

HYDRAULIC PRESSES

Professor Dr.-Ing Gerhard Oehler

Edward Arnold Ltd., 1962

Contents

Preface v

Acknowledgements ix

Conversion Constants xi

Introduction xiii

Part 1. Press Frames

Chapter 1 C-frame Presses 3

Chapter 2 Two-column and Four-column Press Frames 13

Chapter 3 Plate Frame Presses 21

Part 2. Press Hydraulics

Chapter 4 Water and Oil as Pressure Media 27

Chapter 5 Pressure Piping 36

5.1 Piping 37

5.2 High-pressure Hose 39

Chapter 6 Seals and Packings 42

Chapter 7 Pumps for Hydraulic Presses 51

Chapter 8 Cylinders, Rams and Pistons 72

Chapter 9 Hydraulic Accumulators 88

Chapter 10 Valves 99

10.1 Manually Operated Stop Valves 99

10.2 Control Valves 101

10.3 Unloading Valves 108

10.4 Amplifier Valves 109

10.5 Piston and Rotary Slide Valves 109

- 10.6 Pressure Reducing Valves 119
- 10.7 High-pressure Unloading Relief and Safety Valves 122
- 10.8 Prefill Valves 124
- 10.9 Valve-lift Characteristics 126

Chapter 11 Hydraulic Circuits 128

- 11.1 Circuit Resistance 128
- 11.2 Simple Circuits 131
- 11.3 Circuit Control with Variable-delivery Pumps 135
- 11.4 Accumulators in Circuits 139
- 11.5 Electrical Press-control Equipment in Hydraulic Circuits 141
- 11.6 Excess Pressure Unloading and Emergency Stopping 142
- 11.7 Miscellaneous Hydraulic Circuits 144

Part 3. Hydraulic Presses for Sheet Metal Work

Chapter 12 Single-acting Down-stroking Press 149

- 12.1 Hydraulic Presses with Hand Pumps 149
- 12.2 Open-fronted Presses 149
- 12.3 Open-sided and Four-column Presses 153

Chapter 13 Drawing Presses 163

Chapter 14 Special Cold-blanking Presses 198

- 14.1 Precision, Transverse Squeeze Blanking Presses 198
- 14.2 Blanking Presses 201

Chapter 15 Stretch Forming Presses 205

Chapter 16 Rubber-pad Presses 214

Chapter 17 Press Brakes 224

Chapter 18 Plate-bending Presses 238

- 18.1 Plate-bending Machines 238

18.2 Open-sided Flanging and Dishing Presses 243

18.3 Thick-plate Bending Press 255

Chapter 19 Boiler Drum and Pipe-forming Presses 260

Chapter 20 Rim and Wheel Presses 264

Part 4. Presses for Cold-working Rolled-steel Sections: Other Semi-finished Products: Metal Powders

Chapter 21 Backing and Straightening Presses 271

Chapter 22 Trimming Presses 282

Chapter 23 Upsetting, Die-forging and Cold-sinking Presses 291

Chapter 24 Sintering Presses 298

Part 5. Hot-forming Presses

Chapter 25 Forging Presses 313

Chapter 26 Extrusion Presses 340

26.1 Vertical Extrusion Presses 340

26.2 Horizontal Extrusion Presses 349

Chapter 27 Hot Piercing Presses 365

Chapter 28 Cable-sheathing Presses 371

Bibliography 375