

PHOTOGRAPHS OF CHARTS ON PRODUCTION

PRODUCTION (P - 1) MILLING CUTTERS - I

PLAIN MILLING CUTTER	HELICAL PLAIN MILLING CUTTER
SIDE AND FACE MILLING CUTTER	HALF SIDE MILLING CUTTER
STAGGERED TOOTH SIDE MILLING CUTTER	INTERLOCKING SIDE MILLING CUTTER

Side and face milling cutter is provided with cutting edges on both sides as well as on its face or periphery. This means that it is capable of cutting on both its face and sides.

PRODUCTION (P - 2) MILLING CUTTERS - II

END MILLS

STRAIGHT SHANK END MILL

TAPER SHANK END MILL

ANGLE AND FORM MILLING CUTTER

SINGLE ANGLE MILLING CUTTER DOUBLE ANGLE MILLING CUTTER FORM MILLING CUTTER

PRODUCTION (P - 3) ELEMENTS OF JIGS AND FIX. (LOCATING DEVICES)

FLAT LOCATORS

LOCATION BY JIG BODY LOCATION BY BUTTON

CYLINDRICAL LOCATOR **CONICAL LOCATOR**

JACK PIN LOCATOR **DRILL BUSH LOCATOR**

SLIDING V-LOCATOR **FIXED V-LOCATOR**

PRODUCTION (P - 4) ELEMENTS OF JIGS AND FIX. (CLAMPING DEVICES)

FLAT CLAMP **SCREW CLAMP** **DOUBLE ACTING CLAMP**

EQUALIZING CLAMP **PIVOTED CLAMP**

PIVOTED CLAMP **LATCH CLAMP**

WEDGE CLAMP **CAM CLAMP**

PRODUCTION (P - 5) ELEMENTS OF JIGS AND FIX. (INDEXING DEVICES)

INDEXING SYSTEM USING PLUNGER ACTUATED BY RACK AND PINION

INDEXING SYSTEM USING SPRING LOADED BALL

INDEXING SYSTEM USING PLUNGER

INDEXING SYSTEM USING SPRING LOADED PLUNGER

PRODUCTION (P - 6) ELEMENTS OF JIGS (DRILL BRUSHES)

Plain fixed Headed fixed

FIXED AND LINER BUSHES Fixed with shaped end

Extra long fixed with relieved bore Plain liner Headed liner

Renewable bush Liner bush Slip bush Liner bush

RENEWABLE BUSH **SLIP BUSH**

PRODUCTION (P - 7) SHEET METAL TOOLS - I

PRICK PUNCH TRAMMEL POINTS

CENTRE PUNCH Scriber

SWING BLADE PROTRACTOR HAND LEVER PUNCH

SPRING DIVIDER WING DIVIDER

PRODUCTION (P - 8) SHEET METAL TOOLS - II

TYPES OF SNIPS

(A) STRAIGHT SNIP (B) CURVED SNIP

SOLDERING IRONS

(A) STRAIGHT POINTED (B) HATCHET SHAPED

CHISEL

Head Bevel Round cutting edge

GROOVER & RIVET

GROOVER RIVET

STAKES

(A) BEAK HORN STAKE (B) BOTTOM STAKE

WIRE GAUGE

PRODUCTION (P - 9) LATHE PARTS

1. Main driving pulley 10. Gear box control 20. Reverse for sliding and surfacing

2. Headstock 11. Gear plate 21. Screw cutting engage

3. Driving clutch control lever 12. Feed shaft 22. Lead screw

4. Live center 13. Feed shaft 23. Feed nut

5. Tool post 14. Dose slip 24. Top

6. Dead center 15. Tailstock case 25. Hand lowering

7. Ram 16. Tailstock 26. Feed engaging wheel

8. Clamp 17. Feed box 27. Change

9. Tailstock 18. Bed 28. Slide ramp

19. Cross slide hand wheel 29. Slide stop

PRODUCTION (P - 10) SCREW CUTTING IN THE LATHE

SIMPLE GEAR TRAIN **COMPOUND GEAR TRAIN**

Driver teeth = Driver teeth = Pitch to be cut = Lead - screw turns = Spindle turns = Pitch of lead - screw

PRODUCTION (P - 11) TAPER TURNING

USING COMPOUND TOP SLIDE

USING TAPER TURNING ATTACHMENT

PRODUCTION (P - 12) UNIVERSAL DIVIDING HEAD

GEARING DIAGRAM

DIVIDING HEAD SETUP

FOR DIFFERENTIAL INDEXING FOR HELICAL MILLING

PRODUCTION (P - 13) TURRET LATHE

ELEMENTS OF THE TURRET LATHE

TURRET LATHE SLIDE ARRANGEMENT

Handwheel for moving saddle Turret Slide (Saddle) Ways of the bed Bed

PRODUCTION (P - 14) CAPSTAN LATHE

ELEMENTS OF A CAPSTAN LATHE

MAIN CONTROLS, MOTIONS AND ADJUSTMENTS

Headstock Saddle feed motion Four way front tool post Turret feed motion Turret index motion

PRODUCTION (P - 15) PARTS OF A STANDARD SHAPER

BLOCK DIAGRAM OF SHAPING MACHINE INDICATING BASIC FEATURES AND MOTIONS

QUICK RETURN SHAPING MECHANISM

PRINCIPLE OF THE QUICK RETURN MOTION

PRODUCTION (P - 16) VERTICAL MILLING MACHINE

Tilting head adjustment

Actual spindle rotation for boring or setting depth of cut

Spindle rotation Table feed

Table height adjustment

Horizontal distance inboard

Walkpiece, clamped to table

Indexing shaft

Movements and Principle of the boring head

PRODUCTION (P - 17) COLUMN AND KNEE TYPE MILLING MACHINE

1. Base, 6. Front brace, 11. Overhanging arm, 15. Telescopic feed shaft.

2. Elevating screw, 7. Arbor support, 12. Cutter, 16. Saddle,

3. Knee, 8. Knee elevating handle, 13. Column, 17. Conspuley,

4. Knee elevating handle, 9. Saddle, 14. Conspuley,

5. Crossfeed handle, 10. Arbor, 15. Telescopic feed shaft.

PRODUCTION (P - 18) GRINDING MACHINE

HORIZONTAL SPINDLE SURFACE GRINDING MACHINE

VERTICAL SPINDLE SURFACE GRINDER

PLAIN CYLINDRICAL GRINDING MACHINE

PRODUCTION (P - 19) GRINDING WHEELS

RECESSED ONE SIDE (STRAIGHT) STRAIGHT

TAPERED RECESSED BOTH SIDE (STRAIGHT)

STRAIGHT CUP CYLINDER

SAUCER FLARING CUP

DISH SEGMENTED WHEEL

PRODUCTION (P - 20) SENSITIVE DRILLING MACHINE VERTICAL DRILLING MACHINE

SENSITIVE DRILLING MACHINE

VERTICAL DRILLING MACHINE OF THE BOX COLUMN TYPE

PRODUCTION (P - 21) RADICAL DRILLING MACHINE

Auxiliary motor for rearing and lowering arm

Headstock Spindle head motor Speed change levers

Radial slides

Feed selector Feed start buttons

Column Auxiliary stand Base plate

In radial drilling machine, the drilling head is mounted to move on slides along a radial arm which itself can be swung about the end column.

The base of the machine itself is a work table and is provided with tee-slots.