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16786

Distr.
RESTRICTED

IO/R.53
6 April 1988

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

PROSPECTS FOR INTEGRATION IN THE WOODWORKING
INDUSTRY OF THE CARIBBEAN COMMUNITY

UC/CAR/86/201

Technical report: Guidelines for the selection of woodworking
equipment for the small-scale furniture/joinery
industry in the Caribbean Community
(CARICOM)*

Prepared for the CARICOM Secretariat
by the United Nations Industrial Development Organization

Based on the work of Pietro Borretti, woodworking consultant

Backstopping officer: A. V. Bassili
Industrial Management and Rehabilitation Branch

182

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Mention of equipment brand names in this report is not to be construed as a recommendation or endorsement but merely as a citation that this is typical in its field. To help identify as wide a range of suppliers as possible, the equipment is cross referenced with the code numbers of the Technical Classification of Woodworking Machines of the European Committee of Woodworking Machinery Manufacturers (EUMABOIS). A list of European and non-European associations of woodworking equipment manufacturers is also given in Annex II.

ABSTRACT

This report, entitled "Guidelines for the Selection of Woodworking Equipment for the Small-Scale Furniture/Joinery Industry in the Caribbean Community (CARICOM) was prepared by P. Borretti in 1987 under UNIDO's project UC/CAR/86/201 as part of a regional study carried out for the CARICOM Secretariat with the aim of promoting regional co-operation in the development of woodworking industries and in particular in the supply of wood products from within the Caribbean Community.

In the course of field missions to nine CARICOM Member States, the small-scale furniture/joinery industry sector was found to have an important potential role to play in meeting the demand for wood products in a situation of highly-fragmented island markets, provided it attains a higher degree of efficiency and productivity.

These Guidelines aim at providing a basis for the introduction of modern and appropriate technologies as well as for sound investment in the purchase of new equipment.

TABLE OF CONTENTS

	<u>Page</u>
A. Background	1
B. Objective	1
C. Scope and Structure of the Report	1
D. <u>Equipment lists</u>	
D.1 Production Equipment	6
D.2 Tool Maintenance Equipment	7
D.3 Miscellaneous Maintenance Tools	8
E. <u>Equipment Specification Sheets</u>	
E.1 Production Equipment	9
E.2 Maintenance Equipment	41
E.3 Miscellaneous Maintenance Tools	63
 <u>Charts</u>	
Selection Chart 1 (Production Equipment)	4
Selection Chart 2 (Tool Maintenance Equipment)	5
 <u>ANNEXES</u>	
1. Addresses of Suppliers of Typical Equipment	65
2. List of Associations of Woodworking Equipment Manufacturers	70

A. BACKGROUND

A mission was undertaken in 1987 by Pietro Borretti, a UNIDO woodworking consultant to the CARICOM Secretariat in Georgetown, Guyana, involving visits to nine member states ^{1/} of the Caribbean Community, with as main objective the promotion of regional cooperation in the woodworking industry.

One of the main findings of the mission was that the small-scale furniture/joinery industry could play an important role in meeting the demand for wood products of the small and highly fragmented markets in the region, provided it attains a higher degree of efficiency and productivity.

One of the main constraints in the development of any small-scale woodworking industry was identified as being misinvestment in the acquisition of new equipment, that is: 1) purchasing of equipment either too sophisticated or of the 'hobby' type, unsuitable for heavy-duty wood processing operations, and 2) failure to acquire machinery enabling the introduction of modern, streamlined wood-jointing techniques.

Another major problem encountered throughout the wood processing sector in the region is the lack of proper tool maintenance equipment, resulting in reduced serviceable life of expensive and imported machinery tools (such as saw blades, planer knives, etc.) as well as contributing to the low recovery rate of raw material and to the low quality of finished wood products.

B. OBJECTIVES OF THE GUIDELINES

The central aim of the Guidelines is to promote the development of small-scale furniture/joinery workshops - with a manpower of about 5 to 20 workers - equipped with a basic set of modern and appropriate woodworking equipment enabling them to benefit from the economics of industrialized wood processing based on the interchangeability of parts, high productivity and more efficient utilization of raw material.

In particular, the Guidelines are designed to provide factual reference for equipment-purchasing decisions to those entrepreneurs in the small-scale furniture/joinery industry who plan either to establish new woodworking or tool maintenance workshops or expand and/or improve existing facilities.

C. SCOPE AND STRUCTURE OF THE GUIDELINES

The Guidelines provide information on basic equipment for smaller workshops and on machinery of intermediate type - such as automatic round-end tenoners, dovetailing machines, specialized tool maintenance equipment, multi-spindle boring machines, etc. - meant for the modernization of larger furniture/joinery plants.

Some equipment was selected to fulfill the needs of particular plants such as, for instance, the tool maintenance equipment selected for the Whitney Sawmill in Belize which has recently acquired parquet-making machines, a band resawing machine and a heavy-duty moulder.

^{1/} Antigua, Barbados, Belize, Dominica, Guyana, Jamaica, St. Lucia, St. Vincent, Trinidad and Tobago.

Specifications have also been provided for the selection of four-side moulder for utilization either by larger furniture/joinery plants or sawmills planning to increase their value-added scope by producing dressed lumber of export standard, tongue-and-groove flooring boards and other types of mouldings.

The equipment presented in these Guidelines is mainly related to solid-wood processing since the use of wood-based panels is still very limited in the region.

