

ENGINEERING PRACTICE ILLUSTRATED

AN INDISPENSABLE REFER-
ENCE BOOK FOR WORKSHOP,
INSPECTION DEPARTMENTS,
DRAWING OFFICE,
STORES, ETC. ETC.

ALL MACHINE PARTS, TOOLS
EQUIPMENT & INSTRUMENTS
IDENTIFIED ON SIGHT
WITH THE AID OF THIS
INVALUABLE BOOK.



PLANING
BORING
DRILLING

MILLING CUTTERS
LATHE TOOLS
DRILLS

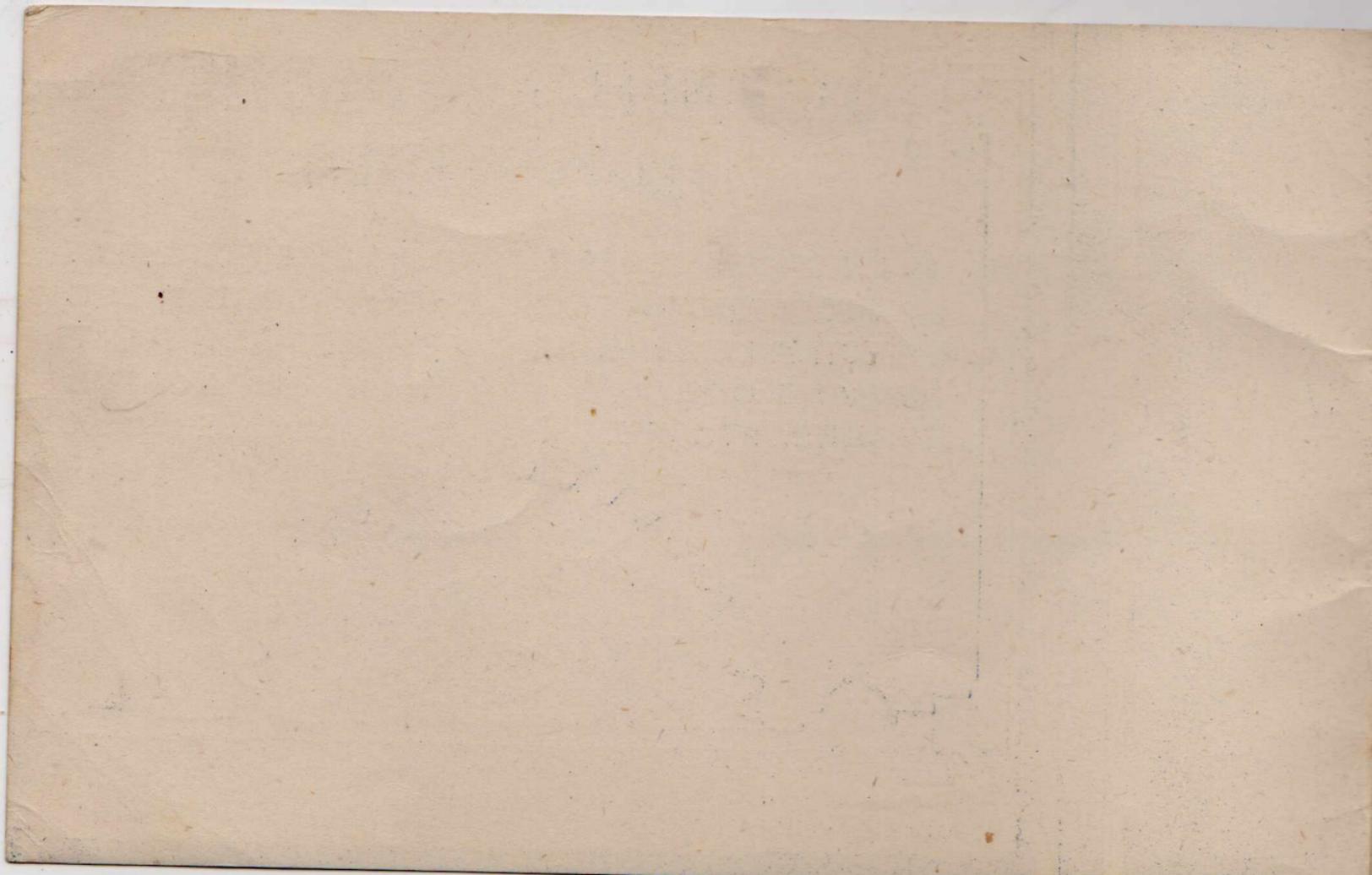
REAMERS
MICROMETERS
GEARS

BEARINGS
SPIGOTS
ARBORS

MACHINES
EQUIPMENT
COMPONENTS

GRINDING
TURNING
MILLING





MARKING OUT

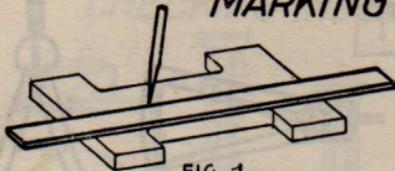


FIG. 1
SCRIBER AND STRAIGHT EDGE.



FIG. 2
SCREW JACK.

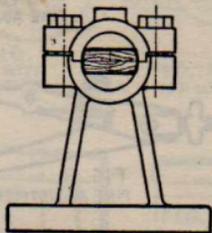


FIG. 3
CENTRE LINE ON INSERTED BLOCK.



FIG. 4
USE OF PACKING WEDGES FOR
MARKING OUT IRREGULAR WORK.

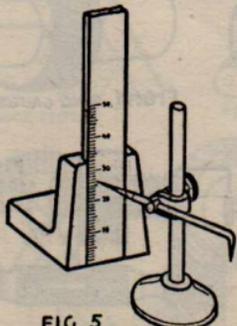


FIG. 5
'STANDARD RULE FOR'
SCRIBING BLOCK.

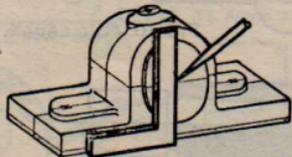


FIG. 6
USE OF SQUARE FOR MARKING OUT.

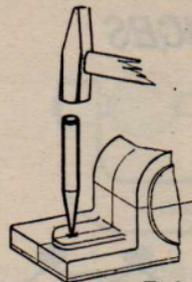


FIG. 1
CENTRE PUNCH.

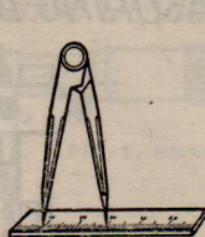


FIG. 2
DIVIDERS.



FIG. 3
AUTOMATIC
CENTRE PUNCH.



FIG. 4
CENTRE PUNCHING CONTOURS.



FIG. 5
CORRECT AND INCORRECT DRILLING
TO CENTRE PUNCHES ON PERIPHERY.

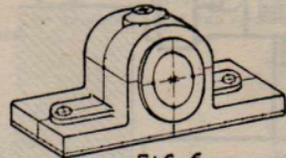


FIG. 6
CENTRE LINES-PUNCHED.

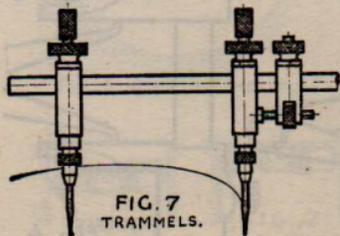


FIG. 7
TRAMMELS.

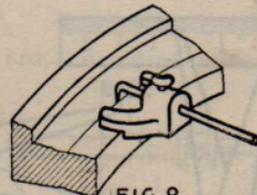


FIG. 8
ADAPTOR FOR INNER
CIRCLES MARKING.

MEASURING DEVICES

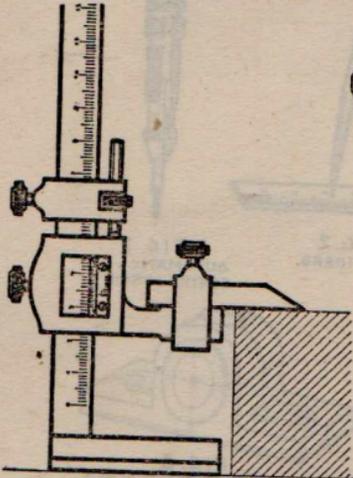


FIG. 1. HEIGHT GAUGE.

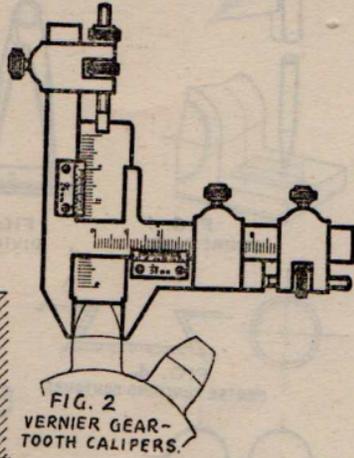


FIG. 2
VERNIER GEAR-TOOTH CALIPERS.

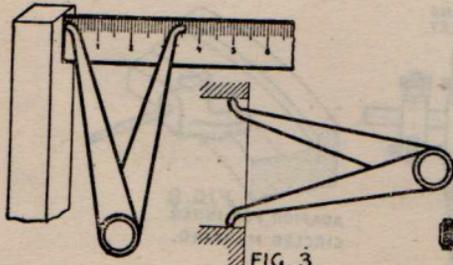


FIG. 3
INSIDE CALIPERS, SETTING TO RULE

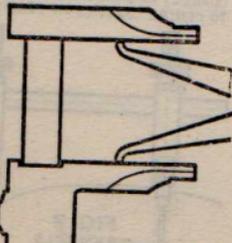


FIG. 4
CHECKING WITH VERNIER.

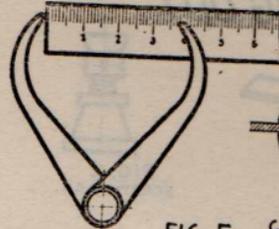


FIG. 5
OUTSIDE CALIPERS.

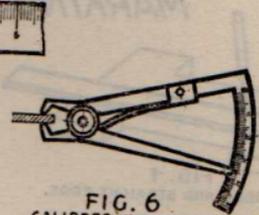


FIG. 6
CALIPERS WITH GRADUATION.

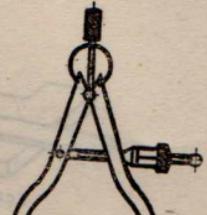


FIG. 7
FINE ADJUSTMENT.

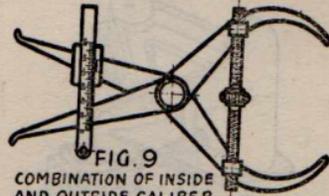


FIG. 9
COMBINATION OF INSIDE AND OUTSIDE CALIPER WITH VERNIER RULE.

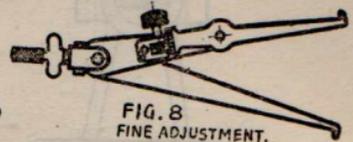


FIG. 8
FINE ADJUSTMENT.

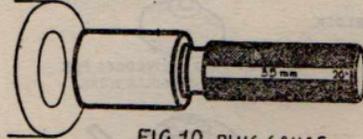


FIG. 10. PLUG GAUGE.

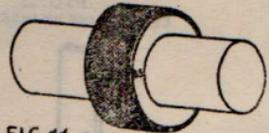


FIG. 11. RING GAUGE.

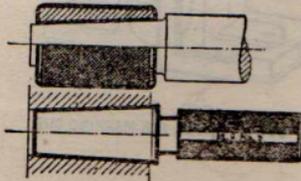


FIG. 12. TAPER GAUGES.

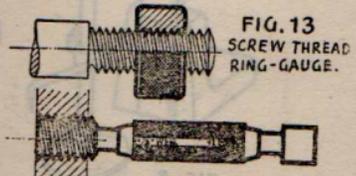


FIG. 13
SCREW THREAD RING-GAUGE.

FIG. 14
SCREW THREAD PLUG-GAUGE, RIGHT END CORE DIAMETER GAUGE.

CHECKING INSTRUMENTS

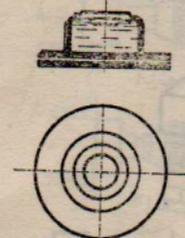


FIG. 1
LEVEL WITH
CONCENTRIC MARKINGS.

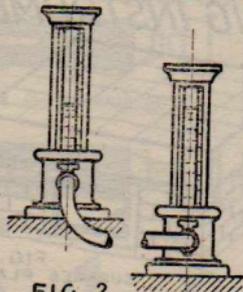


FIG. 2
HYDRAULIC LEVEL.

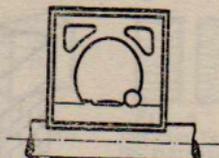


FIG. 3
APPLICATION OF LEVEL
BOX, ON ROUND OBJECTS.

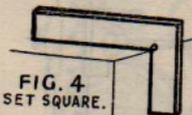


FIG. 4
SET SQUARE.

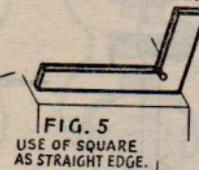


FIG. 5
USE OF SQUARE
AS STRAIGHT EDGE.

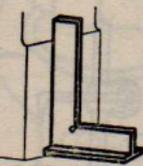


FIG. 6
USE OF SQUARE
FROM FACE PLATE.

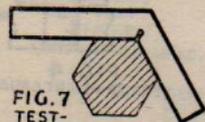


FIG. 7
TEST-
GAUGE 120°.

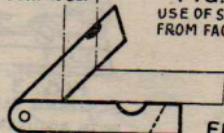


FIG. 8. BEVEL GAUGE.

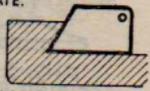


FIG. 11. FORM GAUGE.



FIG. 9
PROTRACTOR.

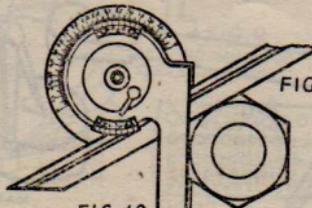


FIG. 10
VERNIER
PROTRACTOR.

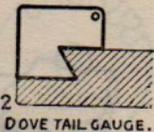


FIG. 12
DOVE TAIL GAUGE.



FIG. 13. FORM GAUGE.

MEASURING DEVICES

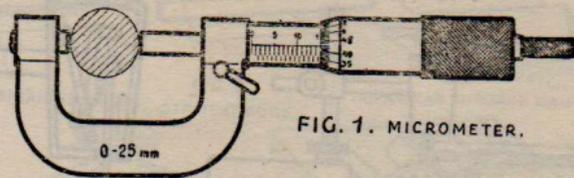


FIG. 1. MICROMETER.

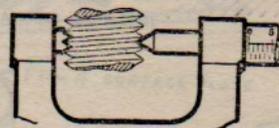


FIG. 2. SCREW THREAD MICROMETER.



FIG. 3
SPINDLE, SLEEVE AND THIMBLE.

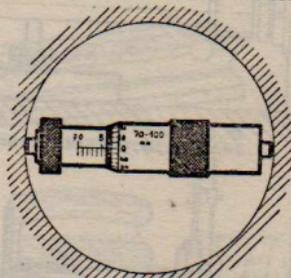


FIG. 4. INSIDE MICROMETER.

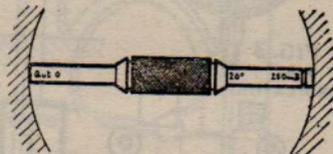


FIG. 5. FIXED INSIDE GAUGE.

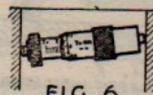


FIG. 6
WRONG POSITION
OF MICROMETER.



FIG. 7
RIGHT POSITION
OF MICROMETER.

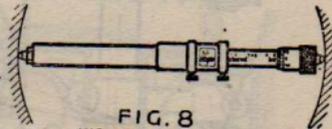


FIG. 8
INSIDE MICROMETER
FOR LARGE BORES.

MEASURING DEVICES

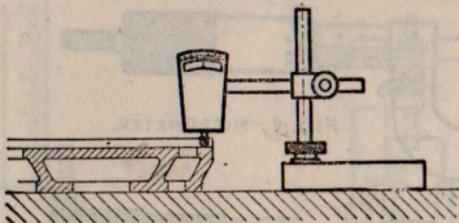


FIG. 1. TEST INDICATOR.

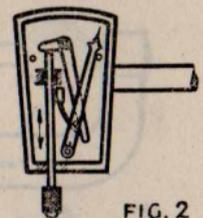


FIG. 2. INTERNAL MECHANISM.

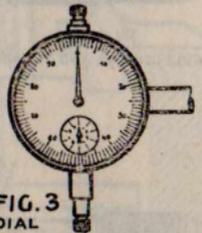


FIG. 3. DIAL INDICATOR.

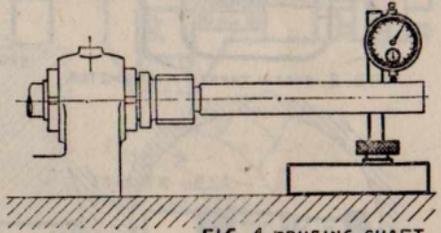


FIG. 4. TRUEING SHAFT.

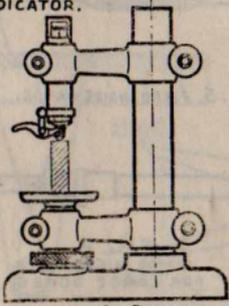


FIG. 5. COMPARATOR DIAL GAUGE.



FIG. 6. INTERNAL MECHANISM.

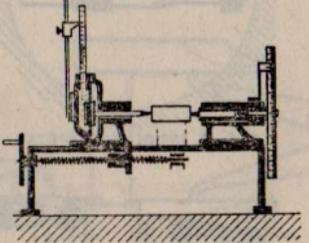


FIG. 7. HYDRAULIC TEST INDICATOR.

CHECKING INSTRUMENTS

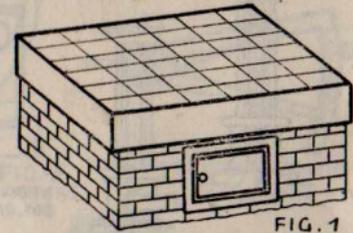


FIG. 1. SURFACE PLATE.

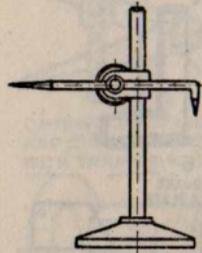


FIG. 2. SCRIBING BLOCK.

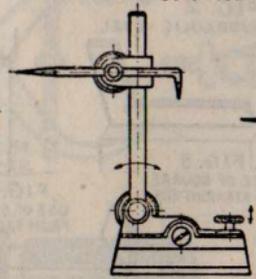


FIG. 3. SCRIBING BLOCK WITH ADJUSTMENT.

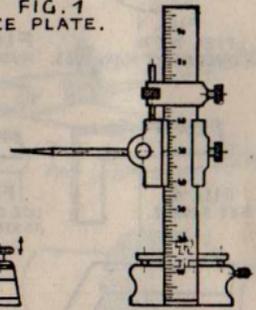


FIG. 4. VERNIER HEIGHT GAUGE.

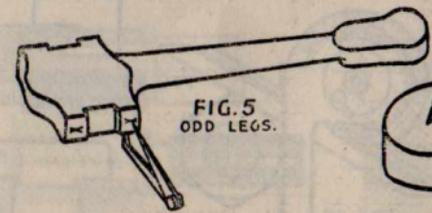


FIG. 5. ODD LEGS.

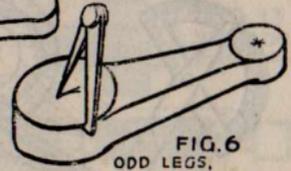


FIG. 6. ODD LEGS, MARKING OUT CENTRE.

MEASURING DEVICES



FIG. 1. PLUG GAUGE 'GO'.



FIG. 2. PLUG GAUGE 'NO GO'.



FIG. 3. PARALLEL TEST.



FIG. 4. OFFICIAL TEST FOR FLATNESS. PARALLEL MARKS-FLAT.

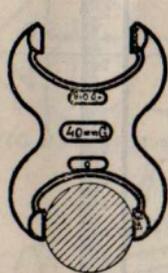


FIG. 5. LIMIT GAP-GAUGE 'GO'.

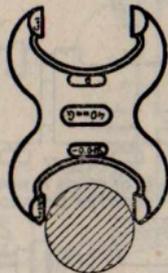


FIG. 6. LIMIT GAP-GAUGE 'NO GO'.

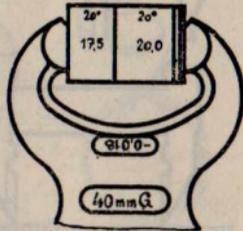


FIG. 7. CHECKING GAUGE WITH SLIPS.

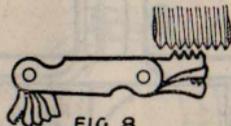


FIG. 8. SCREW PITCH GAUGES.



FIG. 9. SETTING GAUGE FOR THREADING TOOL.

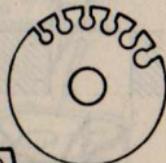


FIG. 10. WIRE GAUGE.



FIG. 11. FEELER GAUGES.

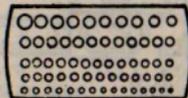


FIG. 12. DRILL GAUGE.

CHECKING INSTRUMENTS

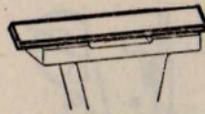


FIG. 1. STRAIGHT EDGE.

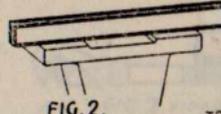


FIG. 2. STRAIGHT EDGE.

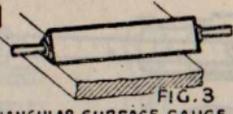


FIG. 3. TRIANGULAR SURFACE GAUGE.

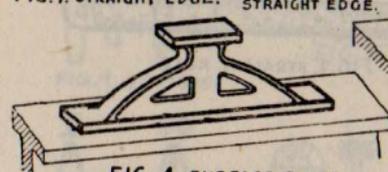


FIG. 4. SURFACE PLATE.

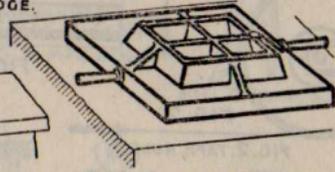


FIG. 5. SURFACE PLATE.

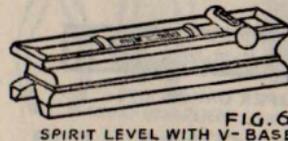


FIG. 6. SPIRIT LEVEL WITH V-BASE.

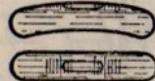


FIG. 8. SPIRIT LEVEL, CURVED.

FIG. 7. SPIRIT LEVEL BAR, 2. LEVELS AT RIGHT ANGLES, WITH V-BASE.

