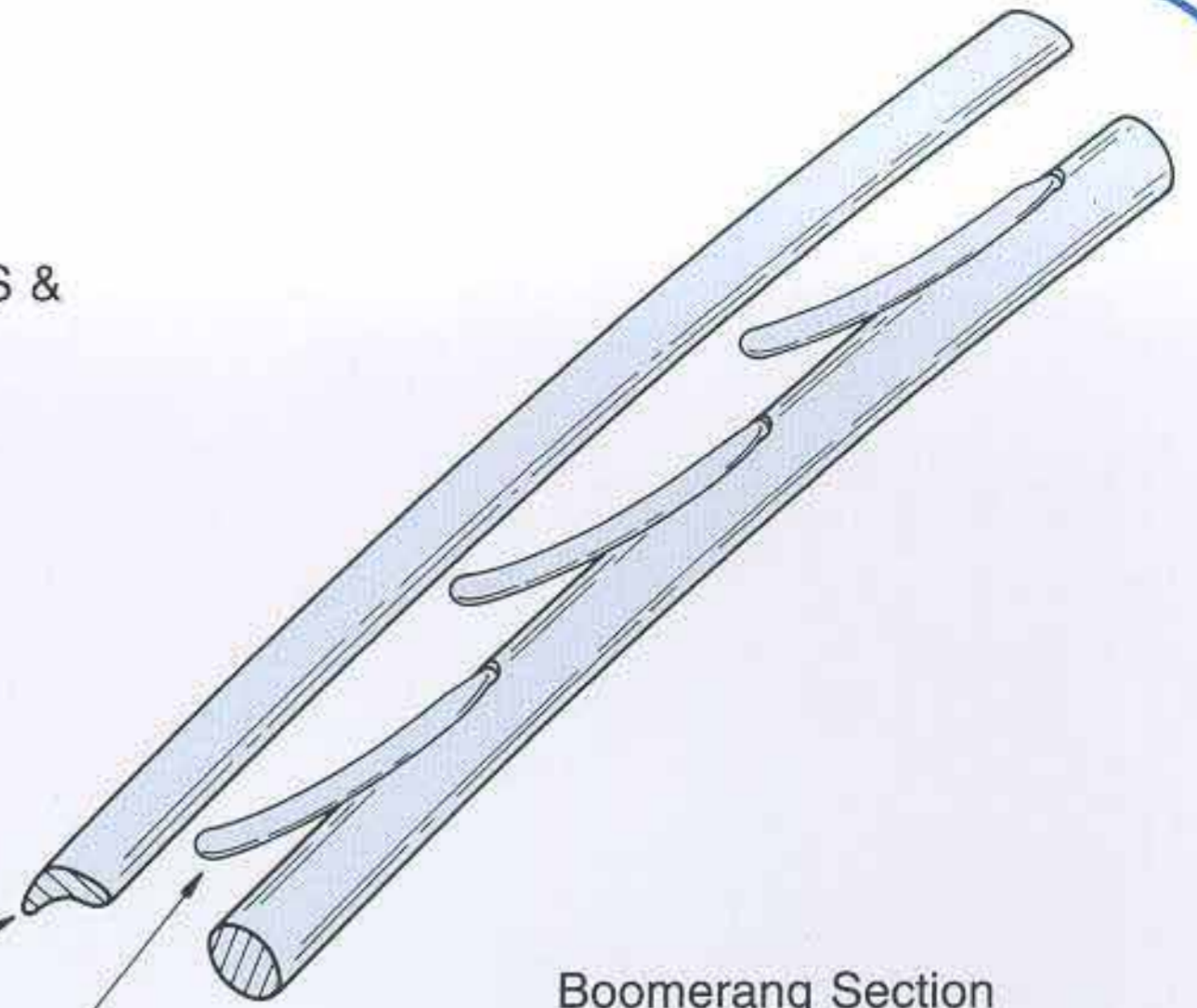


BOOMERANG SECTIONS &  
CENTIPEDE SEALS



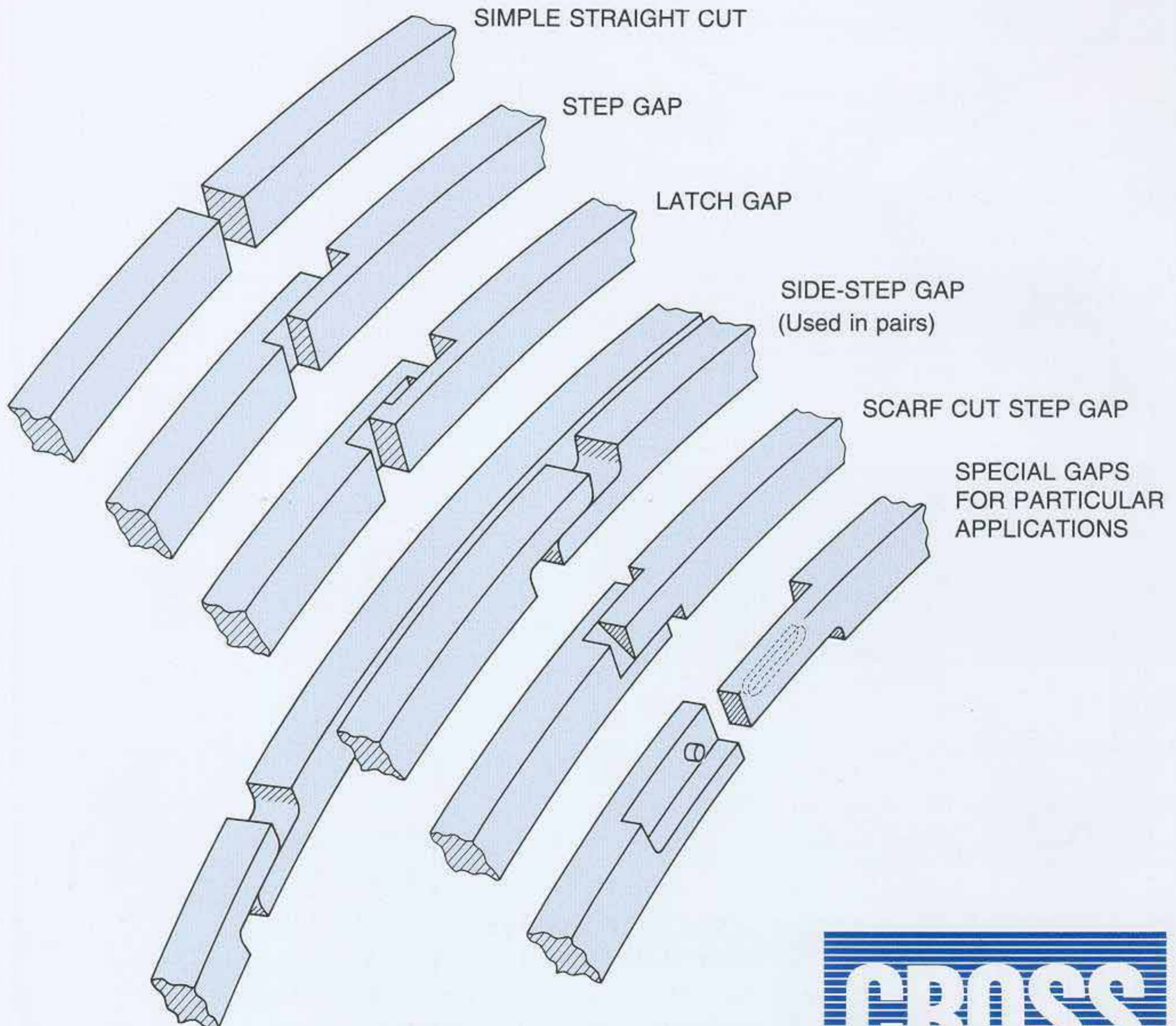
Cobalt Alloy  
Boomerang Section

Nickel Alloy  
Spring Legs



Boomerang Section  
Seal Ring is held  
against side of groove  
and sealing diameter by  
nickel alloy spring legs  
held in a carrier ring