However, the recommended introduction of (1) boring jigs and multi-spindle boring machines for the utilization of dowel joints, and (2) clamp carriers for edge lipping of panels, is also meant to introduce in the small-scale woodworking industry a rational use of ready-veneered particle board panels as well as of ready-veneered Medium Density Fibreboard (MDF) panels, the latter material having already been introduced in Jamaica and Trinidad and Tobago.

The guidelines consist of three parts cross-referenced to each other:

- (a) Equipment lists;
- (b) Equipment specification sheets; and
- (c) Equipment selection charts.

The equipment lists are arranged under four headings: CODE

- | | |
|-------------------------------------|-----|
| (a) Production equipment | PE |
| (b) Tool maintenance equipment | ME |
| (c) Miscellaneous maintenance tools | MMT |
| (d) Power and air tools | PAT |

Specification sheets are given for most of the items included in the Equipment List and they are designed to provide the entrepreneurs with a basis for requesting equipment quotations from potential machinery suppliers. No specification sheets have been included for the traditional type of equipment such as hollow chisel mortising machines and power/air tools with which the industry is already familiar.

Most of the equipment in the Specification Sheets is cross-referenced with its EUMABOIS Classification number so as to facilitate the identification of as wide a range of equipment suppliers as possible. Furthermore, in order to provide an immediate equipment cross-reference with respect the required specifications; the sheets also indicate supply sources of typical equipment. This, however, is not to be construed as a recommendation or endorsement but merely as an identification of equipment which is typical in its field.

Two Equipment Selection Charts are provided in the report on pages 4 and 5, one covering Production Equipment and Power Tools and the second covering Tool-Maintenance Equipment and Miscellaneous Maintenance Tools. The Charts group the equipment under various levels as shown below:

(a) Equipment Selection Chart 1

Production Equipment and Power Tools

- Level IA: Basic production equipment for building construction workshops.
- Level IB: Basic production equipment for small furniture/joinery workshops.
- Level II: Intermediate production equipment for furniture/joinery workshops.
- Level III: Production equipment for larger furniture/joinery plants and sawmills.

(b) Equipment Selection Chart 2

Tool Maintenance Equipment and Miscellaneous Maintenance Tools

- Level I ^{2/}: Basic tool maintenance equipment for smaller furniture/joinery workshops, and building construction workshops.
- Level II ^{3/}: Maintenance equipment for smaller furniture/joinery and building construction workshops.
- Level III: Tool maintenance equipment for: (1) larger furniture and joinery plants, and (2) tool maintenance service centres.
- Level IV: Tool maintenance equipment required by the Whitney Sawmill in Belize to maintain the following tools:
 - bandsaw blades up to 5" wide
 - gangsaw blades
 - inserted teeth of circular saw blades
 - narrow bandsaw blades
 - moulding cutters
 - carbide-tipped circular sawblades
 - standard circular sawblades

^{2/} It applies when external tool maintenance services are available.

^{3/} It applies when no external tool maintenance services are available.

D. EQUIPMENT LISTS

D.1 List of Production Equipment (PE)

	EUMADOIS Ref. No.
PE/1 Combined circular sawing, moulding and tenoning machine	12.89.1
PE/2 Combined surface planing and thicknessing machine with slot-mortising and boring attachment	12.83
PE/3 Table bandsawing machine	12.121.5
PE/4 Manual wood turning lathe convertible into one for semi-automatic operations	12.61 12.62 12.63 12.64
PE/5 Boring jig for panel furniture (case goods) construction	
PE/6 Narrow belt sanding machine (stroke belt sander) with sliding table and expandable to disk and bobbin sander	12.721.2 12.731 12.741.1
PE/7 Routing machine	12.315.12
PE/8 Multi-spindle boring machine	12.422
PE/9 Hollow chisel mortising machine	12.422
PE/10 Clamp carrier for joining panels, applying and assembling frames	31.13 31.121.1
PE/11 Universal radial cross-cut saw	12.131.122
PE/12 Automatic round-end tenoning machine	12.312
PE/13 Automatic slot mortising machine, also suitable for single boring	12.531.1
PE/14 Hand-operated dovetailing machine (single spindle)	12.313.2
PE/15 Four-side moulders	12.34
PE/16 Multi-purpose cutterblocks for mitre and edge joints, rabbeting and bevelling	no number
PE/17 Multi-profile cutterblocks	no number
PE/18 Combined slot mortising, boring and chain/chisel mortising machine	no number

D.2 List of Tool Maintenance Equipment (ME)

	EUMABOIS REF No.
ME/1 General-purpose bench grinder with tool rest and double-end spindle.	55.21
ME/2 Universal tool shortening machine suitable for smaller furniture/joinery workshops (for sharpening of circular sawblades, narrow saw blades, moulding cutters, boring and routing cutters, and with extra attachments for sharpening carbide-tipped circular sawblades and planing knives).	55.7
ME/3 Setting device for narrow band sawblades (hand operated).	55.19
ME/4 Hand-operated setting device for circular saw blades (consisting of blade-holder stand with setting lever).	55.19
ME/5 Flash butt-moulding machine for narrow bandsaw blades (with manual control of welding process).	55.14
ME/6 Semi-automatic planing knives sharpening machine (for smaller woodworking shops as an alternative to sharpening knives on universal sharpening machine, see maintenance equipment item No. ME/2).	55.2
ME/7 Levelling and tensioning equipment for circular sawblades up to 600 mm (23 5/8") dia.	55.19
ME/8 Automatic planing knife sharpening machine (for larger woodworking factories and tool maintenance centres).	55.2
ME/9 Universal tool sharpening machine (suitable for larger furniture/joinery plants and tool maintenance centres).	55.7
ME/10 Sharpening machine for straight and bevel grinding of circular sawblades and narrow bandsaw blades (expandable, if necessary, to sharpen: bandsaws up to 150 mm (5 7/8") wide, bandsaws, hack saws, metal cutting circular sawblades, gang saw blades and planing knives.	55.11 55.21
ME/11 Automatic sharpening machine for carbide tipped circular sawblades. (Sharpening of front, top and side-edges of carbide tips).	55.17