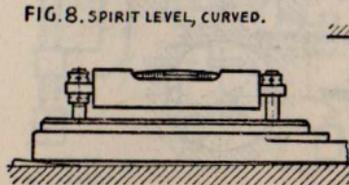
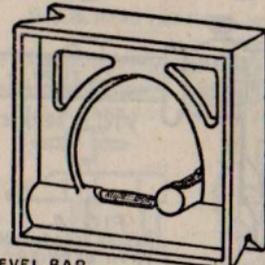


FIG. 9. ADJUSTABLE LEVEL, USE OF WEDGE FOR ALIGNMENT.

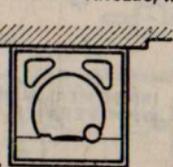


FIG. 10. APPLICATION OF SPIRIT LEVEL BAR.

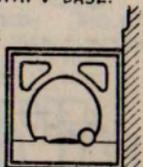


FIG. 11. APPLICATION OF SPIRIT LEVEL BAR.

PRECISION MEASURING INSTRUMENTS

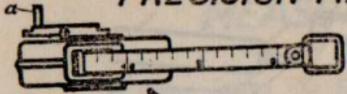


FIG. 1. STRAIGHT RULE.

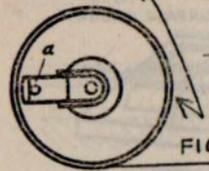


FIG. 2. TAPE RULE.

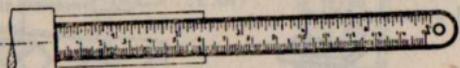


FIG. 3. VERNIER CALLIPER GAUGE.



FIG. 4. INSIDE MEASUREMENT WITH VERNIER.

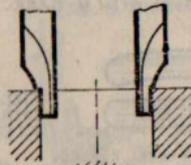


FIG. 5. INSIDE MEASUREMENT WITH VERNIER.

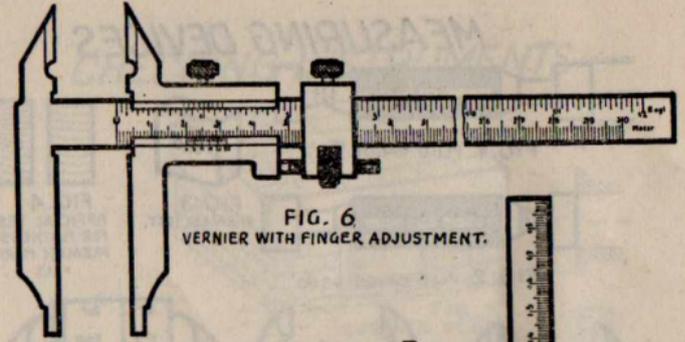


FIG. 6. VERNIER WITH FINGER ADJUSTMENT.

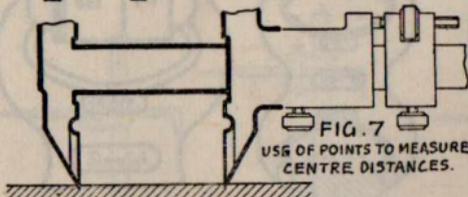


FIG. 7. USE OF POINTS TO MEASURE CENTRE DISTANCES.

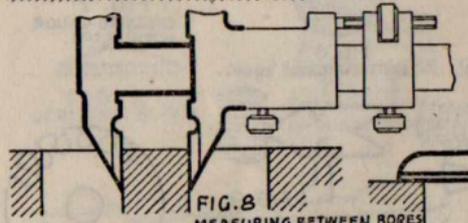


FIG. 8. MEASURING BETWEEN BORES.

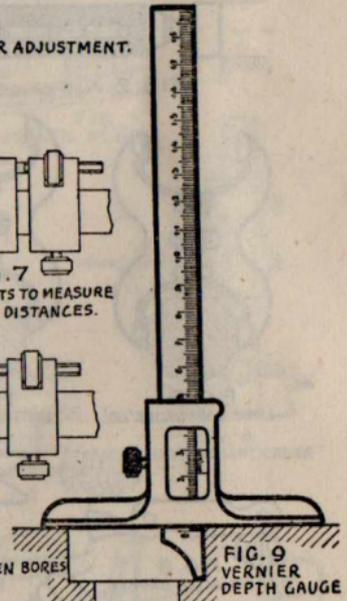


FIG. 9. VERNIER DEPTH GAUGE.

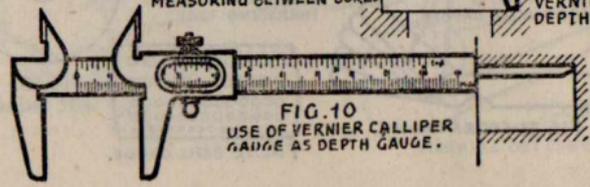


FIG. 10. USE OF VERNIER CALLIPER GAUGE AS DEPTH GAUGE.

PRECISION TOOLS

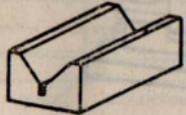


FIG. 1. VEE BLOCK.

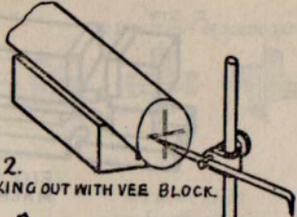


FIG. 2. MARKING OUT WITH VEE BLOCK.

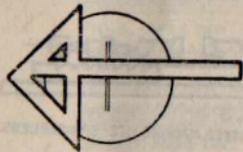


FIG. 3. CENTRE SQUARE.

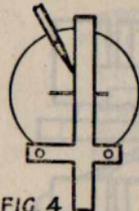


FIG. 4. CENTRE SQUARE.

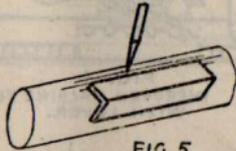


FIG. 5. MARKING OUT KEYWAYS.

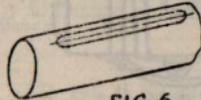


FIG. 6. MARKING OUT KEYWAYS.

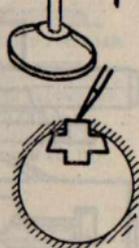


FIG. 7. KEYWAY TEMPLET.

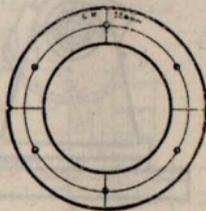


FIG. 8. TEMPLATE FOR MARKING OUT FLANGE.

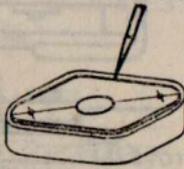
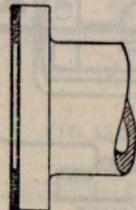


FIG. 9. MARKING TEMPLATE.

CLAMPING DEVICES

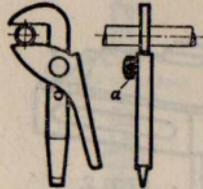


FIG. 1. STILSONS.

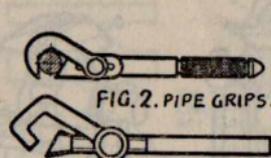


FIG. 2. PIPE GRIPS.

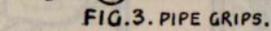


FIG. 3. PIPE GRIPS.



FIG. 4. TONGS.

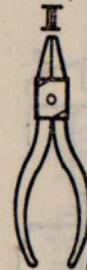


FIG. 5. FLAT NOSE PLIERS.



FIG. 6. ROUND NOSE PLIERS.



FIG. 7. PIN VICE.

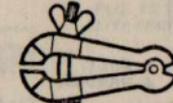


FIG. 8. HAND VICE INSIDE JAWS.



FIG. 9. HAND VICE POINTED JAWS.



FIG. 11. 'C' CLAMP.

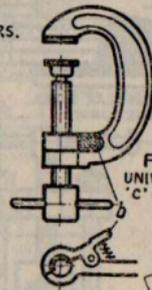


FIG. 12. UNIVERSAL JAW 'C' CLAMP.

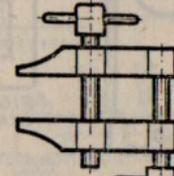


FIG. 13. TOOLMAKER'S CLAMP.

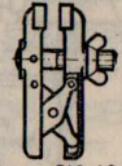


FIG. 10. PARALLEL ACTION HAND VICE.

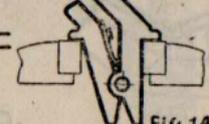


FIG. 14. FOLDING CLAMP.



FIG. 15. JAW PROTECTING CLAMP.

CLAMPING DEVICES

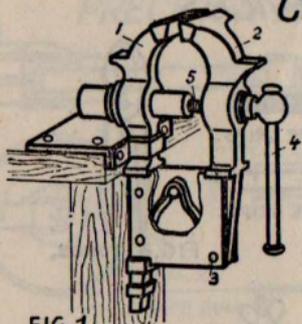


FIG. 1.
BENCH VICE.
1. REAR PART. 3. BOLT.
2. FRONT PART. 4. HANDLE.
5. SPINDLE.

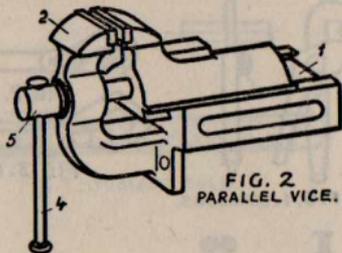


FIG. 2.
PARALLEL VICE.

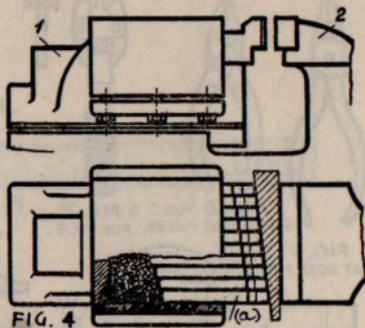


FIG. 4.
VICE FOR IRREGULAR WORK.
(a) ADJUST JAWS.

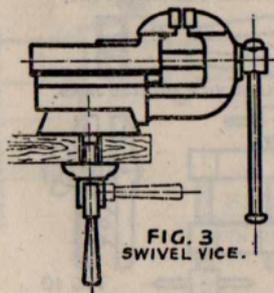


FIG. 3.
SWIVEL VICE.

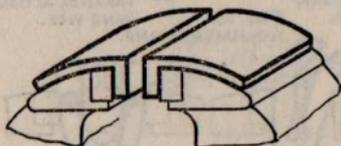


FIG. 5. PROTECTING JAWIS.

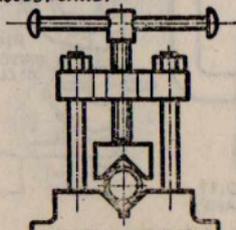


FIG. 6. TUBE VICE.

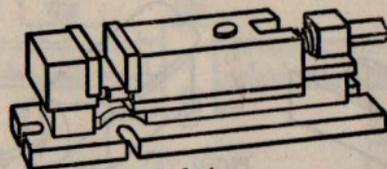


FIG. 1.
MACHINE VICE.

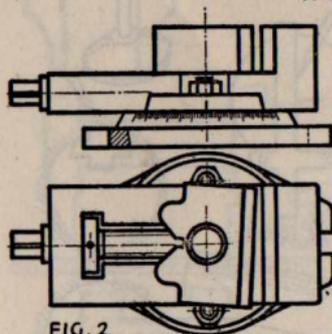


FIG. 2.
GRADUATED VICE WITH
JOINT CLAMP JAW.

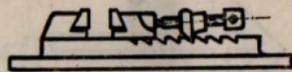


FIG. 3.
IMPROVED MACHINE VICE - SPINDLELESS.



FIG. 4.
IMPROVED MACHINE VICE
WITH LEVER.

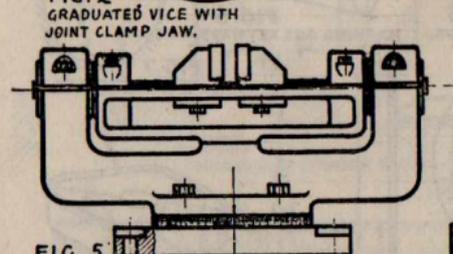


FIG. 5.
SWIVEL VICE WITH LEFT AND RIGHT
HANDED CLAMPING SPINDLE.

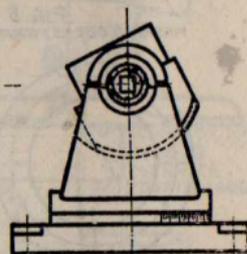


FIG. 6.
SWIVEL VICE END VIEW.

TAPS

FIG. 1. SCREW TAP.



TAPER FULL SECTION SHANK

FOR THROUGH HOLES.



FIG. 3. TAPER TAP.



FIG. 4. SECOND TAP.



FIG. 5. PLUG TAP.

FIG. 2. CROSS SECTIONS OF SCREW TAPS.



FOR BLIND HOLES

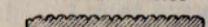


FIG. 6. TRUNCATED FIRST TAP.

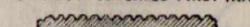


FIG. 7. TRUNCATED SECOND TAP.

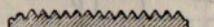


FIG. 8. BOTTOMING TAP.

FIG. 9. TAP WRENCH.

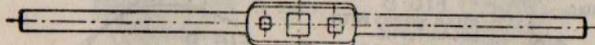


FIG. 11. DIE HOLDER.



FIG. 10. THREADING DIE.

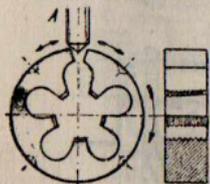


FIG. 12. STOCK AND DIE.



CLAMPING

FIG. 1. SQUARE HEAD BOLT.



FIG. 2. QUICK SET BOLT.

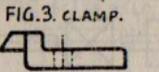


FIG. 4. CRANKED CLAMP.

FIG. 11. CLAMP AND SET SCREW.

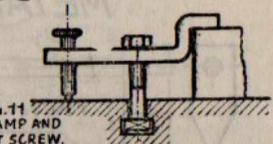


FIG. 12. STEP PACKING BLOCK.

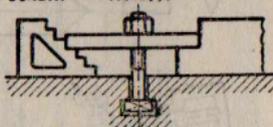


FIG. 5. INCORRECT, NO PACKING.



FIG. 6. INCORRECT, PACKING TOO HIGH.



FIG. 7. INCORRECT, PACKING TOO HIGH.



FIG. 8. CORRECT.

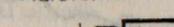


FIG. 9. CORRECT.



FIG. 10. CORRECT.



FIG. 13. SUPPORT BRACKET.

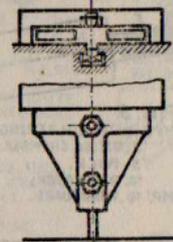


FIG. 14. CLAMPS FOR THIN METAL.



FIG. 15. ANGULAR CLAMP AND SET SCREW.



FIG. 16. CORRECT CLAMPING OF ROUND WORK ABOVE CENTRE LINE.

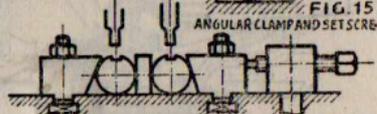
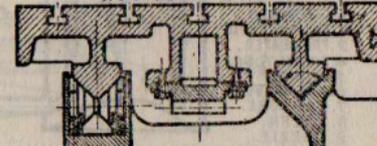


FIG. 17. SECTION THROUGH WORK TABLE WITH TEE-SLOTS.



METAL JOINING

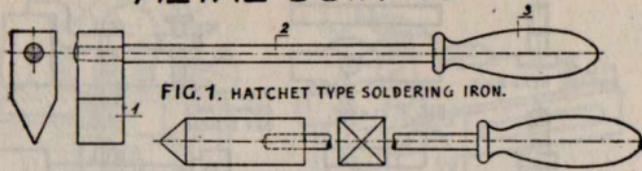


FIG. 1. HATCHET TYPE SOLDERING IRON.

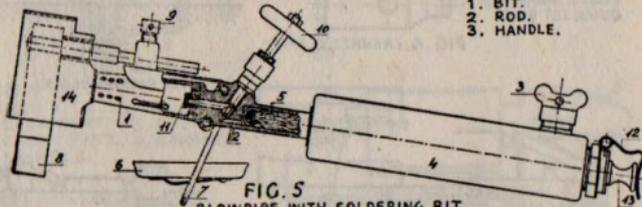


FIG. 2. INTERNAL TYPE SOLDERING IRON.

1. BIT.
2. ROD.
3. HANDLE.

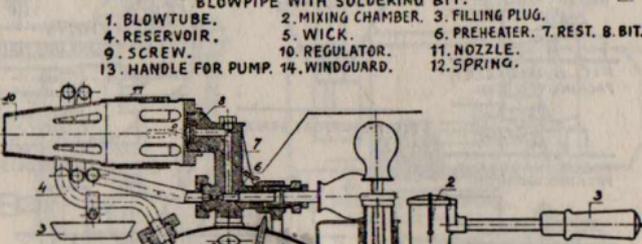


FIG. 5. BLOWPIPE WITH SOLDERING BIT.

1. BLOWTUBE.
2. MIXING CHAMBER.
3. FILLING PLUG.
4. RESERVOIR.
5. WICK.
6. PREHEATER.
7. REST.
8. BIT.
9. SCREW.
10. REGULATOR.
11. NOZZLE.
12. SPRING.
13. HANDLE FOR PUMP.
14. WINDGUARD.

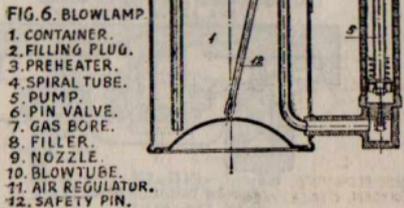


FIG. 6. BLOWLAMP

1. CONTAINER.
2. FILLING PLUG.
3. PREHEATER.
4. SPIRAL TUBE.
5. PUMP.
6. PIN VALVE.
7. GAS BORE.
8. FILLER.
9. NOZZLE.
10. BLOWTUBE.
11. AIR REGULATOR.
12. SAFETY PIN.

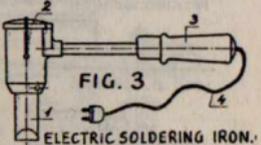


FIG. 3

ELECTRIC SOLDERING IRON.

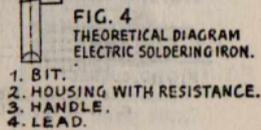


FIG. 4 THEORETICAL DIAGRAM ELECTRIC SOLDERING IRON.

1. BIT.
2. HOUSING WITH RESISTANCE.
3. HANDLE.
4. LEAD.

DIVIDING TOOLS FOR METALS

FIG. 2. CUTTING PLIERS.

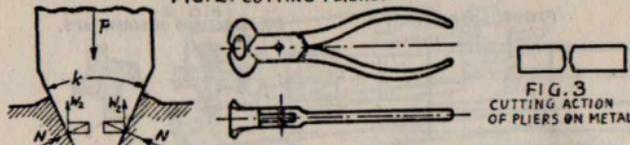


FIG. 3 CUTTING ACTION OF PLIERS ON METAL.

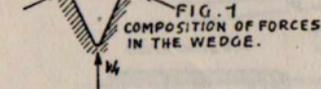


FIG. 1 COMPOSITION OF FORCES IN THE WEDGE.

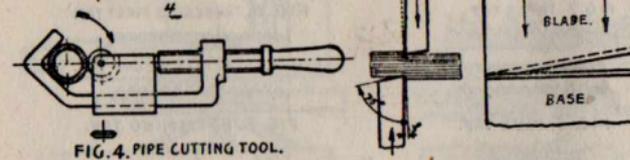


FIG. 5 SHEARING ACTION OF GUILLotine.

FIG. 4. PIPE CUTTING TOOL.

FIG. 6 WRONG SHEARING ANGLE.

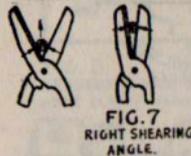


FIG. 7 RIGHT SHEARING ANGLE.

FIG. 8 BLOCK SHEARS WITH LOGARITHMIC CURVED BLADE.

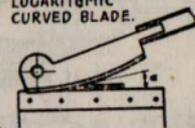


FIG. 9 LOGARITHMIC CURVE.

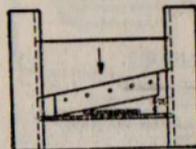
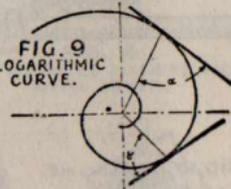
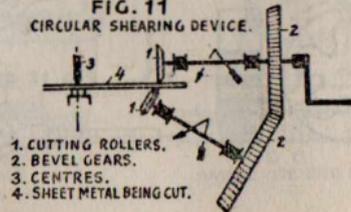


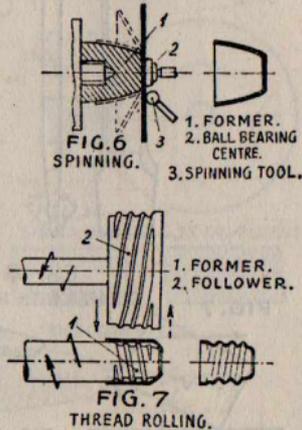
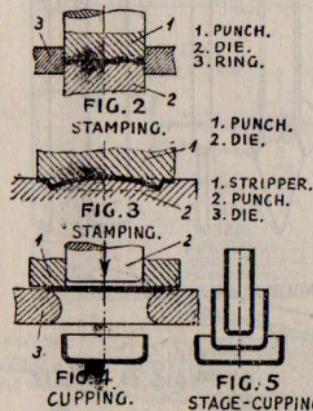
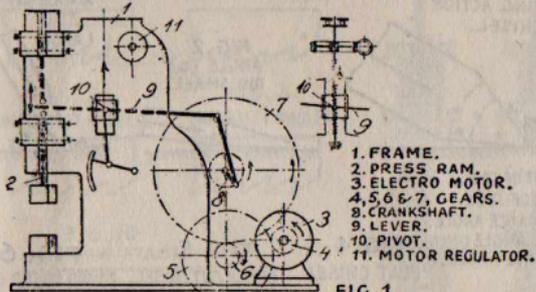
FIG. 10 FRAME GUILLotine.

FIG. 11 CIRCULAR SHEARING DEVICE.