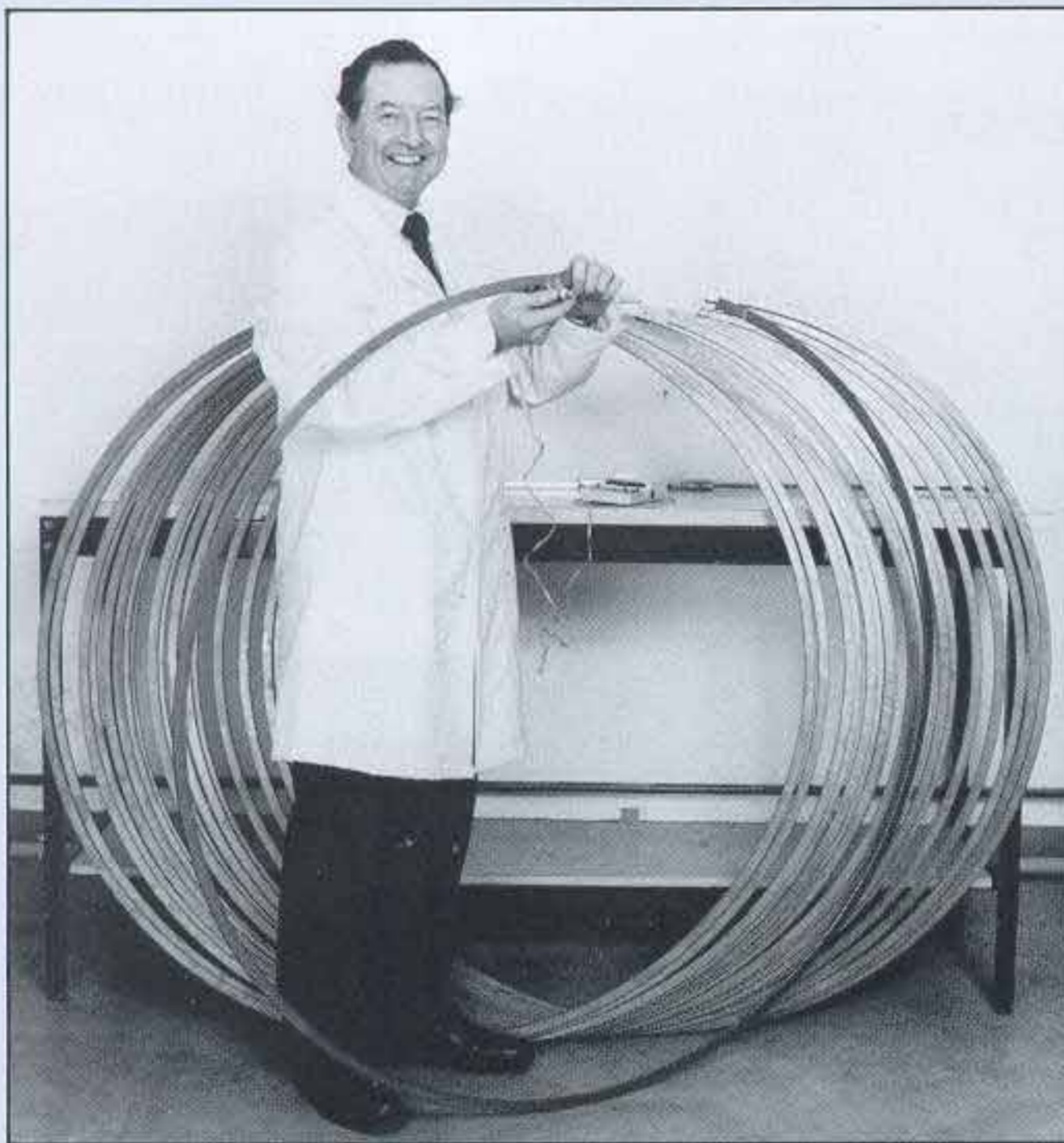
## GAP DESIGN



## TYPICAL MATERIALS

COBALT ALLOYS	Haynes <sup>®</sup> 25, L.605, BS.HR.40, UNS.R.30605, XSH, KC.20WN, Stellite <sup>®</sup> 6B, Stellite <sup>®</sup> 31, X.40, Haynes 188
NICKEL ALLOYS	Nimonic <sup>®</sup> 75, 80A, 90, C.263, 901, Inco <sup>®</sup> 718, X-750, 625, 600, Waspaloy <sup>®</sup>
BRONZES	Phosphor Bronze PB.102, Aluminium Bronze CA.104
STAINLESS STEELS	Austenitic: 321, 316, S.521, DTD.734, Nitronic <sup>®</sup> 60 Martensitic: 420.S.45, DTD.326.A, S.80,
HIGH SPEED STEELS	M.2, 14% Tungsten H.S.S.
CARBON SPRING STEEL	S.203, AISI 1080
BALL RACE STEEL	535.A.99, AISI E.52100, S.135

The requirements for the material for the Seal Ring may be different from the requirements for its Spring. The choice of materials is complex and we offer advice based on our own test results and experience of making rings in different alloys for use in a variety of conditions.



### Free Consultancy Service

Large diameter metallic seals for use in hot and difficult environments pose many complex problems. We offer a complete package of design and manufacture including the detail design of customers grooves and housings. The experience we have gained over many years designing and making rings for a wide range of applications is available as a free consultancy service.

Please contact Rodney Cross, who will be pleased to discuss with you your particular requirements.

### Approvals Held

BS EN ISO 9002 : 1994. CERT. No. 924766  
C.A.A. AI/3610/52 A8-2 & A8-5  
We also hold approved supplier status to many companies.

Haynes<sup>®</sup> 25 & 188, Stellite<sup>®</sup> 6B & 31 are registered trademarks of Haynes Int. Ltd.  
Nimonic<sup>®</sup> 75, 80A & 90 & Inco<sup>®</sup> 718 are registered trademarks of Inco Int. Ltd.  
Waspaloy<sup>®</sup> is a registered trademark of United Aircraft Corp.  
Nitronic<sup>®</sup> is a registered trademark of Armco Steel Corp.



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E-mail: mail@crossmanufacturing.com