- ME/12 Resistance brazing machine for removing and brazing of carbide tips on circular sawblades.
- ME/13 Setting tool for gangsaw blades.
- ME/14 Setting pliers for gangsaw blades.
- ME/15 Lightweight angle grinder (power tool).
- ME/16 Welding clamp for wide band resaw blades.
- ME/17 Lightweight oxy-acetylene welding equipment for sawblades.
- ME/18 Hand-operated shears for wide bandsaw blades.
- ME/19 Levelling and tensioning equipment for wide bandsaw blades.
- ME/20 Hand-operated swaging tool for wide bandsaw blades up to 127 mm (5") width.
- ME/21 Hand-operated side dressing tool for wide bandsaw blades up to 127 mm (5") width.
- ME/22 Hand-operated swaging tool for gangsaw blades.
- ME/23 Hand-operated dressing tool (sharper) for gangsaw blades.
- ME/24 Hand-operated sharpening device for inserted teeth of circular sawblades.

D.3 List of Miscellaneous Maintenance Tools (MMT)

- MMT/1 Vernier caliper.
- MMT/2 Protractor.
- MMT/3 Dial type set gauge.
- MMT/4 Grinding goggles.
- MMT/5 Micrometer.

EQUIPMENT SPECIFICATION SHEETS

E.1 PRODUCTION EQUIPMENT

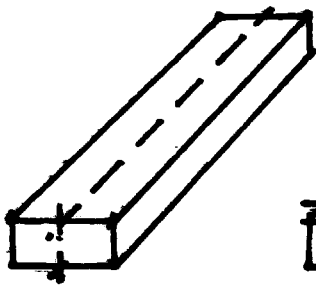
Item No. Quantity

**PE/1 1 Combined circular sawing, moulding and tenoning machine
(EUMABOIS classification No. 12.89.1)**

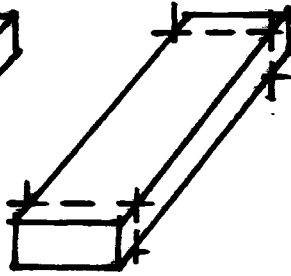
1. Specifications

- 1.1 Saw blade dia: up to 400 mm. (16")
- 1.2 Saw blade arbor titling up to 450 mm.
- 1.3 Depth of cut capacity (with 400 mm. blade) 135 mm. (5 3/8")
- 1.4 Range of spindle speeds to accommodate various diameters of sawblades and dado (trenching) heads: approx. 3,000, 4,500 and 6,000 rpm)
- 1.5 Power of saw spindle motor: 5.5 kW (7.5 HP)
- 1.6 Built-in scoring saw unit for veneered and laminated panels. Power of scoring saw motor: 0.5 to 0.75 kW (0.75-1 HP).
- 1.7 Sliding table for dimensioning (squaring) of panels
- 1.8 Length of sliding table:
 - (a) 2,500 mm for sawing panels 1,220 x 2,440 mm, or
 - (b) 3,200 mm for sawing panels 3,000 mm long.
- 1.9 Inner edge of sliding table to run on the same line as the sawblade to allow clamping, end-sawing and tenoning of short workpieces.
- 1.10 Additional tenoning table attachment to be provided for machining short workpieces, if inner edge of sliding table does not coincide with sawblade line.
- 1.11 Adjustable mitre fence with eccentric clamp and stops.
- 1.12 Diameter of both the sawblade spindle and spindle-moulder spindle: 30 mm.
- 1.13 Spindle moulder equipped with interchangeable type of spindle (preferably of the taper type (MK5)).
- 1.14 Spare spindle with cutters collet chuck to hold router cutters.
- 1.15 Moulding fence/guard provided with micrometric setting
- 1.16 Speed range of moulding spindle: approx. 3,000 to 7,000 r.p.m.
- 1.17 Power of moulding-spindle motor: 5.5 kW (7.5 HP)
- 1.18 Lubricated-for-life bearings of saw spindle and moulding spindle.
- 1.19 Flat hold-down springs attached to the spindle moulder fence and table to provide pressure on workpieces in the moulding process.
- 1.20 Riving knife combined with saw guard.
- 1.21 Overload switch protection.
- 1.22 Tropical insulated motors.
- 1.23 Tenoning cutterhead of adjustable type.