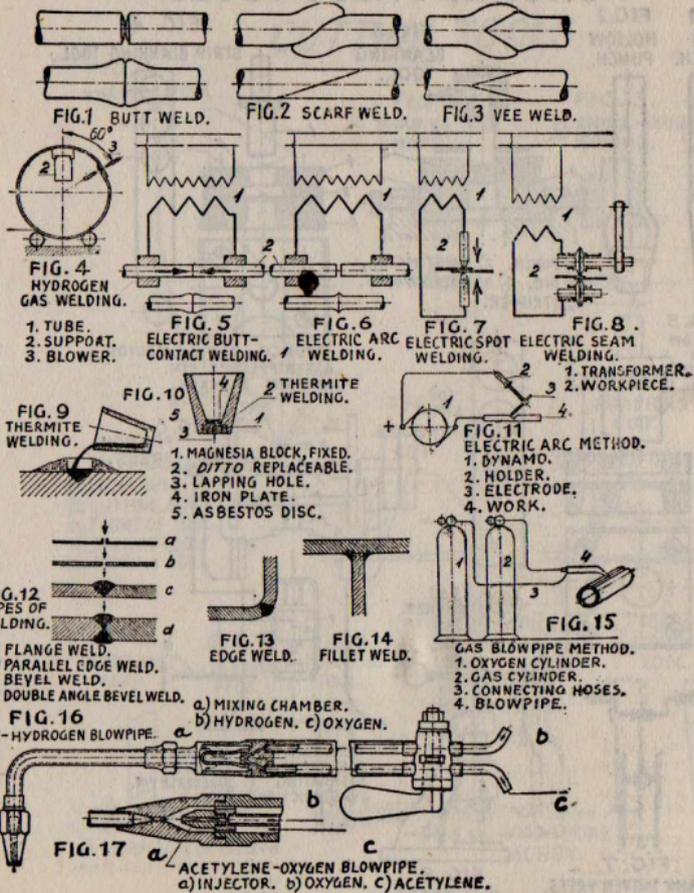


1. CUTTING ROLLERS.
2. BEVEL GEARS.
3. CENTRES.
4. SHEET METAL BEING CUT.

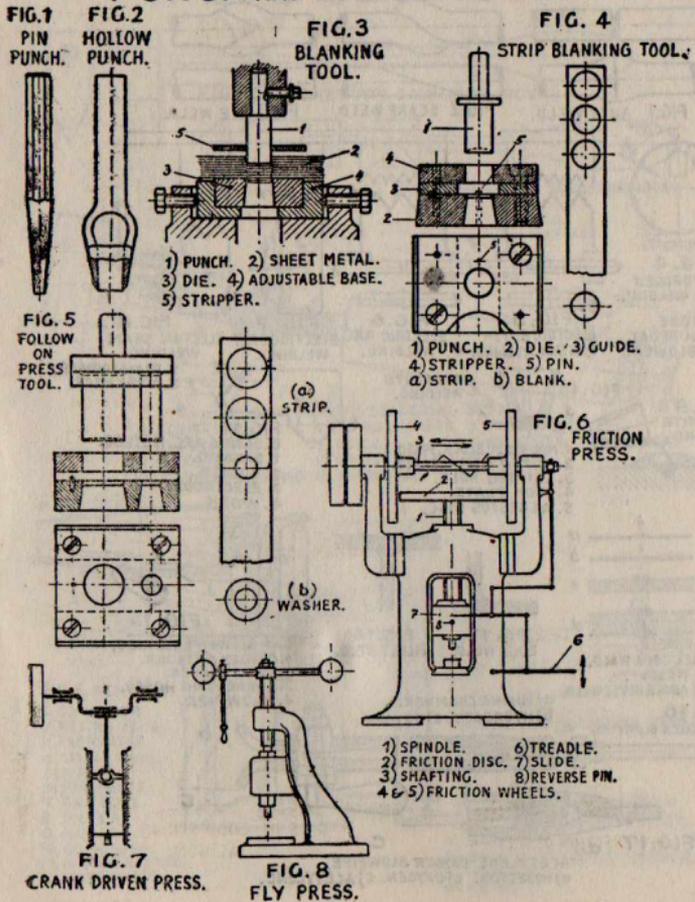
METAL WORKING



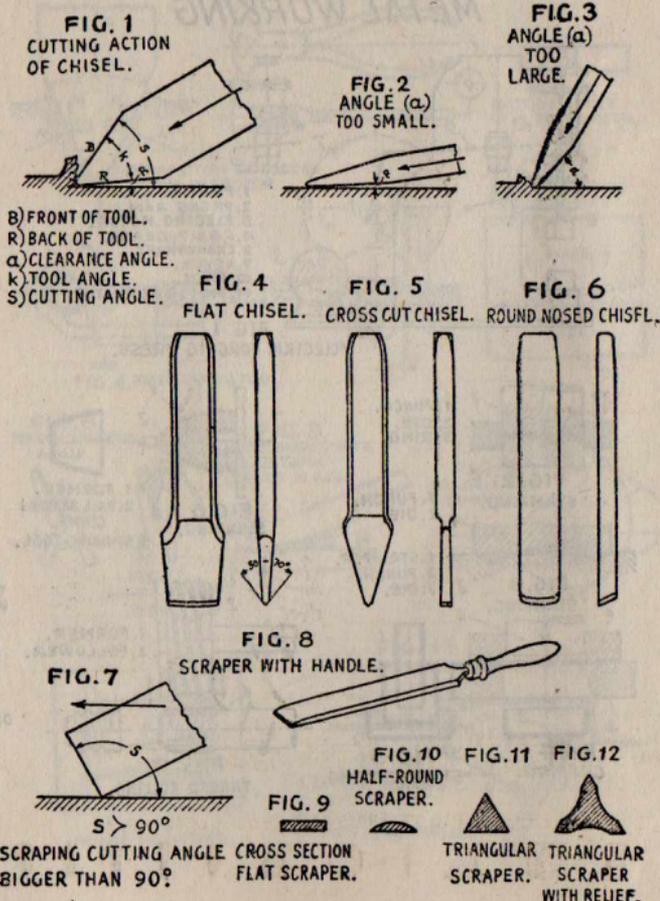
WELDING



PUNCH AND PRESS TOOLS



CHISELS AND SCRAPERS



CUTTING AND RASPING TOOLS

FIG. 1 HACKSAW BLADE.

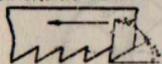


FIG. 2 TEETH TOO HIGH.

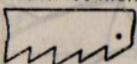


FIG. 3 INCORRECT ANGLES.

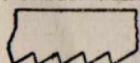


FIG. 4 INCORRECT ANGLES.

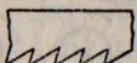


FIG. 10 HACKSAW FRAME.

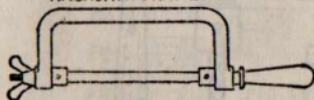


FIG. 11 POWER SAW.

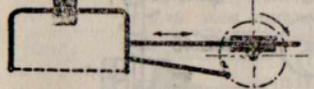


FIG. 12 RASP.



FIG. 13 SINGLE SPIRAL CUT.

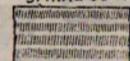


FIG. 14 SINGLE CUT. FIG. 15 DOUBLE CUT

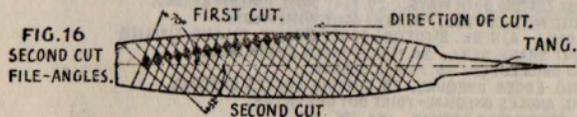


FIG. 17 CROSS SECTION OF FILES.



FIG. 5



STAGGERED TEETH.

FIG. 6



BACKED OFF TEETH.

FIG. 7



HOLLOW GROUND CIRCULAR SAW.

FIG. 8



INSERTED TEETH.

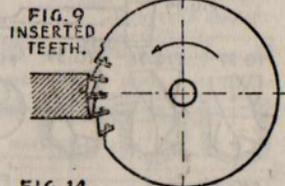
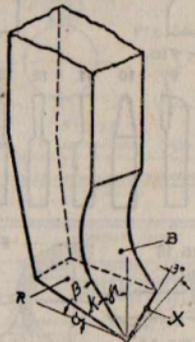


FIG. 9 INSERTED TEETH.

CUTTING TOOLS

FIG. 1. SHAPING TOOL.



(α) CLEARANCE ANGLE
 (k) TOOL ANGLE
 (β) CUTTING ANGLE. (δ) RAKE.
 (B) FRONT OF TOOL.
 (R) BACK OF TOOL.
 (X) CUTTING EDGE

FIG. 2. SHAPING-TOOL MOVING.



FIG. 3. PLANING-WORTH MOVING.

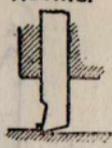


FIG. 4 ROUGHING CUT.

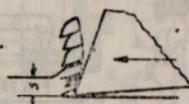


FIG. 5 FINISHING CUT.

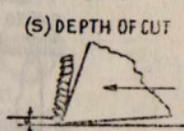


FIG. 6 RIGHT HAND FEED.

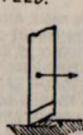


FIG. 7 LEFT HAND FEED.

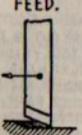


FIG. 8 FINISHING TOOL.

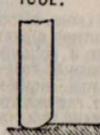


FIG. 9 TOOL TOO LONG.

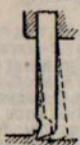


FIG. 10 CRANKED TOOL.



FIG. 11 SLOTTING TOOL.



↔ DIRECTION OF FEED. ↔

DIGS IN. GOOD SPRING ACTION.

METAL CUTTING TOOLS

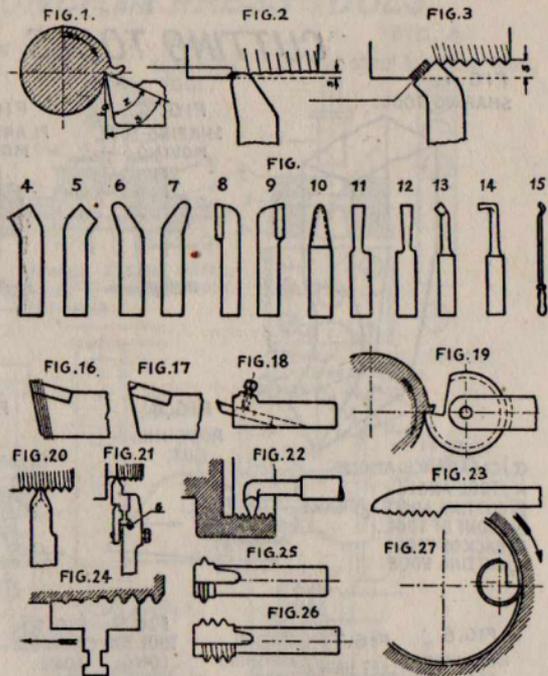
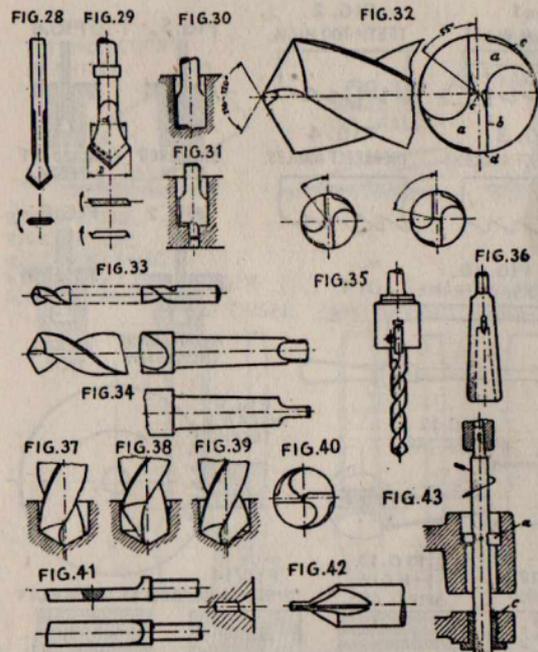


FIG. 1. TURNING TOOL FOR LATHE. Z) TOOL ANGLE. S) CUTTING ANGLE. A) CLEARANCE. 2. ROUGHING CUT-SCREW CUTTING. S) DEPTH OF CUT. 3. FINISHING CUT-SCREW CUTTING. S) DEPTH OF CUT. 4. ROUGHING TOOL-RIGHT HAND. 5. ROUGHING TOOL-LEFT HAND. 6. FINISHING TOOL-RIGHT HAND. 7. FINISHING TOOL-LEFT HAND. 8. FACING TOOL-RIGHT HAND. 9. FACING TOOL-LEFT HAND. 10. RADIUSING TOOL. 11. PARTING TOOL. 12. PARTING TOOL. 13. BORING TOOL. 14. RECESSING TOOL. 15. HAND TOOL. 16. TIPPED TOOL-CORRECT GRINDING. 17. TIPPED TOOL-INCORRECT GRINDING. 18. TOOLHOLDER. 19. CIRCULAR FORM TOOL. 20. SCREW CUTTING TOOL. 21. SCREW CUTTING FORM TOOL. 22. EXTERNAL THREAD CHASER. 23. INTERNAL SCREW CUTTING TOOL. 24. INTERNAL THREAD CHASER. 25. SINGLE POINT THREAD FORMER. 26. THREAD FORMER-TREBLE POINT. 27. USE OF THREAD FORMER.



28. FLAT DRILL CUTTING BOTH WAYS. 29. FLAT DRILL HOLLOW GROUND. 30. FLAT DRILL WITH CENTRE. 31. FLAT DRILL WITH PILOT. 32. TWIST DRILL. A) HEEL. B) CUTTING EDGE. C) POINT. D) LAND. E) RELIEF. 33. STRAIGHT SHANK DRILL. 34. MORSE TAPER SHANK DRILL. 35. DRILL IN DRILL CHUCK. 36. MORSE SLEEVE. 37. CUTTING EDGES UNEQUAL. 38. CUTTING ANGLES UNEQUAL. 39. CUTTING ANGLES UNEQUAL-POINT OUT OF CENTRE. 40. POINT IRREGULARLY GROUND. 41. "D" BIT. 42. CENTRE DRILL. 43. BORING BAR.

METAL CUTTING TOOLS

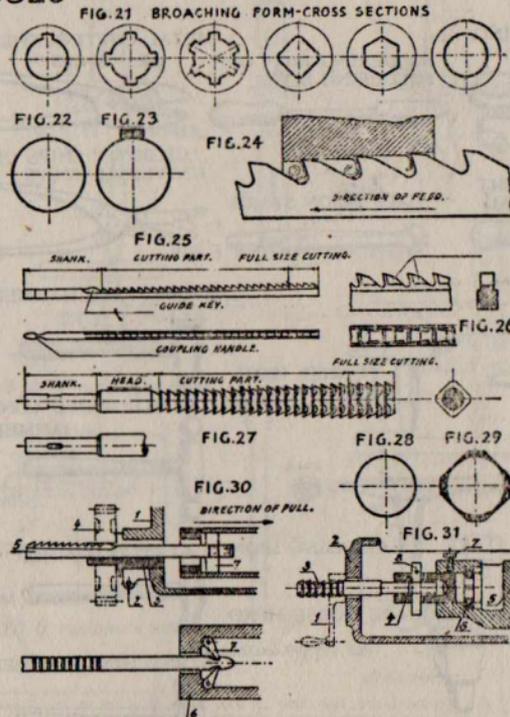
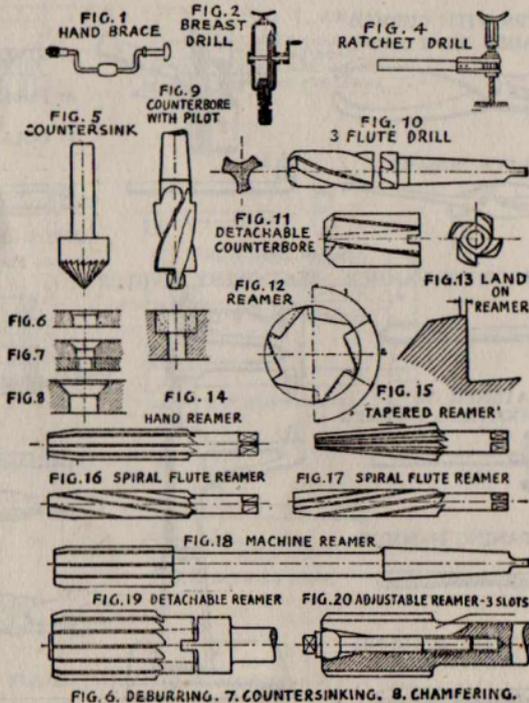


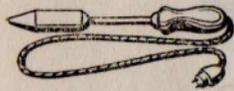
FIG. 22 BEFORE BROACHING A KEYWAY.
 FIG. 23 AFTER BROACHING A KEYWAY. FIG. 24 CUTTING ACTION.
 FIG. 25 FLAT BROACH. FIG. 26 RELIEVED TEETH.
 FIG. 27 PROFILE BROACH. FIG. 28 BEFORE USE OF SQUARE BROACH.
 FIG. 29 AFTER USE OF SQUARE BROACH.
 FIG. 30 BROACHING MACHINE-SIDE ELEVATION.-
 1. MACHINE HEAD. 2. CLAMP SCREW. 3. PACKING.
 4. WORKPIECE. 5. BROACH. 6. PLUNGER. 7. CARRIER JAW.
 FIG. 31 BROACHING MACHINE-PLAN VIEW.-
 1. WORKPIECE. 2. MACHINE HEAD. 3. BROACH.
 4. COUPLING SLEEVE. 5. PLUNGER. 6. STOP RING.
 7. CLAMP SCREW. 8. PIN FOR LOCKING.

SHEET METAL TOOLS

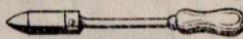
SHEET METAL TOOLS

RIVETING TOOLS

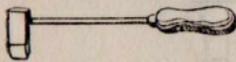
ELECTRIC SOLDERING IRON (BIT)



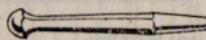
SOLDERING IRON OR SOLDERING BIT



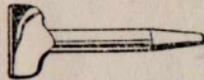
SOLDERING IRON BIT WITH SHAPED HEAD



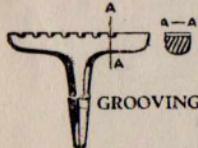
HALF MOON STAKE



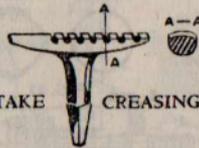
HATCHET STAKE



FUNNEL IRON (FUNNEL STAKE)



GROOVING STAKE



CREASING IRON

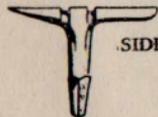
LONG HORSE HEAD



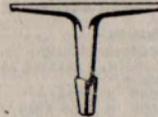
SQUARE HORSE HEAD



COMBINED FUNNEL AND SIDE STAKE



BEAK IRON OR HORN



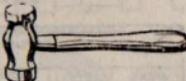
METAL CUTTING SHEARS OR "SNIPS"



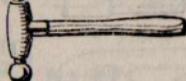
"GILBOW" SNIPS OR UNIVERSAL SNIPS



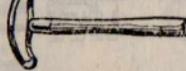
ROUND FACE HAMMER



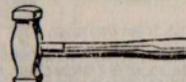
DOUBLE ENDED CONVEX HAMMER



STUD HAMMER



STRETCHING HAMMER

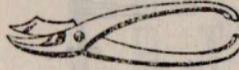


ROUND HEAD ANVIL



(FLAT)

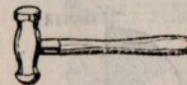
SNIPS WITH CURVED BLADES BENT SNIPS



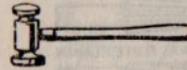
BLOCK SHEARS



HOLLOWING HAMMER



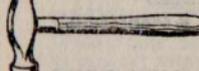
PLATENER OR SMOOTHING HAMMER



PANING HAMMER



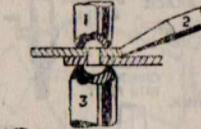
SQUARE & ROUND FACE HAMMER



ROUND HEAD ANVIL



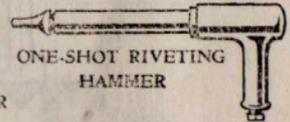
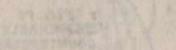
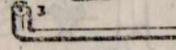
(CONVEX)



1 RIVETING SNAP

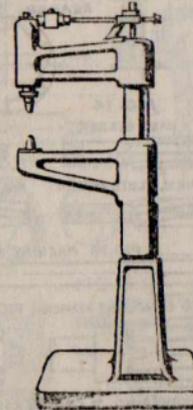
2 FULLERING TOOL

3 DOLLY (DOLLY BAR)



ONE-SHOT RIVETING HAMMER

STATIONERY RIVETER



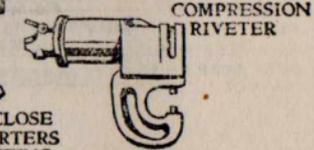
SLOW HITTING RIVETING HAMMER



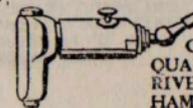
FAST HITTING RIVETING HAMMER



YOKE RIVETER



COMPRESSION RIVETER



CLOSE QUARTERS RIVETING HAMMER

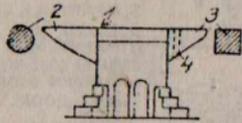


FIG. 1. ANVIL.
 1. FACE (HARDENED).
 2. ROUND HORN.
 3. SQUARE HORN.
 4. HOLE FOR STAKE.

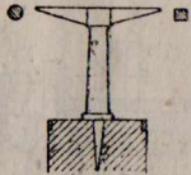


FIG. 2
 ANVIL FOR SMALL WORK.

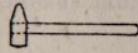


FIG. 3. HAND HAMMER.

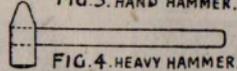


FIG. 4. HEAVY HAMMER.

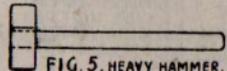


FIG. 5. HEAVY HAMMER.

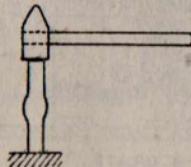


FIG. 7. SETTING.

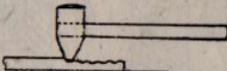
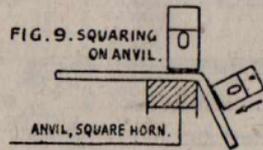


FIG. 6. DRAWING DOWN.



FIG. 8.
 BENDING
 ON ANVIL.

ANVIL, ROUND HORN.



**FIG. 9. SQUARING
 ON ANVIL.**

ANVIL, SQUARE HORN.

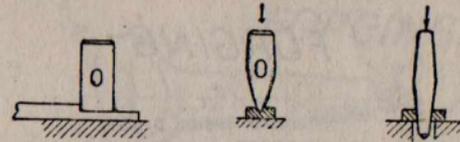


FIG. 1. SETT HAMMER.

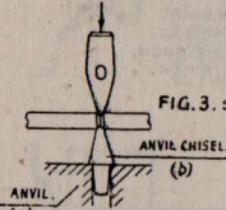


FIG. 3. SPLITTING. HOT SETT.

FIG. 2. CUTTING OF STOCK.

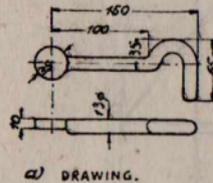


FIG. 6. FORGING A HOOK.