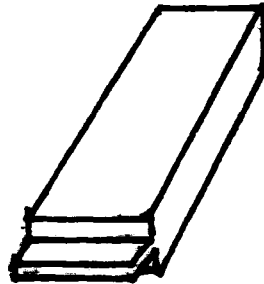
COMBINED CIRCULAR SAWING, MOULDING AND TENONING MACHINE



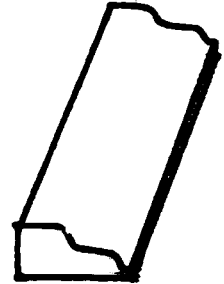
RIPPING



CROSS-CUTTING



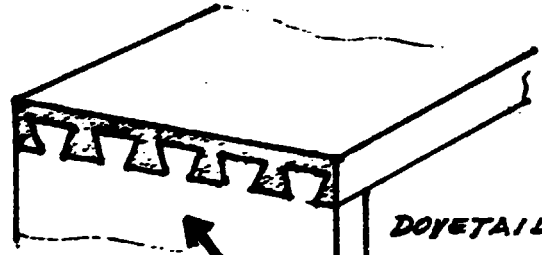
TENONING



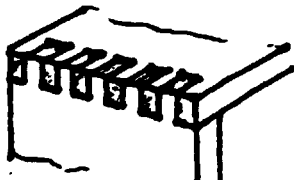
MOULDING



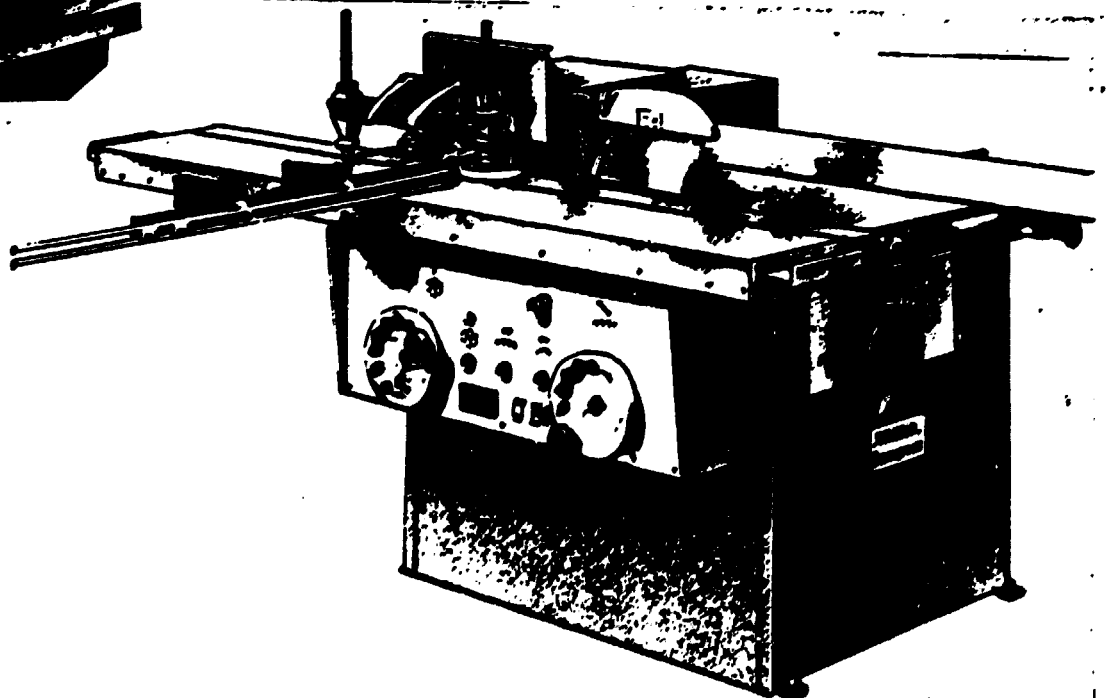
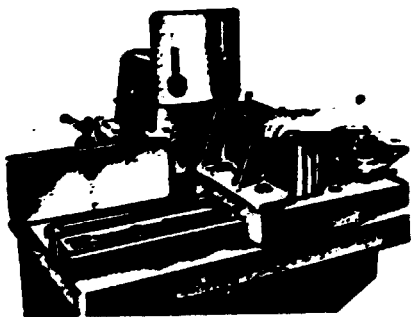
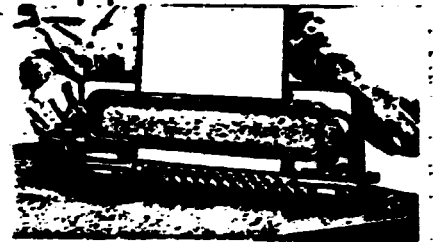
SHAPING



DOVETAILED



**CORNER LOCKING
AND FINGER JOINTING**



Item No. Quantity

PE/2 1 Combined surface planing and thickening machine with slot-mortising/boring attachment.
(EUMADOIS classification No. 12.83)

1. Specifications

- 1.1 Working width up to 500-600 mm (19 3/4"-23 5/8")
- 1.2 Thickening capacity: up to 230 mm (9")
- 1.3 Frame construction: cast iron
- 1.4 Four-life cutterblock
- 1.5 Thickening table with idle rollers
- 1.6 Surfacing fence canting to 45°
- 1.7 Rise and fall of thickening table adjusted manually
- 1.8 Slot mortising attachment equipped with self-centering chuck and eccentric clamp
- 1.9 Provision for inserting short carbide knives on the cutterblock end to trim melamine-faced panels
- 1.10 Overload switch protection
- 1.11 Tropical-insulated motor
- 1.12 Sealed-for-life bearings
- 1.13 Attachment for grinding planing knives on slot mortising table (if the buyer does not envisage purchasing a separate knife grinder)