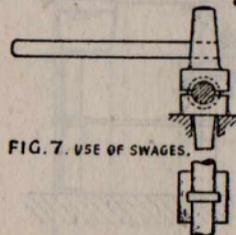


FIG. 7. USE OF SWAGES.

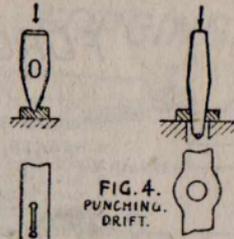


FIG. 4.
 PUNCHING.
 DRIFT.

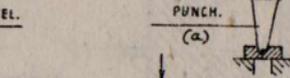
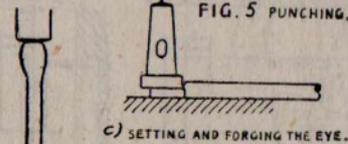
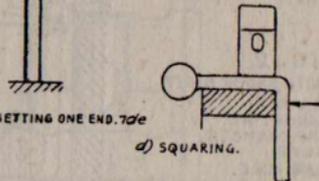


FIG. 5 PUNCHING.

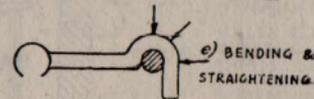


c) SETTING AND FORGING THE EYE.



b) SETTING ONE END. OF

d) SQUARING.



**e) BENDING &
 STRAIGHTENING**

FORGING

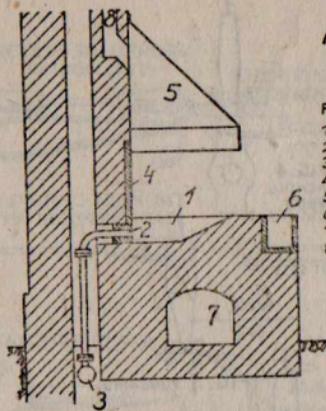


FIG. 1.
FORGE WITH SIDE BLAST.

1. HEARTH.
2. AIR EXIT.
3. AIR LINE.
4. CAST IRON PLATE.
5. SHEET IRON HOOD.
6. QUENCHING TROUGH.
7. COAL CONTAINER.
8. CHIMNEY.

FIG. 2
FORGE WITH UNDER BLAST.

1. AIR LINE.
2. BRANCH LINE.
3. WIND CHAMBER.
4. VALVE.
5. SLAG HOLE.

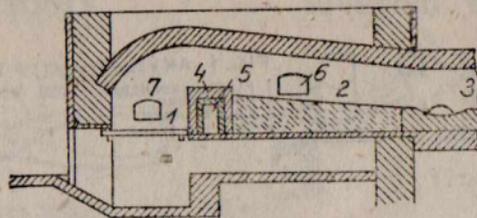
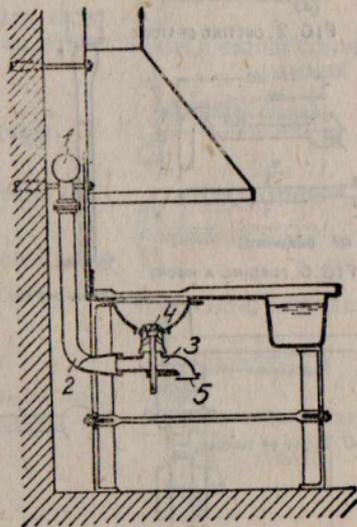


FIG. 1. COAL FURNACE.

1. GRATE.
2. HEARTH.
3. FLUE.
4. FIRE BRIDGE.
5. WATER COOLING.
6. CHARGING DOOR.
7. FUEL DOOR.

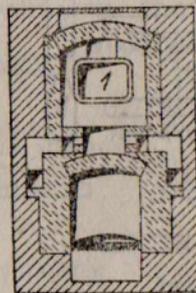
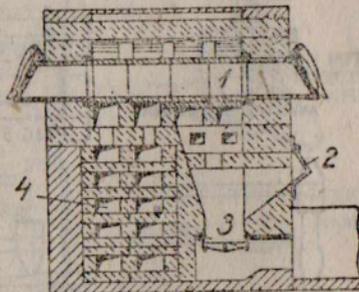
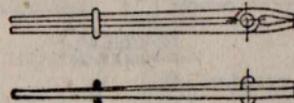


FIG. 2. MUFFLE FURNACE. 1. MUFFLE. 3. GRATE.

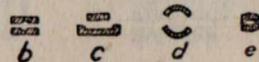


2. FUEL DOOR. 4. PREHEATING AIR BLAST.

FIG. 3. FORGE TONGS.



- a RING BIT.
- b FLAT BIT WITH GROOVES.
- c FLAT BIT WITH LIPS.
- d PLIERS OR PICK-UPS.
- e HOLLOW BIT.



FORGING

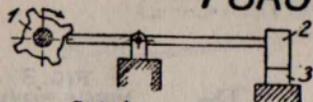


FIG. 1
MECHANICAL HAMMER.
1. CAM WHEEL.
2. STAMP.
3. ANVIL.

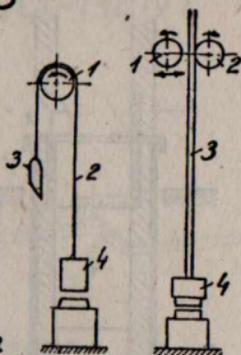


FIG. 2
DROP HAMMER WITH
FRICTION BELT.
1. REVOLVING DISC. 2. BELT.
3. HANDLE. 4. DROP STAMP

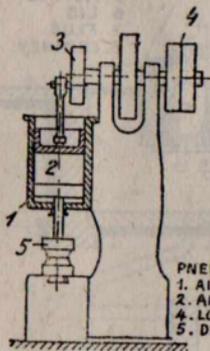


FIG. 4
PNEUMATIC HAMMER.
1. AIR CYLINDER.
2. AIR CUSHION. 3. CRANK.
4. LOOSE AND FIXED, PULLEY.
5. DROP HAMMER.

FIG. 3
DROPHAMMER WITH BOARD.
1. FRICTION ROLLS.
2. FRICTION ROLLS.
3. BOARD & BAR.
4. DROP STAMP

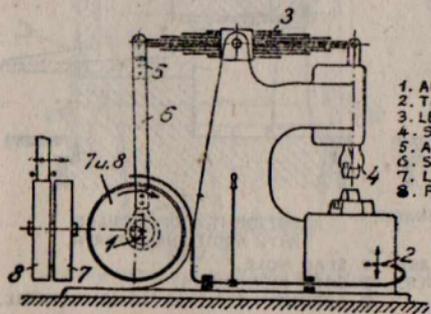


FIG. 5
SPRING HAMMER.
1. ADJUSTABLE ECCENTRIC.
2. TREADLE.
3. LEAF SPRINGS.
4. STAMP.
5. ADJUSTMENT OF STROKE.
6. SPRINGS.
7. LOOSE PULLEY.
8. FIXED PULLEY.

FORGING

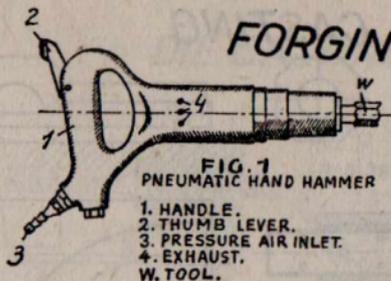


FIG. 1
PNEUMATIC HAND HAMMER
1. HANDLE.
2. THUMB LEVER.
3. PRESSURE AIR INLET.
4. EXHAUST.
W. TOOL.

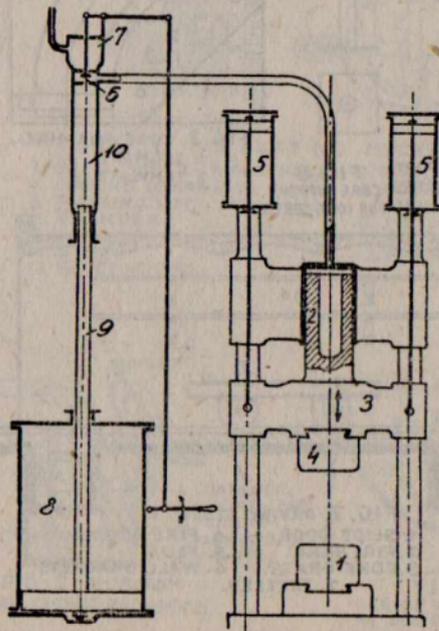


FIG. 3
HYDRAULIC FORGING PRESS.
1. BASE BLOCK.
2. PISTON.
3. CROSS BAR.
4. PRESSURE BLOCK.
5. ELEVATING CYLINDER.
6. VALVE.
7. RESERVOIR.
8. STEAM CYLINDER.
9. CONNECTING ROD.
10. HYDRAULIC CYLINDER

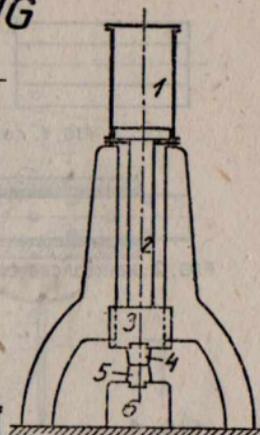


FIG. 2
STEAM HAMMER.
1. CYLINDER.
2. CAM ROD.
3. STAMP.
4. STAMP.
5. ANVIL. 6. BASE.

CASTING

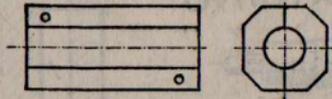


FIG. 1. CORE BAR.

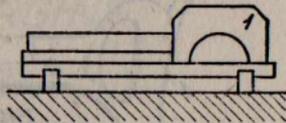


FIG. 3. CORE FORMING.
1. SEGMENT.
2. TEMPLATE.

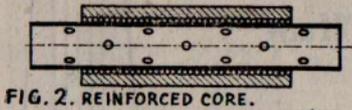


FIG. 2. REINFORCED CORE.



FIG. 4
CORE SUPPORT
FOR LONG CORES.

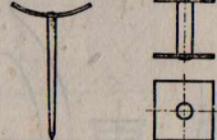


FIG. 5
CORE SUPPORT
FOR LONG CORES.

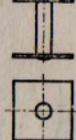


FIG. 6
CORE SUPPORT
FOR LONG CORES.

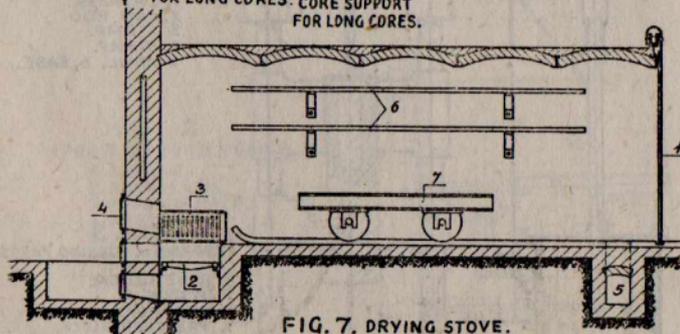


FIG. 7. DRYING STOVE.
1. SLIDE DOOR. 4. FIRE DOOR.
2. FIRE BARS. 5. FLUE.
3. COKE GRATE. 6. WALL BRACKETS.
7. TROLLEY.

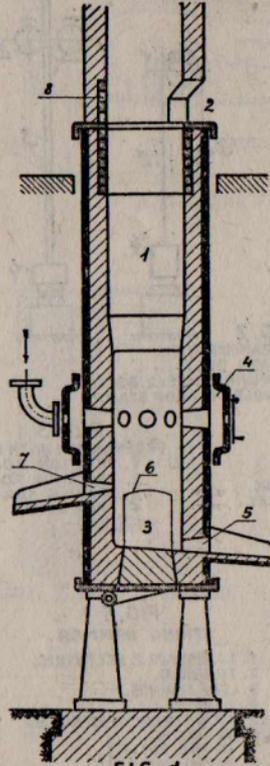


FIG. 1
SIMPLE CUPOLA FURNACE.

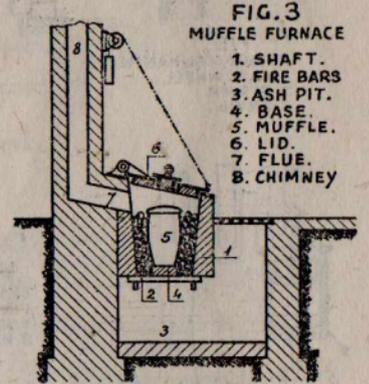


FIG. 3
MUFFLE FURNACE

1. SHAFT.
2. FIRE BARS.
3. ASH PIT.
4. BASE.
5. MUFFLE.
6. LID.
7. FLUE.
8. CHIMNEY.

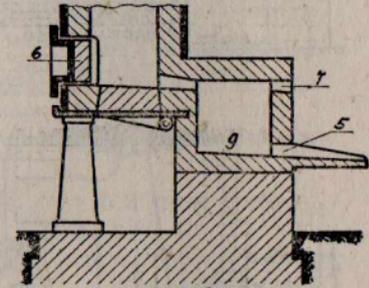


FIG. 2
BOTTOM PART OF FURNACE
WITH ADDITIONAL HEARTH.

1. SHAFT.
2. FIRE BARS
3. HEARTH
4. AIR BLAST.
5. TAP HOLE.
6. DOOR.
7. SLAG HOLE.
8. CAST IRON LINING.
9. ADDITIONAL CHAMBER FOR MOLTEN METAL;

CASTING EQUIPMENT



FIG. 1
HAND METAL POURER.

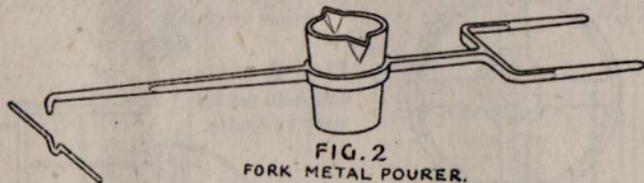


FIG. 2
FORK METAL POURER.

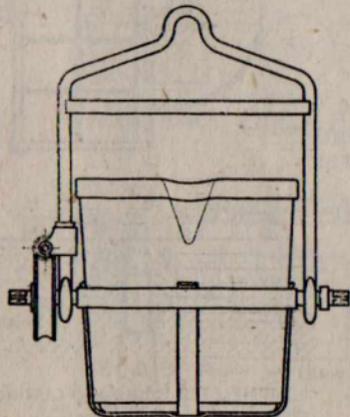


FIG. 3
CRANE METAL POURER FRONT ELEVATION.

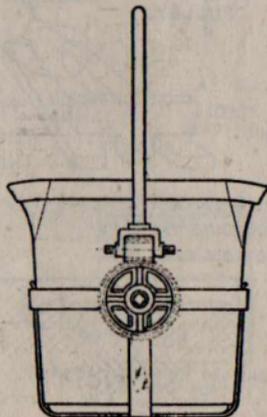


FIG. 4
CRANE METAL POURER SIDE ELEVATION.

DIE CASTING

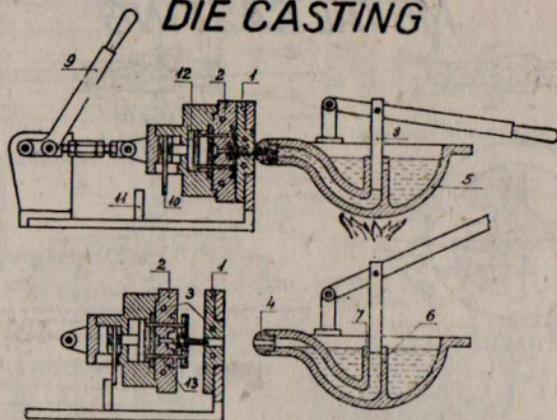


FIG. 1. DIE CASTING MECHANISM.

1. STEEL MOULD - RIGHT HALF.
2. STEEL MOULD - LEFT HALF.
3. COOLING CHANNELS.
4. NOZZLE.
5. MELTING POT.
6. CONNECTING CHANNEL.
7. CYLINDER.
8. PISTON.
9. HAND LEVER.
10. PIN.
11. STOP.
12. EJECTOR PLATE.
13. EJECTOR PINS.

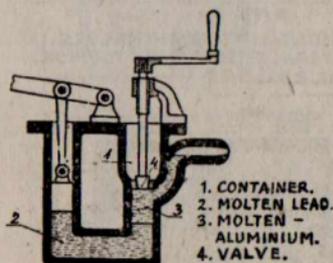


FIG. 2. ALUMINIUM
DIE CASTING MECHANISM.

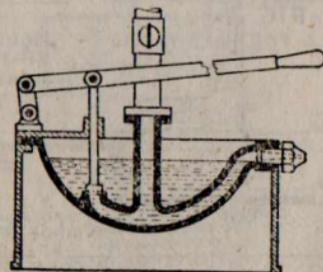


FIG. 3
USE OF AIR PRESSURE
IN DIE CASTING.

METAL CASTING



FIG. 4
ROPE WHEEL.

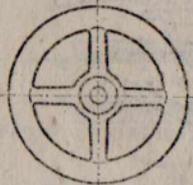


FIG. 1 HANDWHEEL.

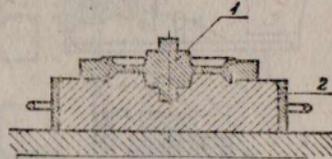


FIG. 5
IMPRINT IN TOP BOX.

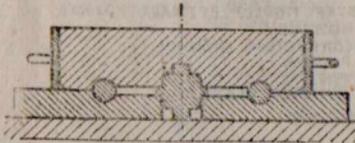


FIG. 2
MOULD FOR HANDWHEEL.

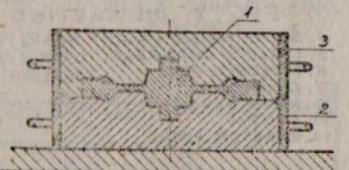


FIG. 6
MOULDING WITH BOTH HALVES.
1. PATTERN. 2. TEMPORARY TOP BOX.
3. BASE BOX.

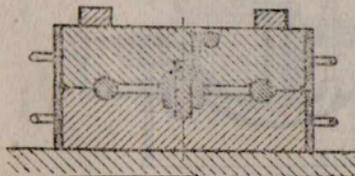


FIG. 3
MOULD AFTER METAL IS POURED.

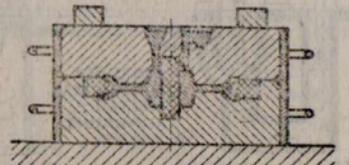


FIG. 7
FINISHED CASTING IN MOULD.

PULLEY MOULDING

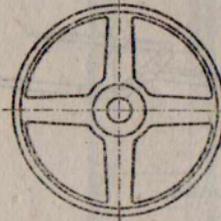


FIG. 1
PULLEY.

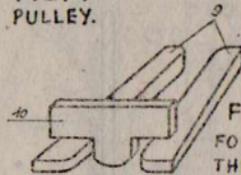


FIG. 4
FORMING
THE WEBS

FIG. 3
MOULDING THE
BOTTOM PART.

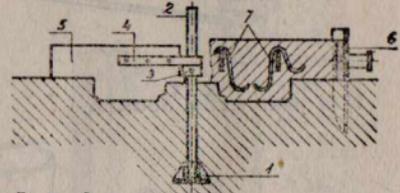
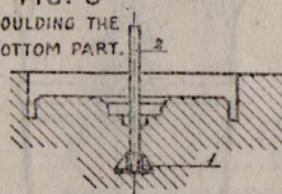


FIG. 2
MOULDING THE TOP
HALF OF PULLEY.

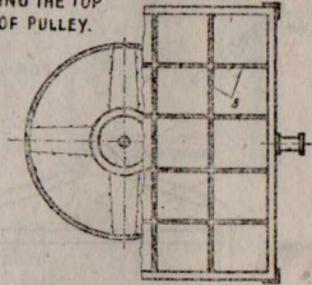


FIG. 5
COMPLETED MOULD AND CASTING.
1. BASE. 2. PIVOT. 3. COLLAR.
4. TEMPLATE BRACKET. 5. TEMPLATE.
6. BOOT. 7. WIRE HOOKS. 8. RIBS.
9. DISTANCE PIECES. 10. WEB SEGMENT.
11. HUB CORE.

CASTING & PATTERN SHOP DETAILS

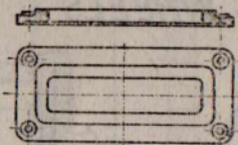


FIG. 1. RELIEVED PLATE.

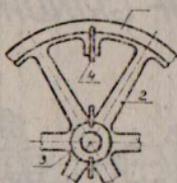


FIG. 2. SPLIT WHEEL.

1. RIM.
2. SPOKES.
3. HUB.
4. CLIP WITH LOAM.

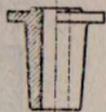


FIG. 3. TAPERED CASTING.

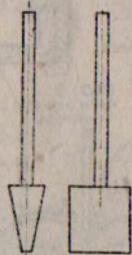


FIG. 4. POINTED RAM.

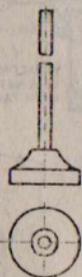


FIG. 5. FLAT BOTTOMED RAM.

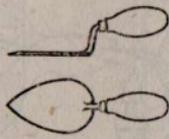


FIG. 6. TROWEL.

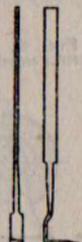


FIG. 7. SANDHOOK.



FIG. 8. TWEEZERS.

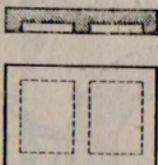


FIG. 9. PATTERN.

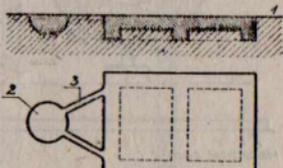


FIG. 11. MOULD AFTER POURING.
1. FOUNDRY FLOOR.
2. MOULD NECK.
3. RUNNERS.



FIG. 10. POLISHER.

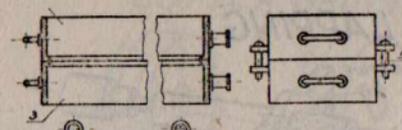


FIG. 5. CASTING FOR T. FITTING.

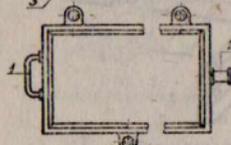


FIG. 1. CASTING FRAME.

1. HANDLES.
2. MOUNTING.
3. BOTTOM HALF.
4. TOP HALF.
5. BOLTS.

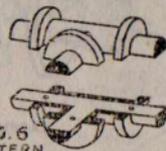


FIG. 6. PATTERN.

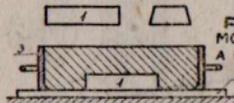


FIG. 2. MOULDING A PLATE.

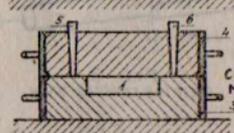


FIG. 3. COMPLETE MOULD.

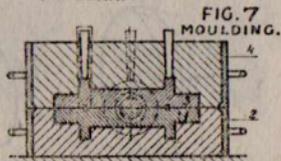


FIG. 7. MOULDING.

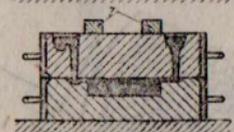


FIG. 4. COMPLETE MOULD AFTER POURING.

1. PATTERN.
2. BASE.
3. BOTTOM PART.
4. TOP PART.
5. MOULD NECK.
6. VENT.
7. WEIGHTS.



FIG. 8. CORE.

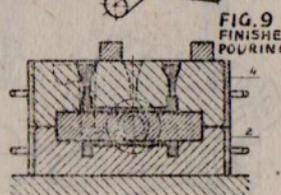


FIG. 9. FINISHED POURING.

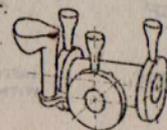


FIG. 10. FINISHED CASTING WITH FLASH.
1. PATTERN HALF - BOTTOM.
2. BOTTOM HALF OF BOTTOM.
3. TOP HALF OF PATTERN.
4. TOP HALF OF BOTTOM.

LAPPING

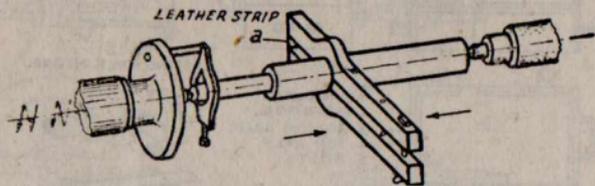


FIG. 1.
LAPPING WITH HINGED HAND LAPPING TOOL.



FIG. 2.
LAPPING ON STEEL DISC
WITH EMERY CLOTH.

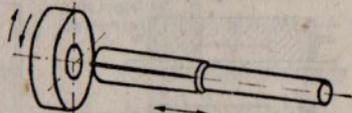


FIG. 3.
SPLIT LAP TAPERED BACK.

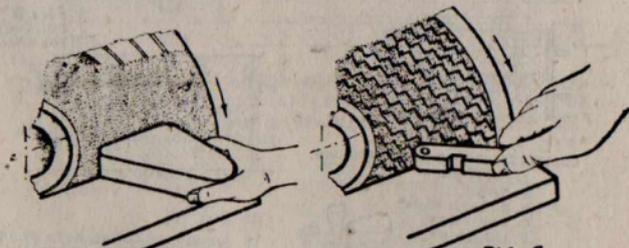


FIG. 4. LAPPING DISC.

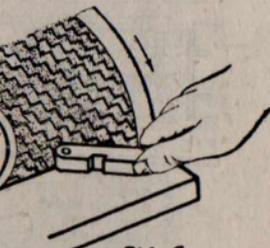


FIG. 5.
LAPPING ON STEEL PLATE
WITH ABRASIVE DISC.

MOUNTING & DRESSING OF GRINDING WHEELS

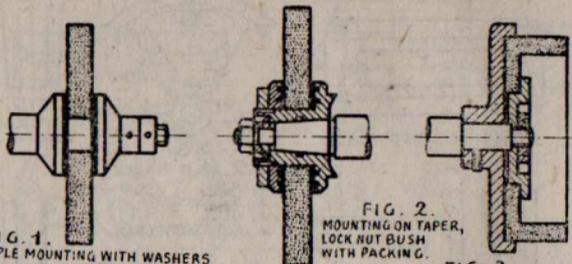


FIG. 1.
SIMPLE MOUNTING WITH WASHERS

FIG. 2.
MOUNTING ON TAPER,
LOCK NUT BUSH
WITH PACKING.

FIG. 3.
MOUNTING OF A CUP
WHEEL.

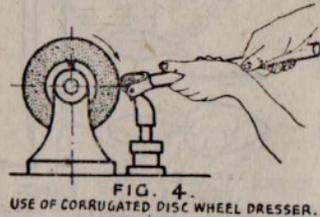


FIG. 4.
USE OF CORRUGATED DISC WHEEL DRESSER.

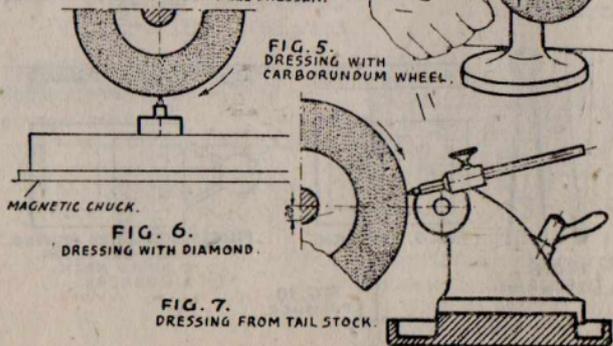


FIG. 5.
DRESSING WITH
CARBORUNDUM WHEEL.

MAGNETIC CHUCK.

FIG. 6.
DRESSING WITH DIAMOND.

FIG. 7.
DRESSING FROM TAIL STOCK.

TYPES OF GRINDING WHEELS

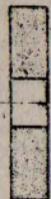


FIG. 1.
PLAIN FLAT.

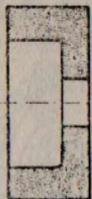


FIG. 2.
STRAIGHT CUP.

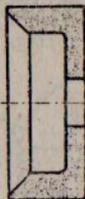


FIG. 3.
CHAMFERED CUP.



FIG. 4.
DOUBLE FLARING CUP.



FIG. 5.

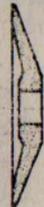


FIG. 6.



FIG. 7.
FLARING CUP WHEEL.



FIG. 8.
SHAPE FOR GRINDING SPIRAL
FLUTE MILLING CUTTERS.

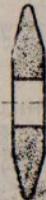
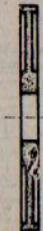


FIG. 9.
WHEEL FOR GRINDING
FLUTE OF TWIST DRILLS



FIG. 10.
DISC WHEELS FOR GAUGE GRINDING.



CUTTER GRINDING

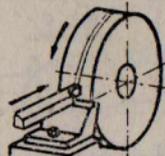


FIG. 1.
RADIAL PRESSURE ONLY.

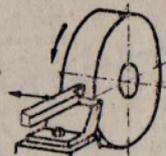


FIG. 2.
LATERAL MOVEMENT
OF TOOL.



FIG. 3.
FLAT WHEEL FOR CUTTER
GRINDING



FIG. 4.
CUP WHEEL FOR CUTTER
GRINDING.

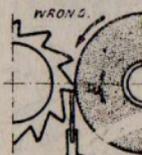


FIG. 5.
WRONG.
FINGER BELOW CUTTER
CENTRE LINE.

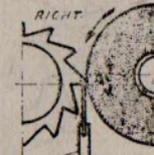


FIG. 6.
RIGHT.
FINGER ON CUTTER CENTRE LINE
WHEEL CENTRE HIGHER.

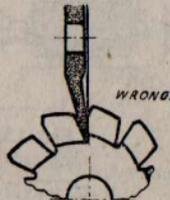


FIG. 7.
WRONG.
DON'T USE HOLLOW SIDE OF WHEEL.

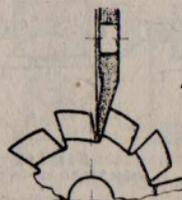
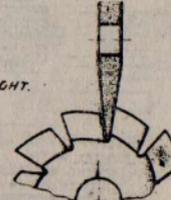
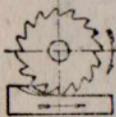
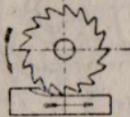
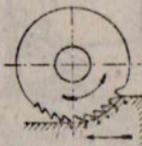
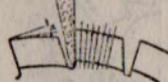
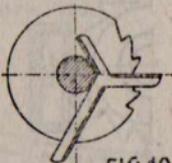
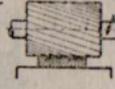
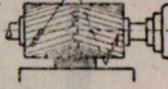
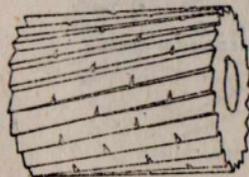
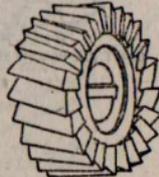


FIG. 8.
RIGHT.
USE BEVELLED SIDE OF WHEEL.



MILLING

FIG. 1
MILLING UP-
CUT METHOD.FIG. 2
MILLING DOWN-
CUT METHOD.FIG. 3
FINISHING.FIG. 4
ROUGHING.FIG. 5
REGRINDING
MILLING CUTTER.FIG. 6
REGRINDING
RELIEVING CUTTER.FIG. 7
GRINDING GAUGEFIG. 8
ROLLER MILL
PARALLEL FLUTES.FIG. 9
ROLLER MILL SPIRAL FLUTES.FIG. 10
INTERLOCKED
ROLLER MILL.FIG. 11
ROLLER MILL WITH
SWARF CUTTING NOTCHES.FIG. 12
HIGH SPEED
ROUGHING MILL.FIG. 13.
FACE CUTTER.

MILLING CUTTERS & HOBS

FIG. 14. SLOTTING CUTTER.

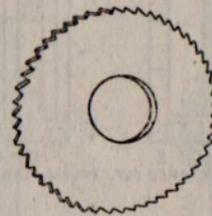
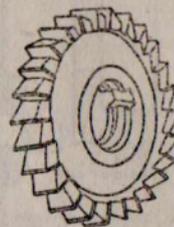
FIG. 15
SIDE AND FACE CUTTER.FIG. 16
ANGLE MILLING
CUTTER

FIG. 17. CONVEX MILL.

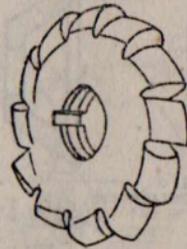


FIG. 18. GEAR CUTTER.

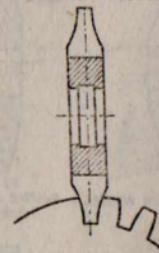


FIG. 19. WORM HOB.

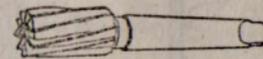
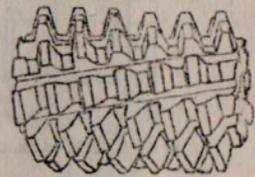


FIG. 20. END MILL.

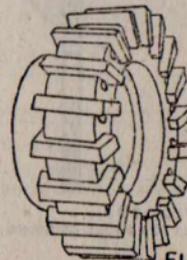
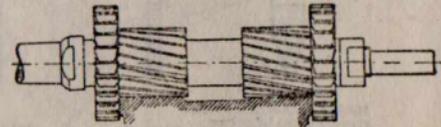
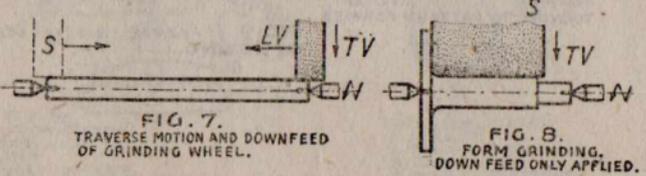
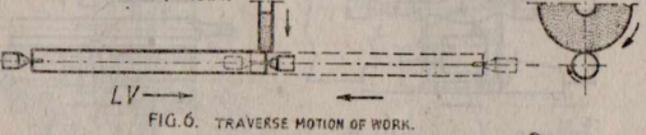
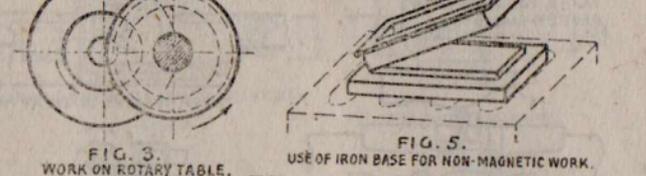
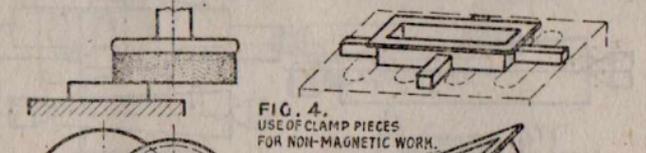
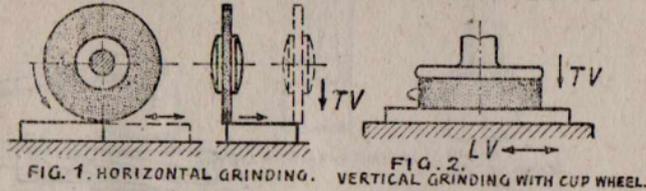
FIG. 21
INSERTED TOOTH MILLING CUTTER.

FIG. 22. GANG MILLING



SURFACE & CIRCULAR GRINDING



CIRCULAR & INTERNAL GRINDING

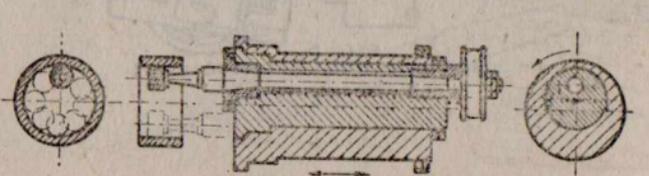
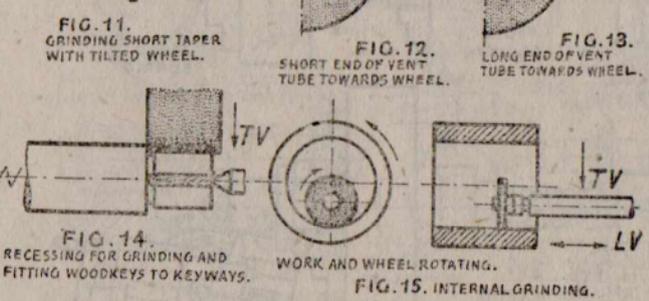
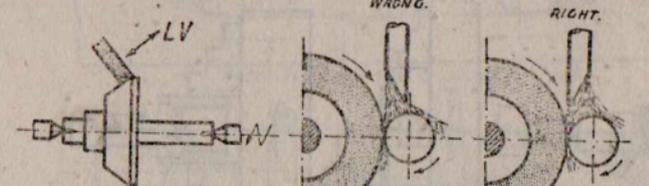
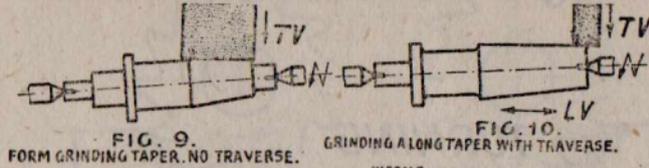
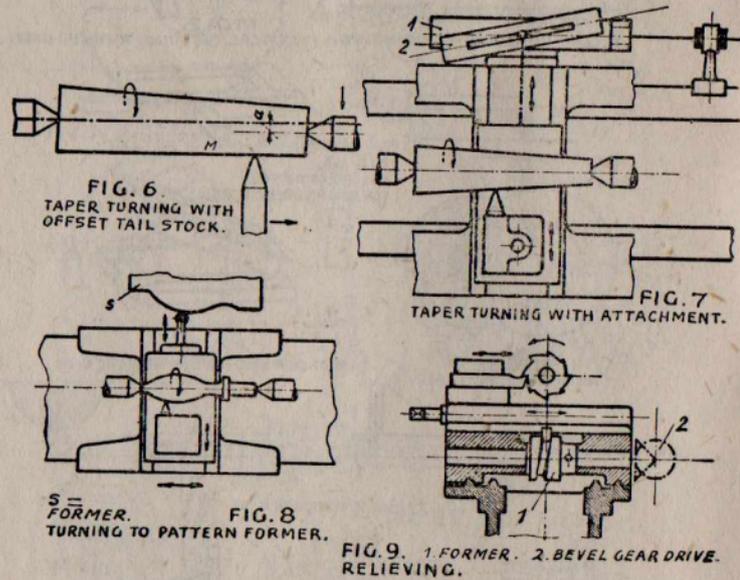
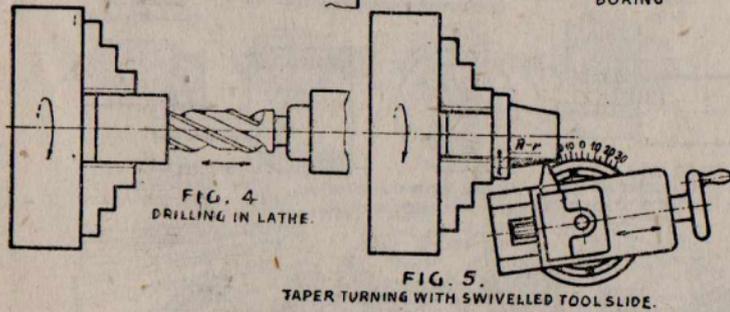
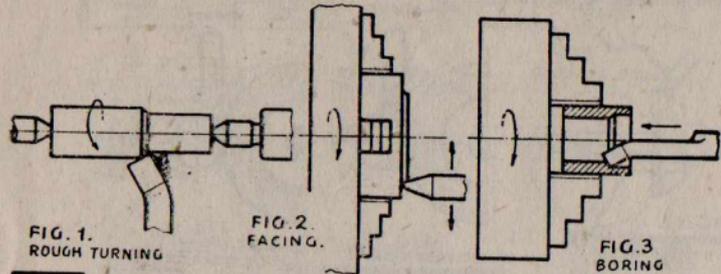


FIG. 16. INTERNAL GRINDING. WORK FIXED, WHEEL ROTATES AROUND INNER SURFACE OF WORK.

TURNING



MILLING



FIG. 1. CENTRE SQUARE.



FIG. 2. CENTRING WITH JENNY DIVIDERS.

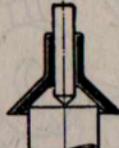


FIG. 3. CENTRE PUNCH.

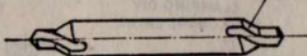


FIG. 4. CENTRE DRILL.



FIG. 5. CORRECT CENTRE.

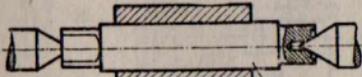


FIG. 6. TURNING ON MANDREL BETWEEN CENTRES.

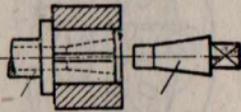


FIG. 7. EXPANDING MANDREL.

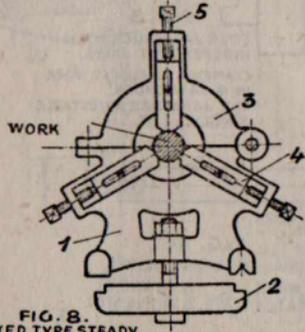


FIG. 8. FIXED TYPE STEADY.
1. STEADY BASE.
2. CLAMP.
3. HINGED TOP-PLATE.
4. JAWS.
5. ADJUSTING SCREWS.

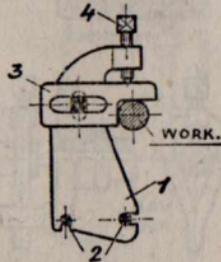


FIG. 9. TRAVELLING STEADY.
1. STEADY.
2. FIXING SCREWS.
3. JAW.
4. ADJUSTING SCREWS

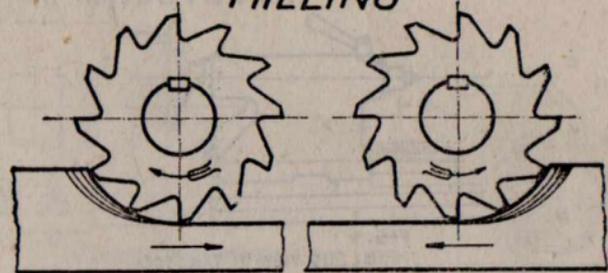


FIG. 1. RESPECTIVE MOVEMENT OF CUTTER AND WORK.

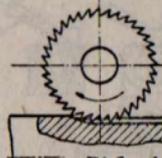


FIG. 4. MILLING KEYWAY WITH SLOTTING CUTTER.

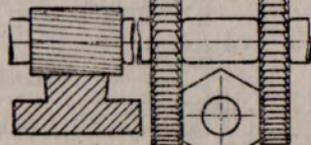


FIG. 2. ROLLER MILL.



FIG. 5. MILLING KEYWAY WITH END MILL.

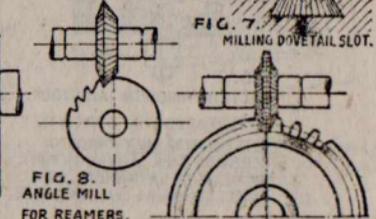


FIG. 7. MILLING DIVETAIL SLOT.



FIG. 10. MILL SPURGEAR.

FIG. 3. GANGMILL.

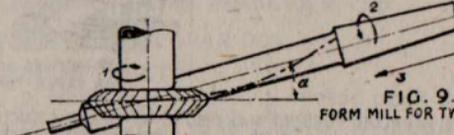


FIG. 9. FORM MILL FOR TWIST DRILLS.

FIG. 8. ANGLE MILL FOR REAMERS.

TAILSTOCKS

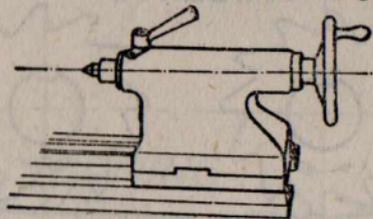


FIG. 1
ISOMETRIC VIEW OF TAILSTOCK.

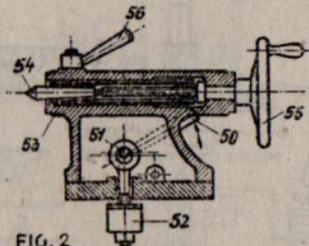


FIG. 2
SECTION THROUGH TAILSTOCK.
a. THREADED SHAFT WITH NUT.
EJECT CENTRE ONLY THROUGH
SCREWING BACK SLIDING MEMBER
BY MEANS OF HANDWHEEL (56)
AFTER RELEASING CLAMPING AT 52.

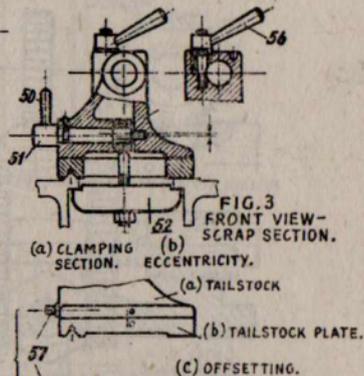


FIG. 3
FRONT VIEW-
SCRAP SECTION.

(a) CLAMPING SECTION. (b) TAILSTOCK PLATE.
(c) OFFSETTING.

FIG. 4
OFF-SETTING BACK CENTRE
FOR TAPER TURNING.