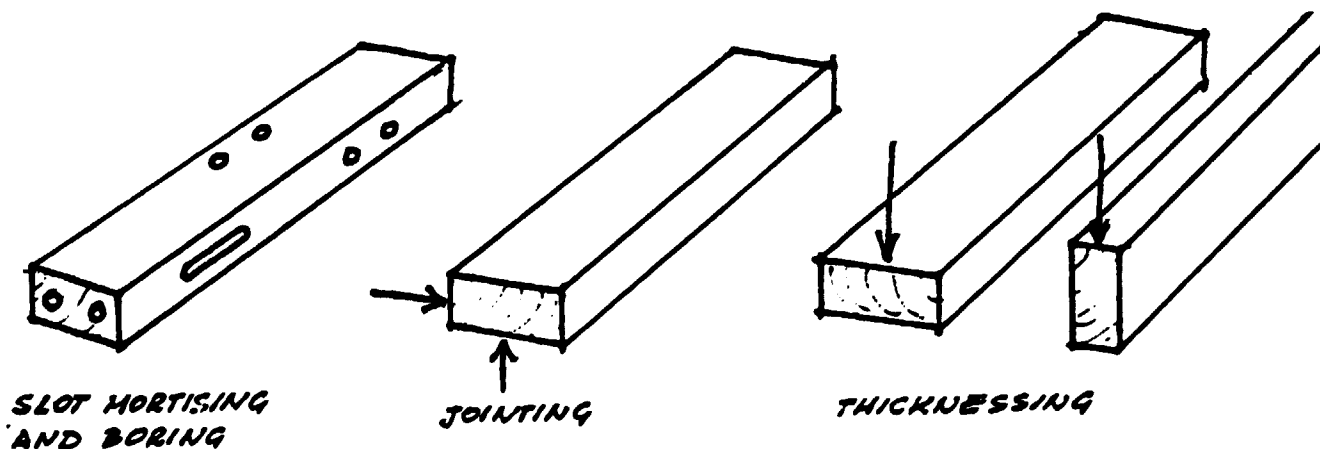
2. Spares requirements

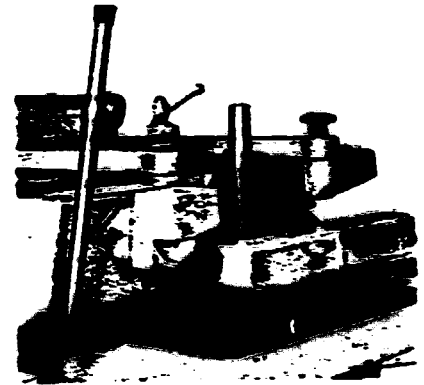
- 1 set -Wearable parts for two year operation
- 3 sets -Spare planing knives
- 6 -Spare slot mortiser bits dia. 10 mm
- 3 -Spare slot mortiser bits dia. 8 mm
- 3 -Spare slot mortiser bits dia. 12 mm

3. Typical equipment suppliers

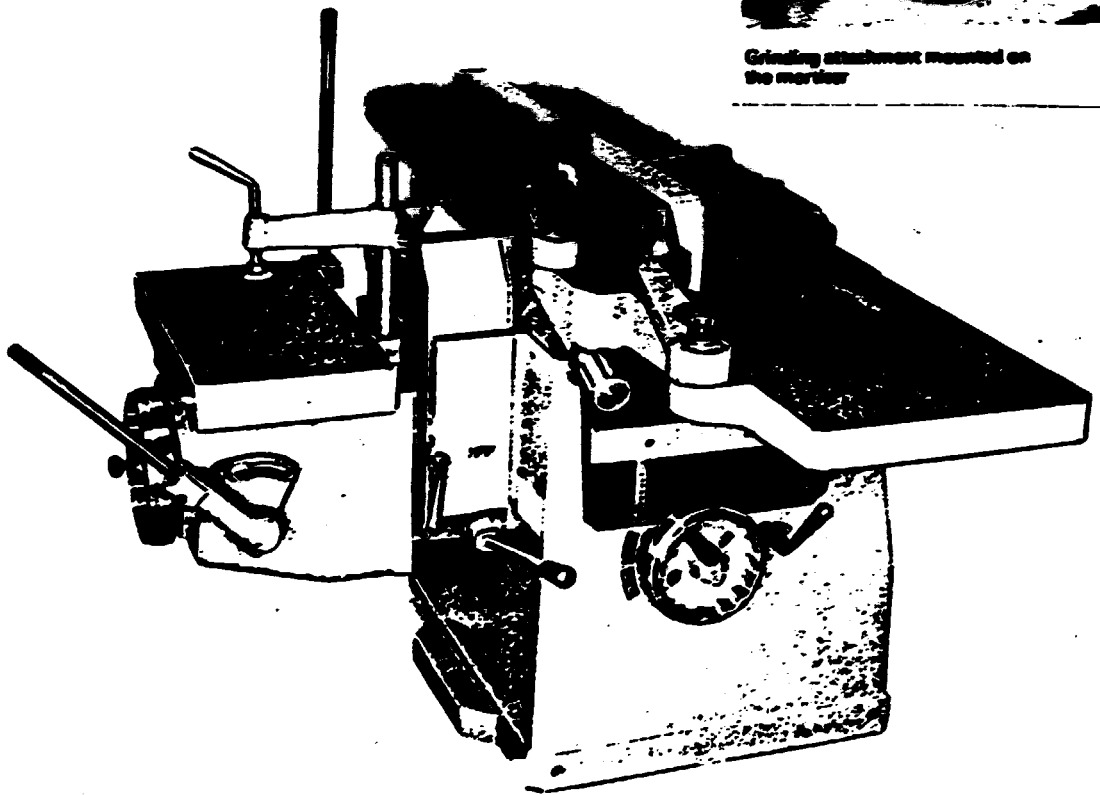
- SCM, Mod. 2250
- WADKIN-BURSGREEN BTS 500