BEFORE PARALLEL TURNING MAKE SURE 'O' MARKS COINCIDE ON TAILSTOCK.
50. TAILSTOCK CLAMPING LEVER. 51. ECCENTRIC BOLT.
52. CLAMPING PLATE. 53. SLIDING MEMBER.
54. LATHE CENTRE. 55. HANDWHEEL.
56. CLAMPING LEVER TO SLIDER. 57. OFFSET SCREW.

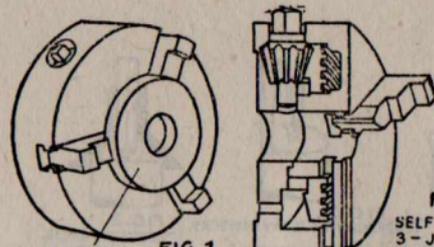


FIG. 1
CLAMPING OF
WORK ON THE LATHE.

FIG. 2
SELF CENTRING
3-JAW CHUCK.
ALL THE JAWS ARE MOVING
SIMULTANEOUSLY.

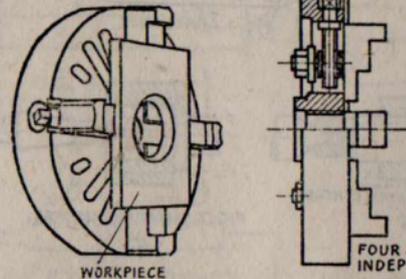


FIG. 3
FOUR JAW CHUCK WITH
INDEPENDENT JAWS.
CLAMPING IRREGULAR WORK
IN 4-JAW CHUCK.
THE JAWS ARE ADJUSTABLE
SINGLY.

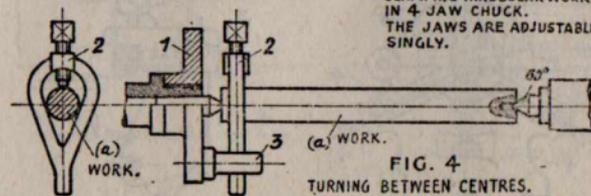


FIG. 4
TURNING BETWEEN CENTRES.
(a) WORK. 2 CARRIER.
1 CATCH PLATE, 3 DRIVING STUD.

MACHINE TOOLS

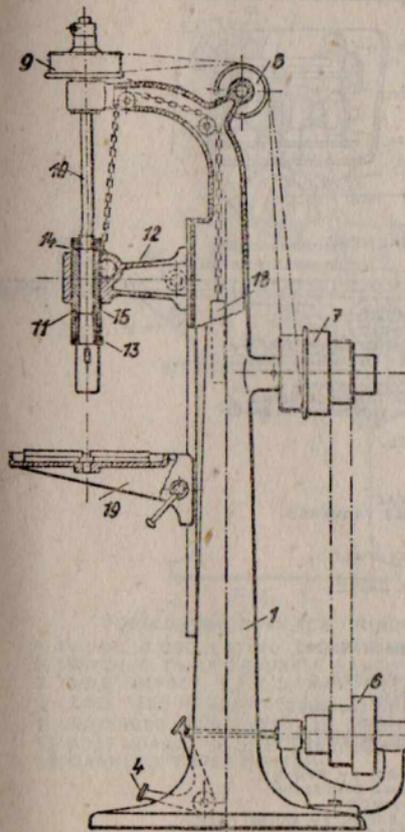


FIG. 1

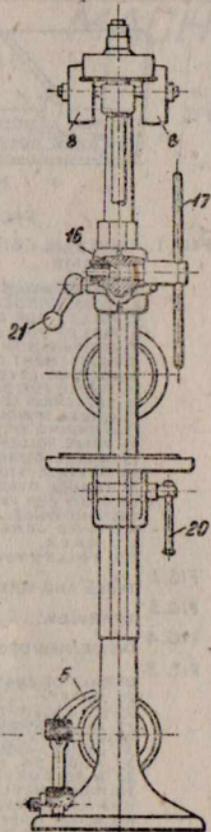


FIG. 2

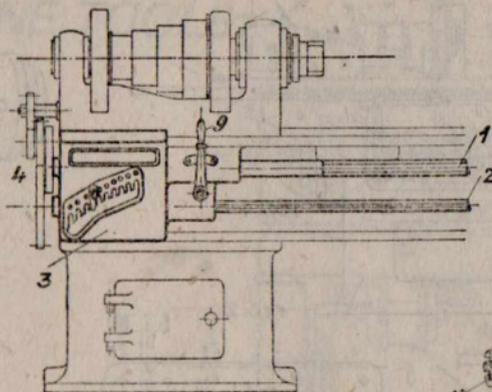


FIG. 3

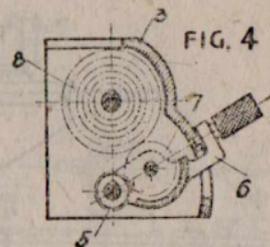


FIG. 4

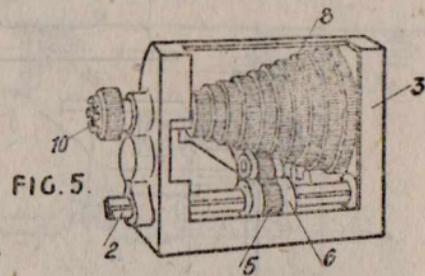


FIG. 5

FIG. 1. DRILLING MACHINE SIDE VIEW.

FIG. 2. DRILLING MACHINE FRONT VIEW.

1. COLUMN, 2. LOOSE PULLEY, 3. FIXED PULLEY, 4. FOOT LEVER, 5. BELT CHANGER, 6. STEPPED PULLEY, 7. STEPPED PULLEY, 8. ROLLERS, 9. PULLEY, 10. SPINDLE, 11. SLEEVE, 12. SPINDLE HEAD, 13. THRUST BEARING, 14. LOCK NUTS, 15. RACK, 16. PINION, 17. HANDLE LEVER, 18. COUNTERBALANCE WEIGHT, 19. TABLE, 20. CLAMPS, 21. CLAMPS.

FIG. 3. MULTISPEED PRECISION LATHE HEADSTOCK END.

FIG. 4. SECTION THROUGH NORTON GEAR BOX.

FIG. 5. INSIDE VIEW NORTON GEAR BOX.

1. LEADSCREW, 2. SCREWSHAFT SLOTTED, 3. NORTON GEAR BOX, 4. CHANGE WHEELS, 5. DRIVING PINION, 6. HANDLE, 7. TUMBLER WHEEL, 8. CONE OF GEAR WHEELS, 9. LEVER, 10. CLUTCH GEAR WHEEL.

GRINDING MACHINES

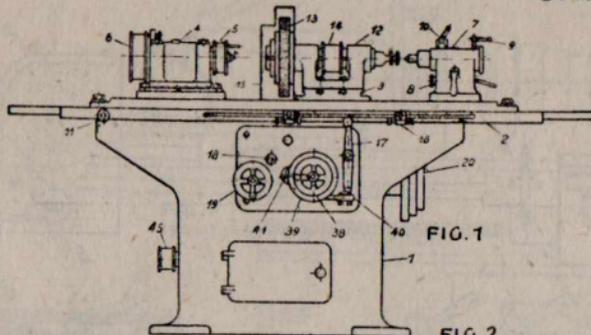


FIG. 1

FIG. 3

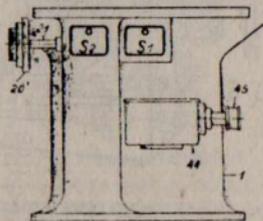


FIG. 2

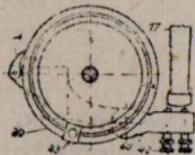
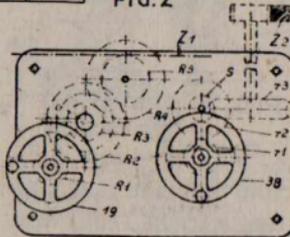


FIG. 5

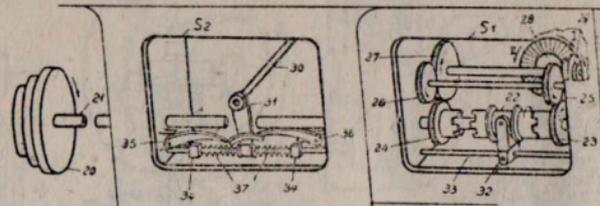


FIG. 4

FIG. 1. UNIVERSAL GRINDING MACHINE.

1. FRAME.
2. TABLE.
3. WHEEL HEAD SLIDE.
4. WORK SPINDLE STOCK.
5. PULLEY FOR CENTRE WORK.
7. TAILSTOCK WITH SPRING-LOADED SLIDING SHAFT.
8. ADJUSTMENT OF SPRING TENSION.
9. LOCKING LEVER.
10. CLAMP FOR DRESSING DIAMOND.
11. SETSCREW TO TABLE FOR TAPER GRINDING.
12. WHEEL SPINDLE BEARINGS, SWIVELLING ON BASE.
13. GRINDING WHEEL.
14. DRIVE PULLEY TO WHEEL.
15. WHEEL GUARD.
16. REVERSE STOPS.
17. CHANGE OVER LEVER.
18. STUD FOR TABLE SELF-FACT.
19. HANDWHEEL FOR TABLE TRAVERSE.
- R1 TO R5 GEAR TRAIN.
- 21 RACK.
20. PULLEY FOR TABLE SELF-FACT.

FIG. 2. TABLE AND WHEEL STOCK DRIVE.

FIG. 3. REAR VIEW.

FIG. 4. INSIDE VIEW OF SELF-FACT MECHANISM.

FIG. 5.

- DETAILS OF CHANGE OVER CONTROLS.
21. SHAFT. 22. COUPLING.
- 23 & 24. GEARWHEELS WITH CLUTCHES.
25. 26. 27. SPUR GEARWHEELS.
28. 29. BEVEL GEAR. 30. CONNECTING ROD.
31. LEVER. 32. CONNECTING PIECE.
33. ROD. 34. BLOCK.
- 35 & 36 CURVED LEVERS. 37. SPRING
38. HANDWHEEL TO GRINDING DISC SLIDE.
- R1 & R2. GEARWHEELS. S) WORM.
- R3. WORM WHEEL. Z, Z2 RACKS. 39. RATCHET WHEELS.
40. LEVER. 41. PAWL. 42. SETSCREWS.
43. SET-JAW TO WHEEL FEED. 44. COOLANT TANK.
45. PULLEY FOR PUMP.

MACHINE TOOLS

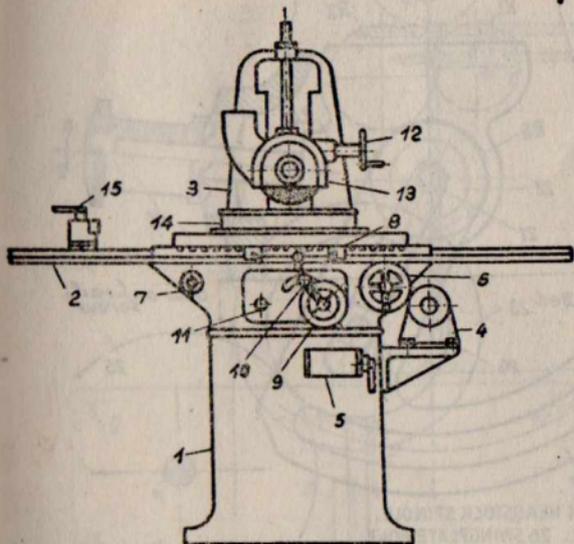


FIG. 1

HORIZONTAL SURFACE GRINDER.

1. PILLAR. 2. OSCILLATING TABLE. 3. HEAD. 4. MOTOR
5. SWITCH. 6. TABLE TRAVERSE HANDWHEEL.
7. TABLE SELF-ACT. 8. SET CLAMPS FOR CHANGE OVER.
9. CROSS FEED HANDWHEEL. 10. CONTROL.
11. CROSSFEED ADJUSTMENT. 12. DOWNFEED HANDWHEEL.
13. DUST GUARD. 14. ELECTRO-MAGNETIC CHUCK.
15. MAGNETIC CHUCK SWITCH.

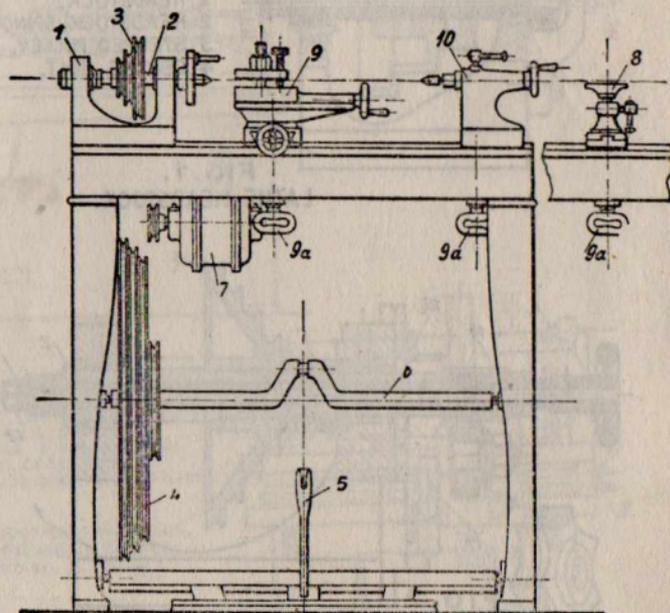
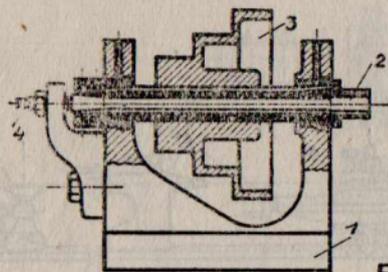


FIG. 2

TREADLE LATHE.

1. HEADSTOCK. 2. HEADSTOCK SPINDLE. 3. PULLEY.
4. FLYWHEEL. 5. TREADLE. 6. CRANKSHAFT.
7. ELECTRIC MOTOR. 8. TOOL REST. 9. SADDLE.
- 9a. CLAMPING HANDLES. 10. TAILSTOCK.

MACHINE TOOLS



- 1 HEADSTOCK.
2 HEADSTOCK SPINDLE.
3 STEPPED PULLEY.
4 CENTRE BOLT.

FIG. 1.
LATHE HEADSTOCK.

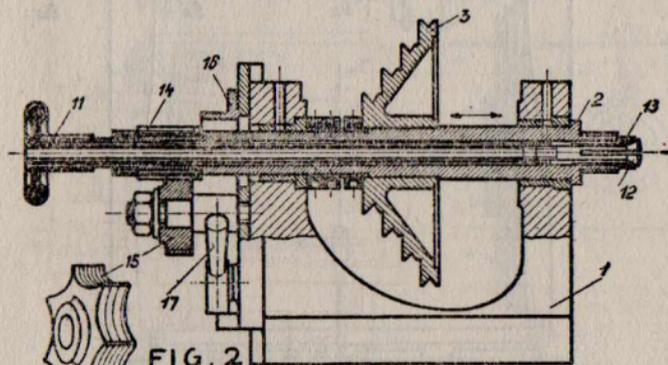
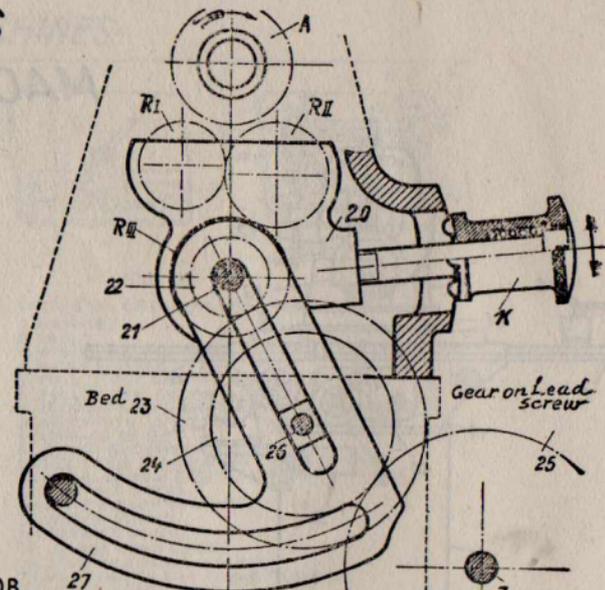


FIG. 2.
LATHE HEADSTOCK WITH ATTACHMENT
FOR SPRING COLLETS.

FIG. 3.
THREADING
ADAPTOR
WITH 7 PITCHES.

- 1 HEADSTOCK. 13 CONE BUSH.
2 HEADSTOCK SPINDLE. 14 THREADING SLEEVE.
3 CONE PULLEY. 15 THREADING ADAPTOR.
11 DRAWBAR WITH HANDWHEEL. 16 STOP.
12 SPRING COLLET. 17 LEVER.



- K) KNOB.
A) GEAR WHEEL ON HEADSTOCK SPINDLE.
20 CHANGE LEVER. 26 SWINGPLATE BOLT.
21 BOLT. 27 SWINGPLATE.
20, 23, 24, 25 CHANGE WHEELS.

FIG. 4.
LATHE LEADSCREW DRIVE

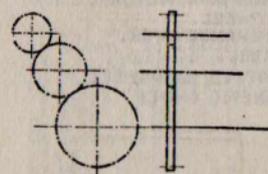


FIG. 5. SINGLE GEAR TRAIN.

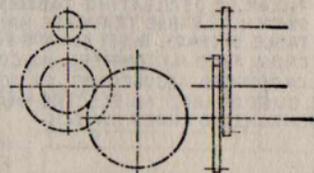


FIG. 6. DOUBLE GEAR TRAIN.

MACHINE TOOLS

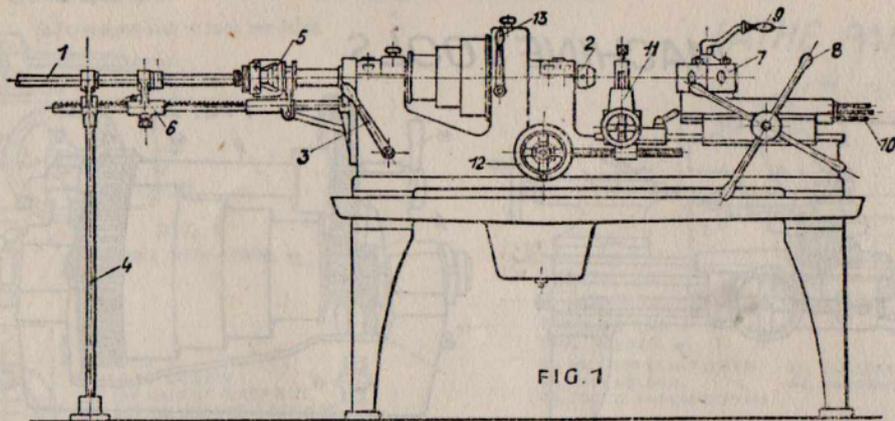


FIG. 1

FIG. 1 CAPSTAN LATHE.

1. BAR STOCK. 2. COLLET. 3. COLLET LEVER.
4. GUIDE STAND. 5. CHUCK. 6. SET STOP.
7. TURRET. 8. STAR HANDLE. 9. CLAMP LEVER.
10. ADJUSTABLE SET RODS. 11. CROSS SLIDE.
12. TOOLSLIDE HANDWHEEL. 13. SPEED CHANGE-LEVER.

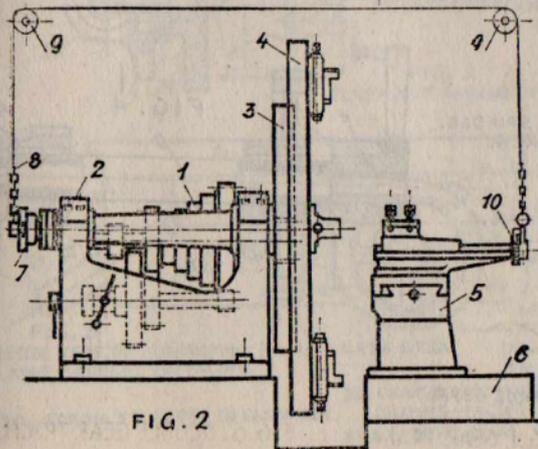


FIG. 2

FIG. 2 GAP LATHE.

1. STEPPED PULLEY. 2. HEADSTOCK SPINDLE BOX.
3. INTERNAL GEAR. 4. FACEPLATE. 5. SADDLE.
6. BASE PLATE. 7. SLOTTED DISC. 8. CHAIN.
9. ROLLERS. 10. PAWL.

FIG. 3 VERTICAL BORING MACHINE WITH REVOLVING WORK TABLE.

1. PILLAR. 2. CRANK. 3. BEVEL GEARS. 4. SPINDLE.
5. CROSS ARM. 6. SLIDE. 7. SIDE ADJUSTMENT SPINDLE.
8. TOOLBAR. 9. VERTICAL ADJUSTMENT SPINDLE.
10. VERTICAL MOVEMENT LEVER. 11. TILTING CRANK.
12. DRIVE GEAR. 13. TURNABLE GEAR.

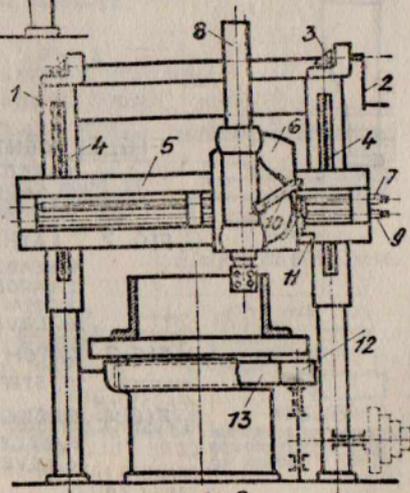


FIG. 3

MACHINE TOOLS

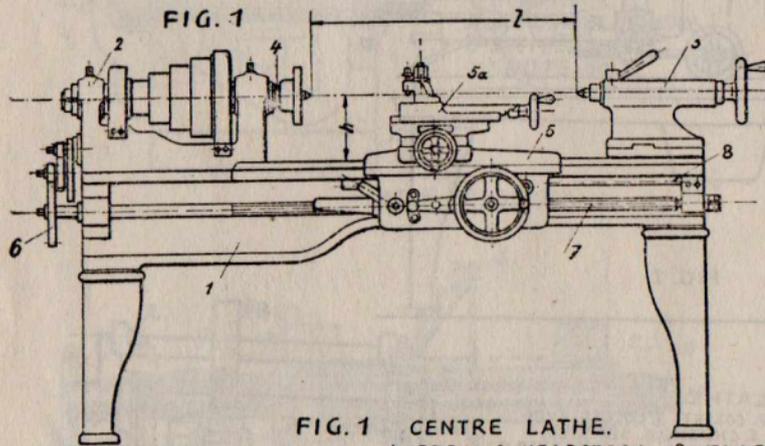


FIG. 1 CENTRE LATHE.