COMBINED SURFACE PLANING AND THICKENING MACHINE
WITH SLOT-MORTISING AND BORING ATTACHMENT





Grinding attachment mounted on the motor



Item No. Quantity Machine Description

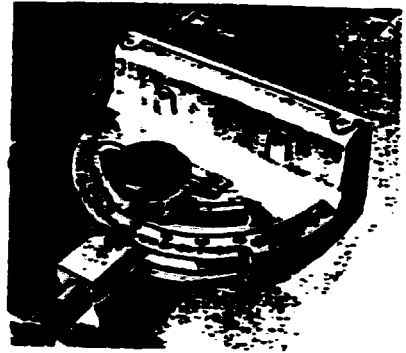
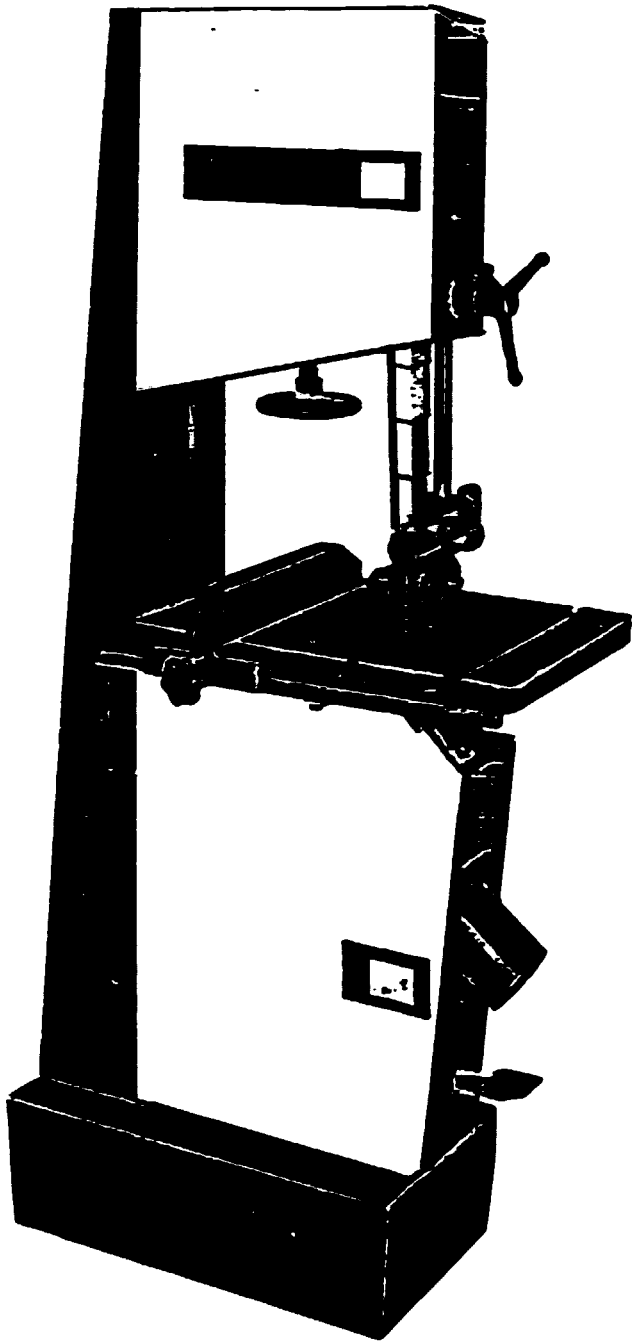
PE/3 1 Table bandsawing machine (Narrow bandsaw)
(EUMABOIS classification No. 12.121.5)

1. Specifications

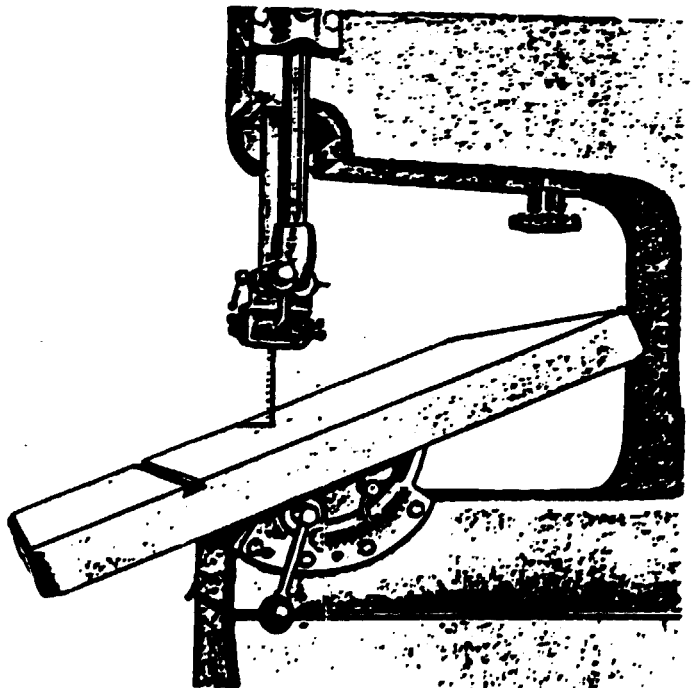
- 1.1 Diameter of wheels (saw pulleys): 800 mm
- 1.2 Width of sawblade: up to 40 mm