1. BED 2. HEADSTOCK. 3. TAILSTOCK. 4. HEADSTOCK SPINDLE.
5. SADDLE. 5a. SLIDE. 6. CHANGE GEARS. 7. LEAD SCREW.
8. RACK. H. CENTRE HEIGHT. L. CENTRE DISTANCE.

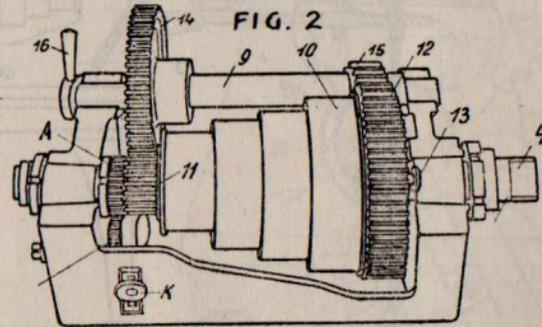


FIG. 2 LATHE HEADSTOCK DRIVE.

4. HEADSTOCK SPINDLE. 10. STEPPED PULLEY. 11. BACK GEAR.
12. LARGE BACKGEAR. 13. CATCH-PIN. 14. LARGE BACKGEAR.
15. SMALL BACKGEARS. G. HOLLOW SHAFT. A. SPLIT COLLAR.
16. LEVER.

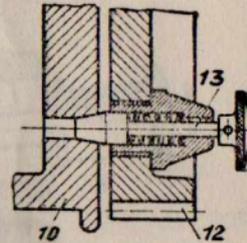


FIG. 3

FIG. 3 CATCH PIN SECTION OF LATHE HEADSTOCK.

10. STEPPED PULLEY. 12. GEAR. 13. CATCH-PIN.

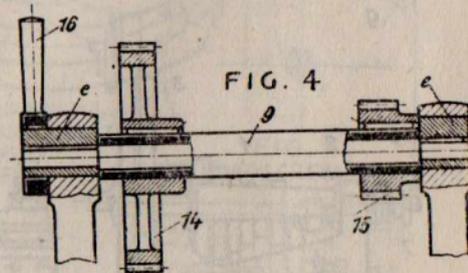


FIG. 4 BACKGEAR SECTION OF LATHE.

E. ECCENTRIC LINING BUSHES. G. HOLLOW SHAFTS. 14. LARGE GEAR.
16. LEVER.

LATHE SADDLES

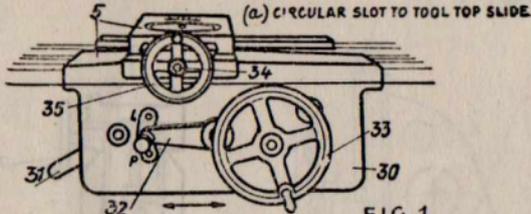


FIG. 1
SADDLE WITH APRON

33. HANDWHEEL FOR SLIDING.
34. HANDWHEEL FOR FACING.
31. LEVER TO CLASP NUT.
32. LEVER FOR SELF ACT.
5. CROSS SLIDE.

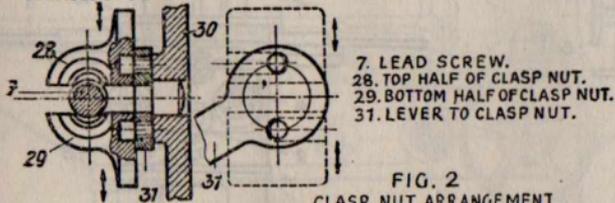


FIG. 2
CLASP NUT ARRANGEMENT.

7. LEAD SCREW.
28. TOP HALF OF CLASP NUT.
29. BOTTOM HALF OF CLASP NUT.
31. LEVER TO CLASP NUT.

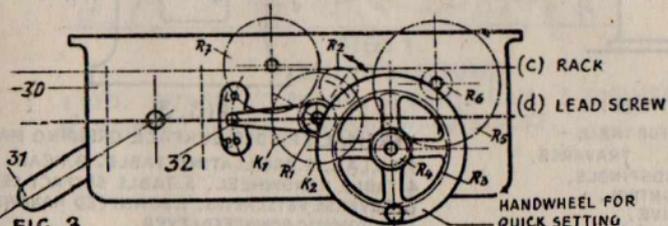


FIG. 3
INSIDE VIEW OF (a) SLIDING. (b) FACING.
LATHE SADDLE. (c) RACK
(d) LEAD SCREW

30. APRON. 31. LEVER TO CLASP NUT.
32. CHANGE OVER LEVER (SLIDING-FACING).
K1, K2, BEVEL GEARS. R1-R7, GEAR WHEELS.

HANDWHEEL FOR QUICK SETTING OF SADDLE OVER R4, R5, 6 TO RACK.

LATHE PARTS

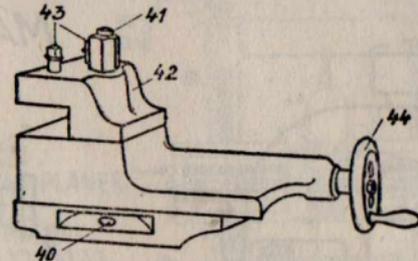


FIG. 1
TOP SLIDE AND TOOL HOLDER.

40. HOLE FOR CLAMP SCREW. 41. CLAMPING STUD.
42. TOOL HOLDER. 44. HANDWHEEL.
43. TOOL CLAMPING SCREWS.

B). FIRST TIGHTEN TOOL CLAMPING STUD THEN CLAMP TOOL WITH CLAMPING SCREWS.

FIG. 2
TOOL HOLDER WITH SET SCREW.
INCORRECT. CORRECT.

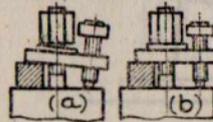


FIG. 4
CORRECT, CUTTING EDGE ON CENTRE LINE (CENTRE HEIGHT).

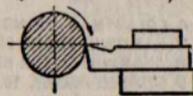


FIG. 3
OVERHANGING LATHE TOOL.



(a) 'a' MUST NOT BE TOO LARGE.

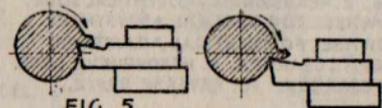


FIG. 5
INCORRECT, CUTTING EDGE ABOVE CENTRE LINE OF WORK.

FIG. 6
INCORRECT, CUTTING EDGE BELOW CENTRE LINE OF WORK.

MACHINE TOOLS

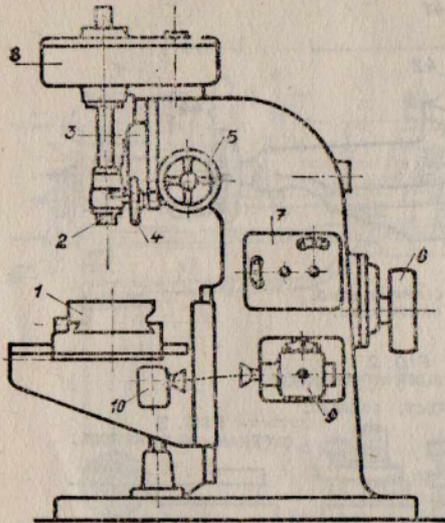


FIG. 1

VERTICAL MILLING MACHINE.

1. TABLE. 2. HEADSPINDLE. 3. VERTICAL SLIDE.
4. HANDWHEEL FOR VERTICAL ADJUSTMENT.
5. HANDWHEEL FOR VERTICAL ADJUSTMENT.
6. PULLEY. 7. GEARBOX. 8. HEADSPINDLE DRIVE.
9. FEED GEARBOX. 10. REVERSE DRIVE.

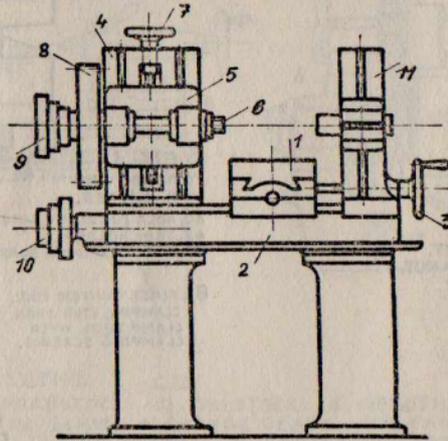


FIG. 2

HEAVY DUTY MILLING MACHINE.

1. TABLE. 2. BED. 3. HANDWHEEL FOR TABLE - TRAVERSE.
4. COLUMN. 5. SPINDLEBOX. 6. HEADSPINDLE.
7. HANDWHEEL FOR SPINDLE STOCK CONTROL.
8. GEARWHEEL FOR HEADSPINDLE DRIVE.
9. STEPPED PULLEY. 10. STEPPED PULLEY. 11. END SUPPORT.

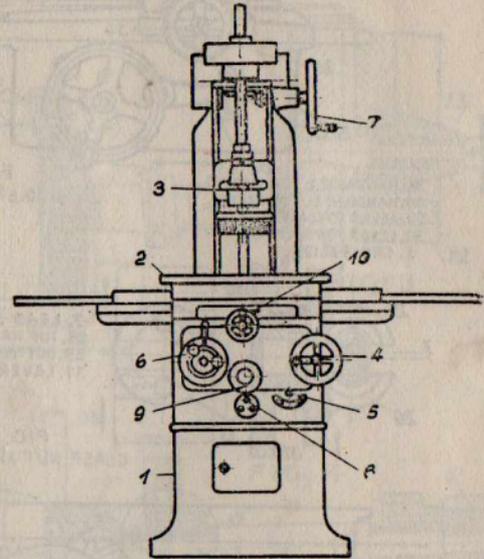


FIG. 3

VERTICAL SPINDLE SURFACE GRINDING MACHINE

1. PILLAR. 2. OSCILLATING TABLE. 3. HEAD
4. TABLE HANDWHEEL. 5. TABLE SELF-ACT LEVER.
6. REVERSE SETSCREWS. 7. DOWNFEED HANDWHEEL.
8. AUTOMATIC DOWNFEED LEVER.
9. CROSS FEED ADJUSTMENT.
10. CROSS FEED REVERSE

MACHINE TOOLS

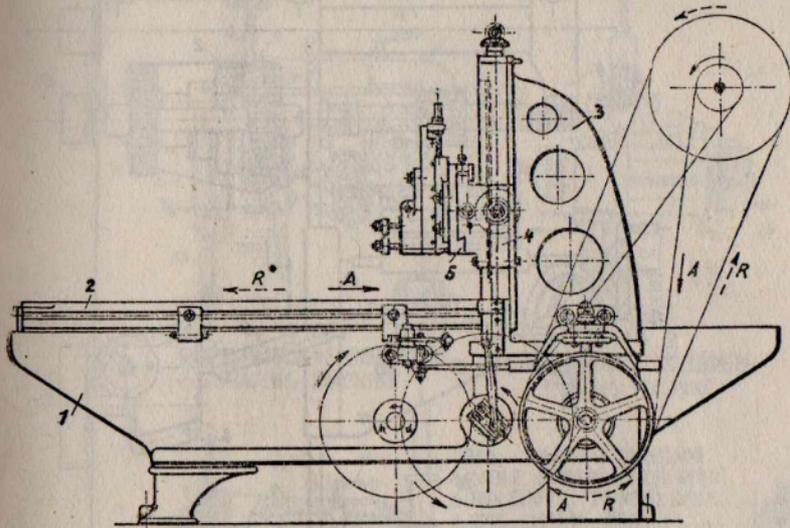


FIG. 1.

PLANING MACHINE

1 BED. 2 TABLE. 3 PILLAR. 4 CROSS RAIL. 5 TOOLHEAD.
R) FORWARD STROKE. A) BACKWARD STROKE.

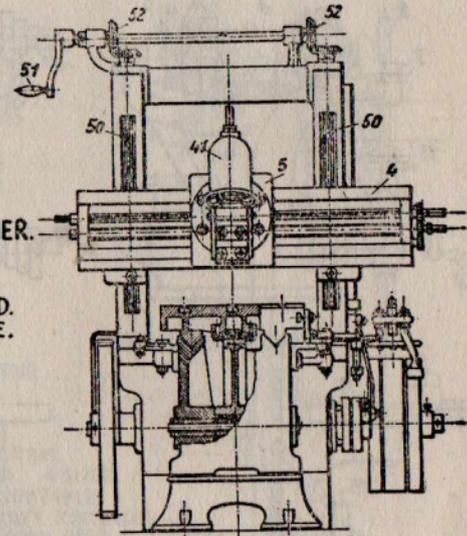


FIG. 2.

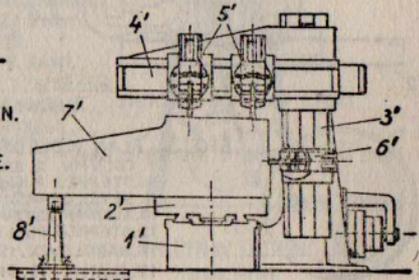
DOUBLE PILLAR PLANER.

4 CROSS RAIL.
5 TOOLHEAD HOLDER.
41 SWIVELLING TOOLHEAD.
50 SPINDLE. 51 HANDLE.
52 BEVEL GEARS.

FIG. 3.

SINGLE COLUMN MULTI-
TOOLHEAD PLANER.

1' BED. 2' TABLE. 3' COLUMN.
4' ARM. 5' TOOLHEADS.
6' TOOLHEAD. 7' WORKPIECE.
8' ADJUSTABLE STEADY.



MACHINE TOOLS

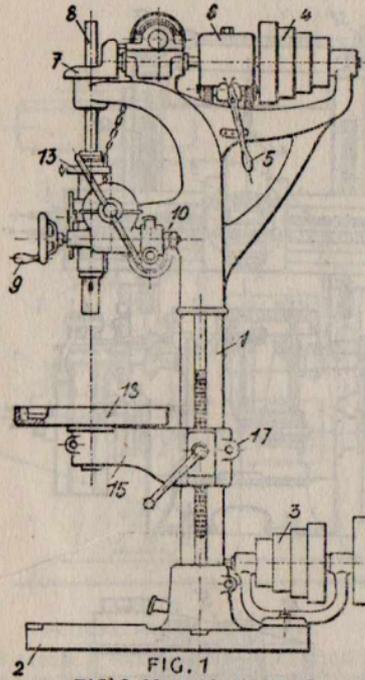


FIG. 1
TABLE DRILLING MACHINE.

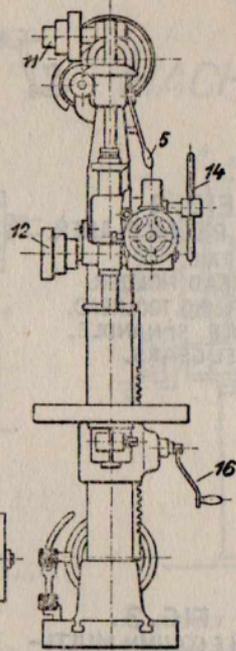


FIG. 2
FRONT VIEW TABLE DRILLING MACHINE.

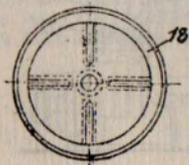


FIG. 3. PLAN VIEW OF TABLE.

1. COLUMN. 2. BASEPLATE. 3. STEPPED PULLEY.
4. STEPPED PULLEY. 5. HAND-LEVER. 6. GEARBOX.
7. BEVEL GEARS. 8. DRILL SPINDLE. 9. FEED HANDWHEEL.
10. AUTOMATIC FEED COUPLING. 11. STEPPED PULLEY.
12. STEPPED PULLEY. 13. AUTOMATIC RELEASE.
14. HANDLEVER. 15. TABLE ARM. 16. ELEVATING CRANK.
17. CLAMP. 18. DRILL TABLE.

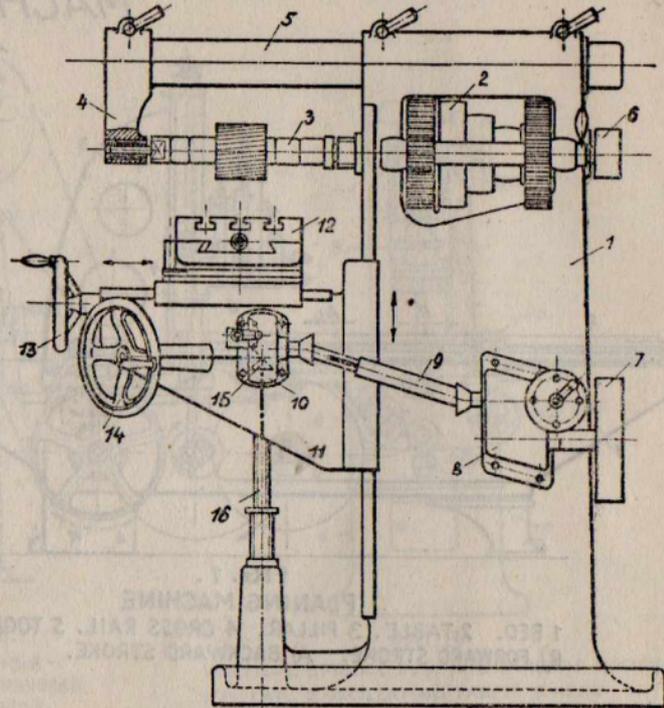


FIG. 4. UNIVERSAL MILLING MACHINE.

1. COLUMN. 2. SPINDLE DRIVE-BACKGEARS. 3. ARBOR.
4. SLIDE BEARING. 5. OVERARM. 6. PULLEY. 7. PULLEY. 8. FEEDBOX.
9. TELESCOPIC SHAFT. 10. REVERSE GEARS. 11. KNEE BRACKET.
12. TABLE. 13. CROSS-SLIDE HANDWHEEL.
14. VERTICAL ADJUSTMENT HANDWHEEL. 15. BEVEL GEARS.
16. TABLE ELEVATION SPINDLE.

SHAPING MACHINES

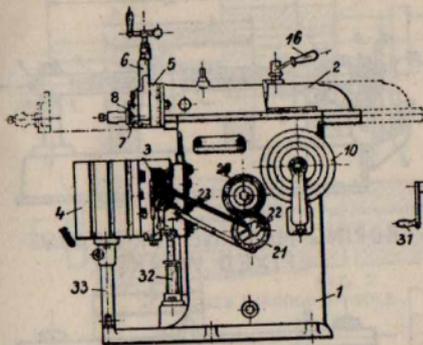


FIG. 1
SIDE ELEVATION OF HORIZONTAL
SHAPING MACHINE

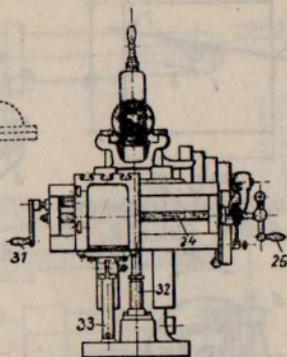


FIG. 2
FRONT ELEVATION OF HORIZONTAL
SHAPING MACHINE

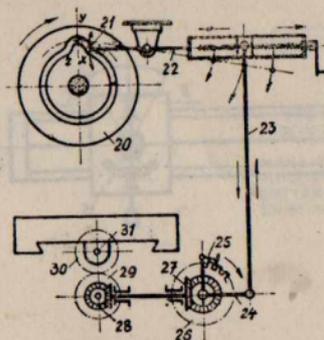


FIG. 6
FEED MECHANISM OF SLOTTING
MACHINE

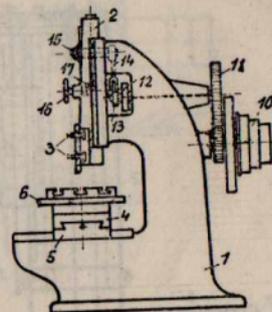


FIG. 5
VERTICAL SLOTTING MACHINE

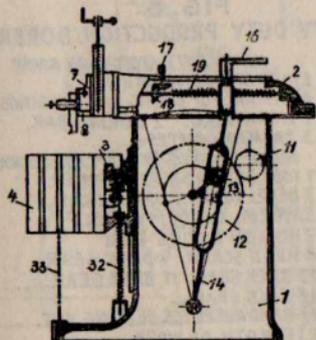


FIG. 3
INSIDE VIEW HORIZONTAL
SHAPING MACHINE

1 BED. 2 RAM. 3 CROSSSLIDE.
4 TABLE. 5 SWIVELLING TOOL HEAD.
6 TOOLSLIDE. 7 SWIVEL BASE.
8 TOOL LIFTING BOX.
10 STEP PULLEY. 11 SPUR GEAR.
12 REVOLVING DISC. 13 PIN.
14 SLOTTED ARM. 15 HANDWHEEL.
16 CLAMP. 17 HANDLE.
18 BEVEL GEAR. 19 SPINDLE.
20 SPUR GEAR. 21 SLOTTED GEAR.
22 PIN. 23 ROD.
24 TRAVERSE SPINDLE.
25 HAND ADJUSTMENT. 30 PIVOT.
31 VERTICAL ADJUSTMENT OF TABLE.
32 TELESCOPIC SPINDLE.
33 SUPPORT.

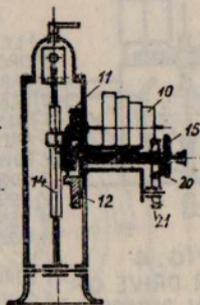


FIG. 4
RAM DRIVE OF HORIZONTAL
SHAPING MACHINE

1 FRAME. 2 RAM.
3 TOOL HOLDER. 4 SLIDE.
5 SLIDE. 6 TURNTABLE.
10 STEPPED PULLEY. 11 SPUR GEAR.
12 CRANK. 13 CONN ROD.
14 CONN ROD. 15 NUT.
16 HANDWHEEL. 17 BEVEL GEARS.
20 SLOTTED DISC. 21 PIN.
22 LEVER. 23 ROD.
24 ANGLE PIECE. 25 PAWL.
26 ADJUSTING WHEEL. 27 BEVEL GEAR.
28 BEVEL GEAR. 29 SPUR GEAR.
30 SPUR GEAR. 31 SPINDLE.
(X, Y, Z.) FORMER.