<u>Item No.</u>	<u>Quantity</u>	<u>Machine Description</u>
		1.3 Horse power: 5 minimum
		1.4 Frame construction: cast iron or welded steel plate
		1.5 Top and bottom blade guides of precision type (wooden side guides not acceptable)
		1.6 Saw pulleys lined with rubber pulleys
		1.7 Hand-operated or foot-operated brake
		1.8 Sawblade tension indicator
		1.9 Adjustable rip fence
		1.10 Canting table <u>with angle indicator</u>
		1.11 Overload switch protection
		1.12 Greased-for-life bearings
		1.13 Tropical-insulated motor
		<u>2. Extra desirable features</u>
		2.1 Adjustable mitre fence running on table groove
		2.2 Telescopic blade guard
		2.3 Rise-and-fall of upper blade guide adjustable by rack-and-pinion
		<u>3. Spare parts requirements</u>
1 set		-Wearable parts for two-year operation
		<u>4. Typical equipment suppliers</u>
		- CENTAURO, Mod. CO 800
		- WADKIN, Mod. C8

TABLE BANDSAWING MACHINE



Mitre Fence
Increases the versatility of the machine. Crosscutting, mitring and compound beveling are possible in conjunction with the tilting table.



Item No. Quantity
PE/4 1

Manual wood turning lathe convertible to semi-automatic and automatic operation.

(EUMABOIS classification Nos. 12.61, expandable to 12.62, 12.63 and 12.64)

1. Specifications of basic machine

- 1.1 Distance between centres: 1,500 mm (59");
- 1.2 Power of spindle motor: 1 kW (1.5 HP);
- 1.3 Variable spindle speeds: approx. 600-1800 r.p.m.
- 1.4 Height of centres: approx. 220 mm (8 5/8") (maximum diameter turned: 440 mm (16 1/4"))
- 1.6 Head stock equipment
 - 1.6.1 Standard three-spike head stock
 - 1.6.2 Centre-and-prongs type head stocks (approx. 24 and 44 mm)
 - 1.6.3 Self-centering three jaws head stock
 - 1.6.4 Drill-chuck head stock
 - 1.6.5 Ball-bearing type tail stock
 - 1.6.6 Holder for cut-off knife
 - 1.6.7 Steady rest for long workpieces
- 1.7 Overload switch protection
- 1.8 Greased for life bearings
- 1.9 Tropical-insulated motor

2. Attachments for adapting basic turning lathe to permit copying operation

- 2.1 Copying attachment suitable for both template and turning sample operation. Semi-automatic wheel operated chain feeding attachment.
- 2.2 Motor-operated automatic feed device to be added on to the semi-automatic feeding attachment. (See item 2.1 above)

3. Extra optional features

- 3.1 Outside plate head stock with tool rest
- 3.2 Table gap to increase the diameter capacity of turnings
- 3.3 Sanding unit with 0.29 kW (0.4 HP) motor