1 TOOLBAR. 2 BED.
3 CRANKDRIVE. 4 GUIDE ARM.

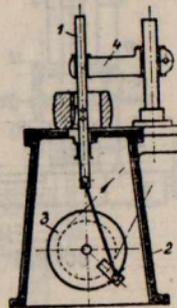


FIG. 7
KEYWAY SLOTTING
MACHINE

MACHINE TOOLS

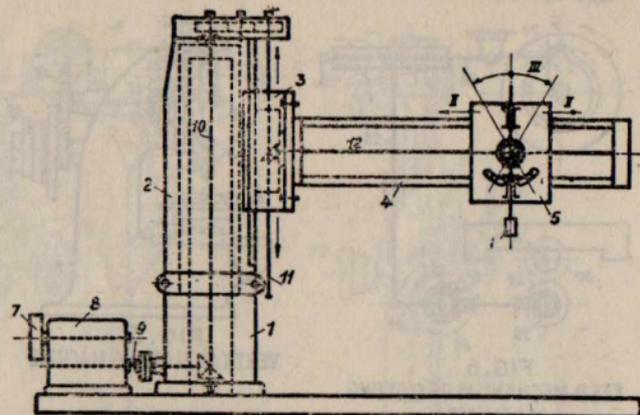
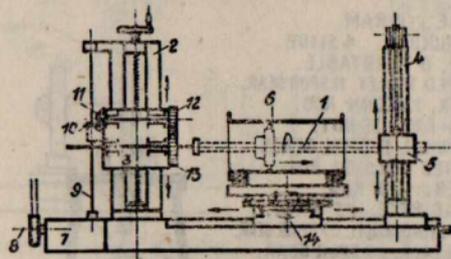
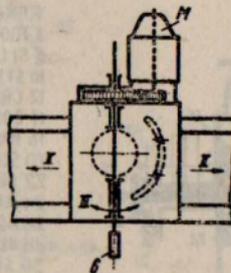
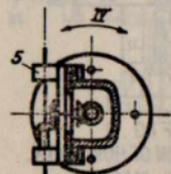


FIG. 1. RADIAL DRILLING MACHINE.

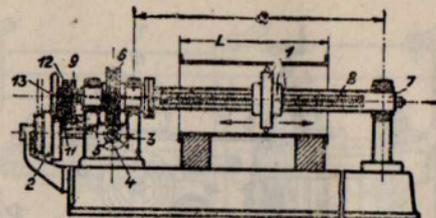
FIG. 5
BORING MACHINE.FIG. 4
MOTOR DRIVE OF
RADIAL DRILLER.FIG. 2
DIAGRAMATIC SCHEME OF
RADIAL DRILLER.FIG. 3
SPINDLE DRIVE OF
RADIAL DRILLER.

RADIAL DRILLER.

- L) LENGTH OF WORK. B) WIDTH OF WORK.
I) CIRCULAR MOVEMENT OF DRILLING HEAD.
II) RADIAL MOVEMENT OF DRILLING HEAD.
III) HEAD SWIVELLING MOVEMENT.
1 PILLAR. 2 BARREL. 3 PILLAR SLIDE.
4 ARM. 5 SADDLE. 6 DRILL SPINDLE.
7 POWER SHAFT. 8 GEAR BOX.
9 HORIZONTAL SHAFT.
10 VERTICAL SHAFT.
11 VERTICAL SHAFT.
12 HORIZONTAL SHAFT. M) MOTOR.

BORING MACHINE.

- 1 BORING BAR. 2 COLUMN. 3 DRIVE BOX.
4 GUIDE COLUMN. 5 SLIDE ARM. 6 TOOLBOX.
7 GEAR BOX. 8 SHAFT. 9 SHAFT.
10 BEVEL GEAR. 11 BEVEL GEAR. 12 SPUR GEAR.
13 SPUR GEAR. 14 TRAVERSE SPINDLE.

FIG. 7
BORING MACHINE FOR HEAVY
FIXED WORK.FIG. 6
HEAVY DUTY PRODUCTION BORER.

HEAVY DUTY PRODUCTION BORER.

- L) LENGTH OF WORK.
A) DISTANCE OF BORING BAR BEARINGS.
1 WORKTABLE. 2 BORING BAR.
3 PACKING PIECES.
BORING MACHINE FOR HEAVY FIXED WORK.
1 TOOL BOX. 2 STEPPED PULLEY.
3 BEVEL GEAR. 4 BEVEL GEAR.
5 WORM. 6 WORM WHEEL.
7 HOLLOW BORING BAR.
8 HEAD SCREW. 9 BACK GEAR.
10 BACK GEAR. 11 BACK GEAR.
12 BACK GEAR.
13 HANDWHEEL FOR SETTING CUT.
L) LENGTH OF WORK.
A) DISTANCE OF BORING BAR BEARINGS.

MILLING ARBORS & DIVIDING HEADS

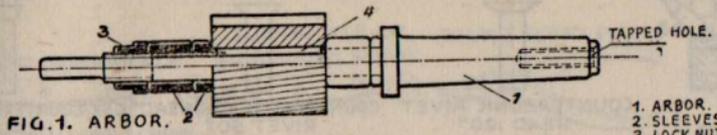


FIG. 1. ARBOR.

- 1. ARBOR.
- 2. SLEEVES.
- 3. LOCK NUT.
- 4. WEDGE.
- 5. SPINDLE.
- 6. DRAWBOLT.
- 7. BUSH

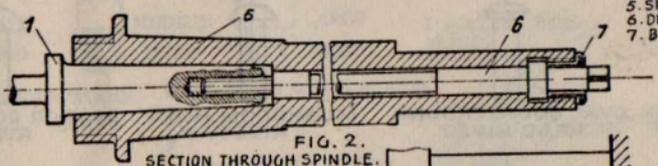


FIG. 2. SECTION THROUGH SPINDLE.

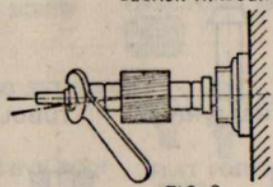


FIG. 3. WRONG WAY TO TIGHTEN LOCK NUT TO MILLING CUTTER.

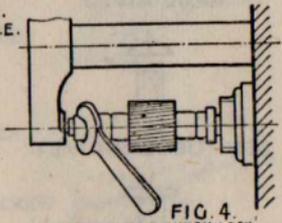


FIG. 4. RIGHT WAY TO TIGHTEN LOCK NUT TO MILLING CUTTER.

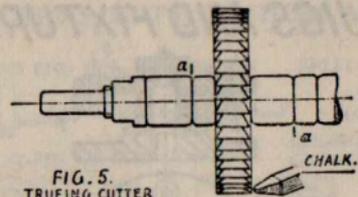


FIG. 5. TRUEING CUTTER

MARK HIGH SPOT WITH PIECE OF CHALK AND TRUE CUTTER BY INSERTING PAPER SHIMING AT α-1.

- KEY TO FIGS. Nos 6, 7, & 8.
- 1. HEAD SPINDLE.
 - 2. WORM WHEEL.
 - 3. WORM.
 - 4. DIVIDING CRANK.
 - 5. INDEX PLATE.
 - 6. SETTING INDICATOR.
 - 7. BEVEL GEARS.
 - 8. SPUR GEARS.
 - 9. HOUSING.
 - 10. DRIVE.

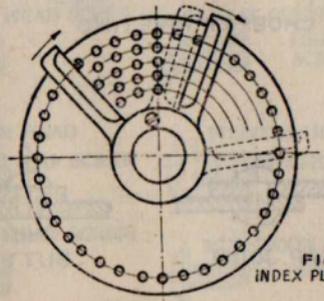


FIG. 8. INDEX PLATE.

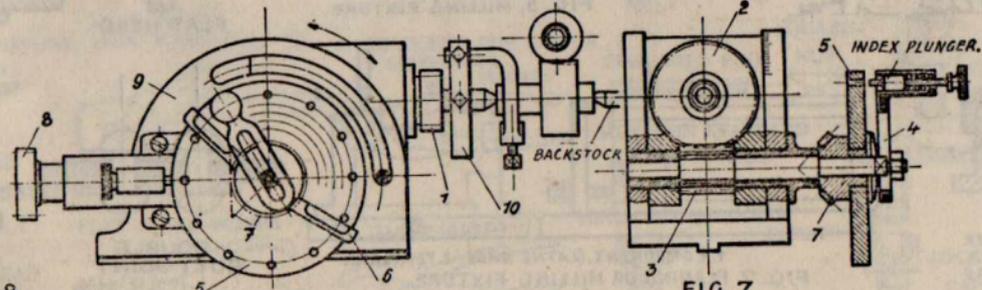
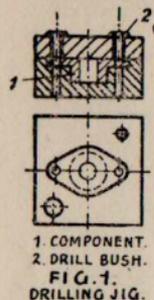


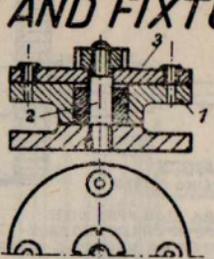
FIG. 6. DIVIDING HEAD.

FIG. 7. SIDE ELEVATION AND SECTION OF DIVIDING HEAD

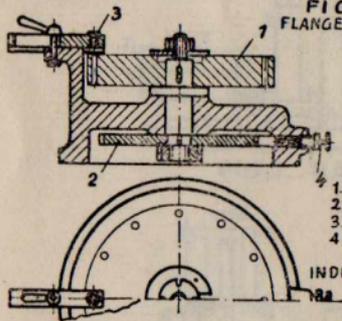
JIGS AND FIXTURES



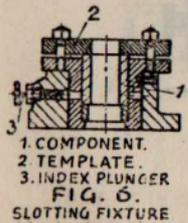
1. COMPONENT.
2. DRILL BUSH.
FIG. 1.
DRILLING JIG.



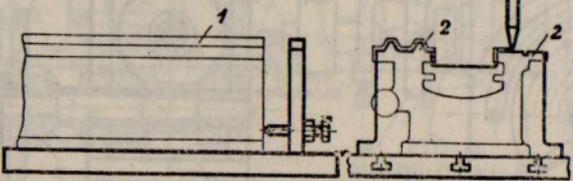
1. COMPONENT.
2. CENTRE STUD.
3. CENTRING SLEEVE
FIG. 2.
FLANGE DRILL JIG.



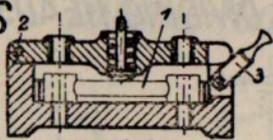
1. COMPONENT.
2. INDEX PLATE.
3. DRILL BUSH.
4. INDEX PLUNGER.
FIG. 4.
INDEXING DRILL JIG.



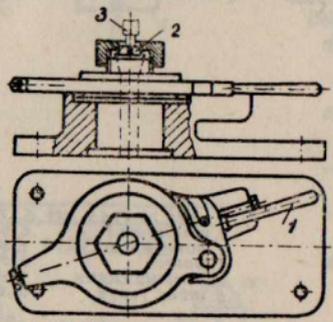
1. COMPONENT.
2. TEMPLATE.
3. INDEX PLUNGER
FIG. 6.
SLOTTING FIXTURE



1. COMPONENT. (LATHE BED). 2. TEMPLATE.
FIG. 7. PLANING OR MILLING FIXTURE.

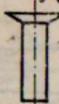


1. COMPONENT.
2. HINGED TOP.
3. CLAMPING LEVER
FIG. 3.
DRILL JIG WITH HINGED TOP PLATE.

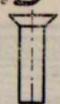


1. LEVER.
2. SPRING COLLET.
3. COMPONENT
FIG. 5. MILLING FIXTURE.

RIVETS AND RIVETING



COUNTERSUNK RIVET
HEAD 120°



COUNTERSUNK (C'SK) HEAD
RIVET 90°



C'SK/COUNTERSUNK RIVET
HEAD 60°



OVAL COUNTERSUNK
HEAD RIVET



MUSHROOM HEAD
RIVET



SNAP OR ROUND HEAD
RIVET



SEMITUBULAR RIVET



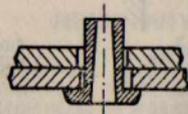
PAN HEAD RIVET



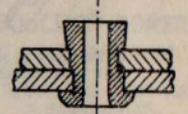
TUBULAR RIVET



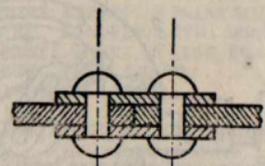
FLAT HEAD



CHOBERT RIVETING



DE BERGE
RIVET



DOUBLE
BUTT JOINT

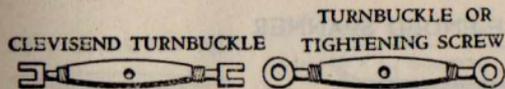


LAP JOINT

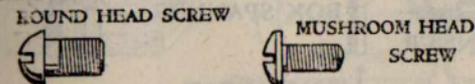
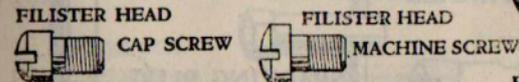
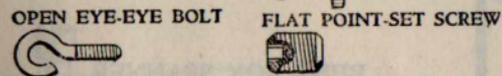
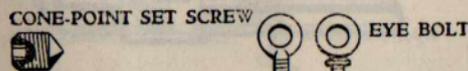
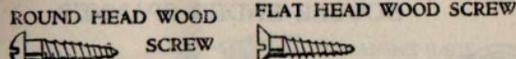
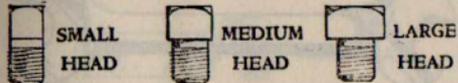


BUTT JOINT

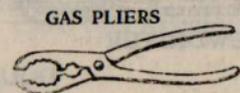
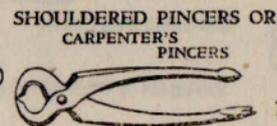
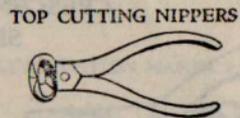
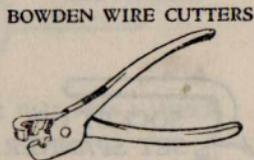
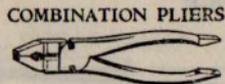
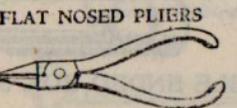
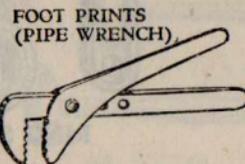
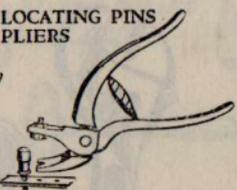
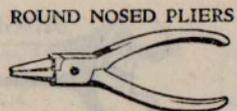
SCREWS



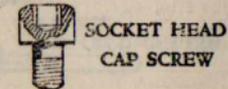
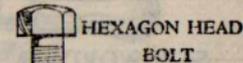
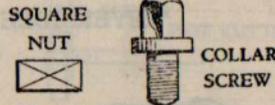
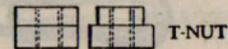
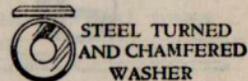
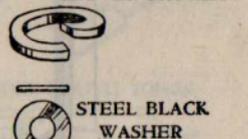
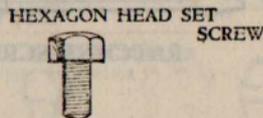
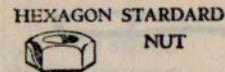
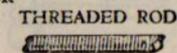
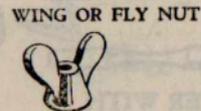
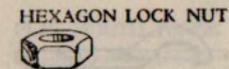
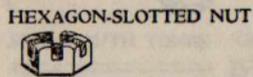
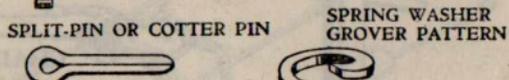
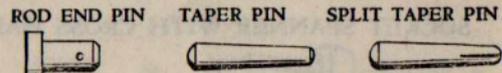
SQUARE HEAD SET SCREW—



PLIERS

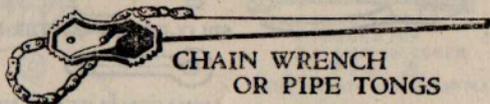
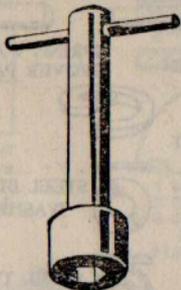


SCREWS, NUTS, WASHERS AND PINS



SPANNERS AND SCREW-DRIVERS

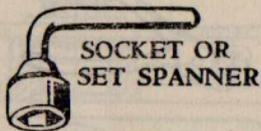
SOCKET SPANNER WITH CROSS HANDLE



CHAIN WRENCH
OR PIPE TONGS



HOOK SPANNER

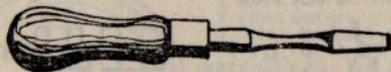


SOCKET OR
SET SPANNER

CRESCENT TYPE
SPANNER



GAS-PIPE HOOK



SCREWDRIVER WITH
REVERSIBLE ENDS



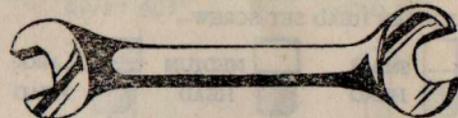
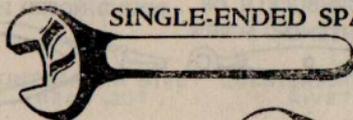
SCREWDRIVER



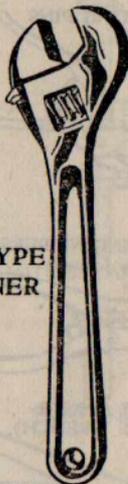
RATCHET SCREWDRIVER

SPANNERS

SINGLE-ENDED SPANNER



DOUBLE ENDED SPANNER



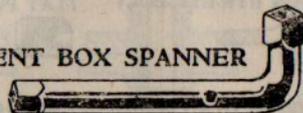
MONKEY WRENCH



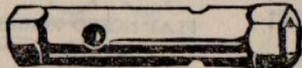
BENT BOX SPANNER



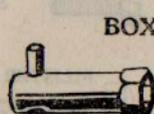
RING SPANNER



BOX SPANNER



DOUBLE ENDED BOX SPANNER



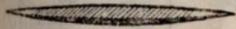
SPARKING PLUG
BOX SPANNER



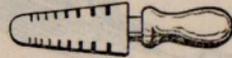
TOMMY BAR

JOINER'S TOOLS

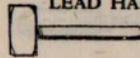
TRIANGULAR SAW FILE



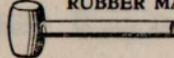
SAW SET



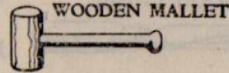
LEAD HAMMER



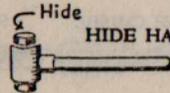
RUBBER Mallet



TENON SAW



WOODEN Mallet



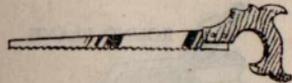
HIDE HAMMER



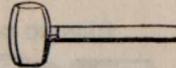
STRAIGHT-BACK HAND SAW



BALL PEIN HAMMER



COMPASS SAW

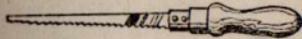


COPPER HAMMER

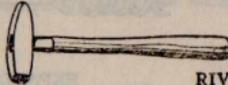


Copper

COMBINATION HAMMER



KEY HOLE OR PAD SAW



RIVETING HAMMER

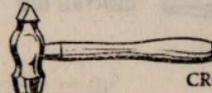
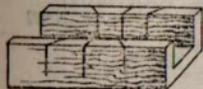


SKEW-BACK HAND-SAW

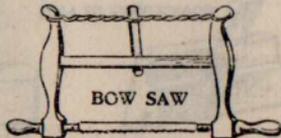


ENGINEER'S HAMMER

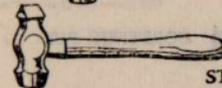
MITRE BOX



CROSS PEIN HAMMER



BOW SAW

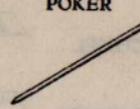


STRAIGHT PEIN HAMMER

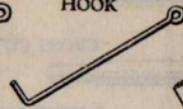
HAMMERS

BLACKSMITH'S TOOLS

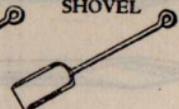
POKER



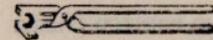
HOOK



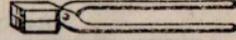
SHOVEL



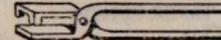
SIDE MOUTH TONGS



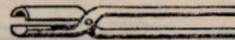
CLOSE MOUTH TONGS



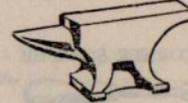
FLAT MOUTH TONGS



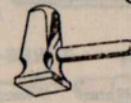
HOLLOW BILL TONGS



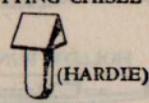
ANVIL



BLACKSMITH'S FLATTER

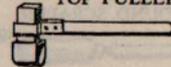


BLACKSMITH'S CUTTING CHISEL



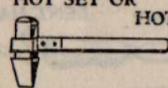
(HARDIE)

TOP FULLER

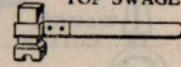


HOT SET OR

HOT CUTTER



TOP SWAGE



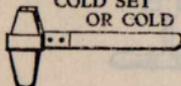
BOTTOM SWAGE



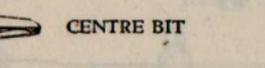
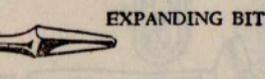
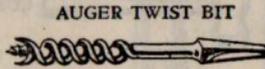
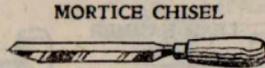
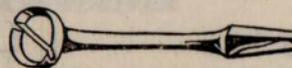
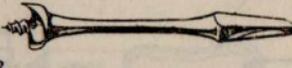
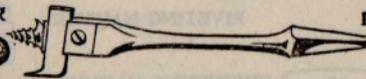
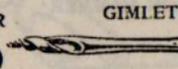
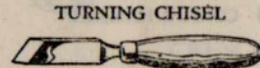
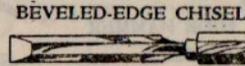
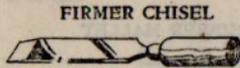
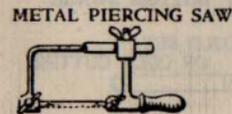
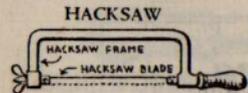
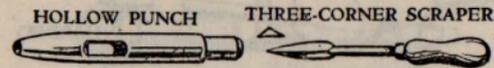
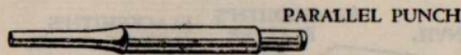
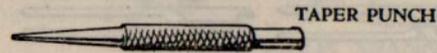
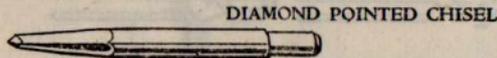
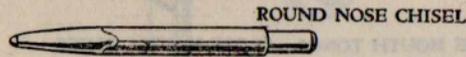
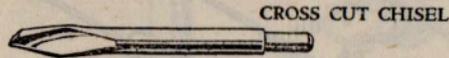
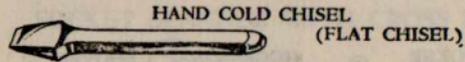
BOTTOM FULLER



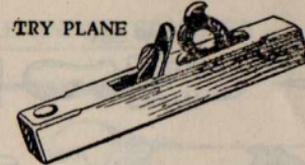
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