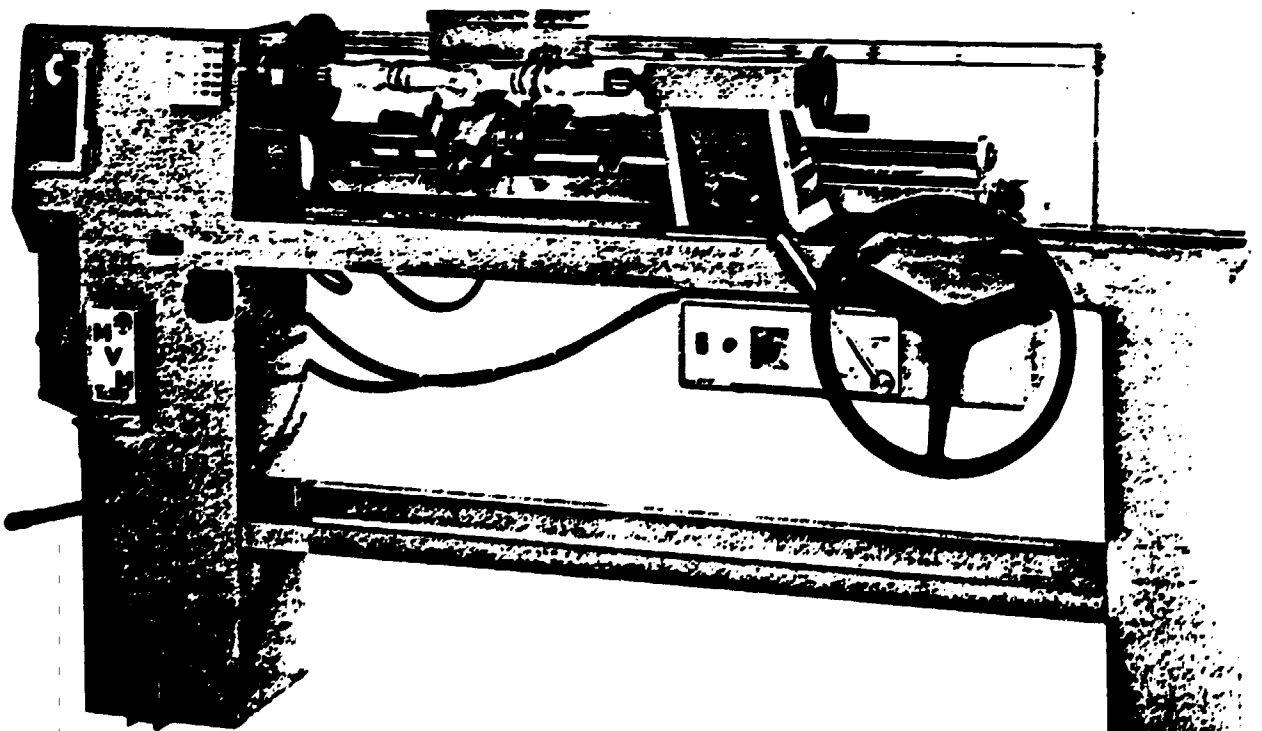
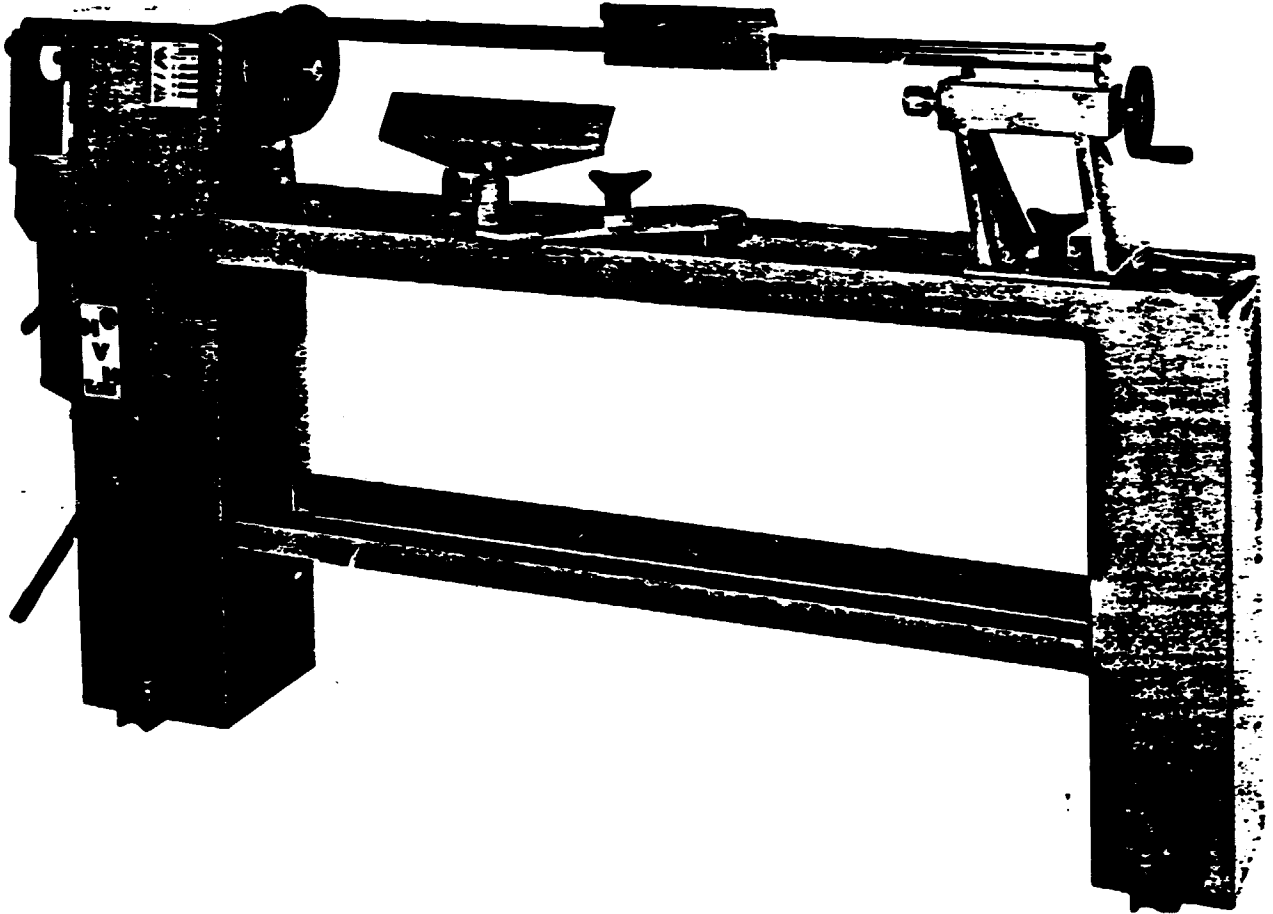
4. Spare parts and tools requirements

- 1 set Wearable parts for two-year operation
- 2 Each type and size hand tools and machine knives

5. Typical equipment suppliers

- MWM, Mod. T-1500

MANUAL WOOD TURNING LATHE CONVERTIBLE INTO
SEMI-AUTOMATIC OR AUTOMATIC OPERATION



<u>Item No.</u>	<u>Quantity</u>
PE/5	1

Boring jig for panel-furniture construction

1. Specifications

- 1.1 Suitable for power-drill operation
- 1.2 Parcel width capacity: up to 600 mm (25 5/8")
- 1.3 Parcel thickness range: 16, 19 and 22 mm
- 1.4 To be used with broad point drills

2. Typical equipment suppliers

- STERN, Mod. 777

Made of light metal, with 12 hardened steel sockets of 8 mm and an adjustable length limit stop. It ensures absolute precision and angle accuracy in using the dowel drill.

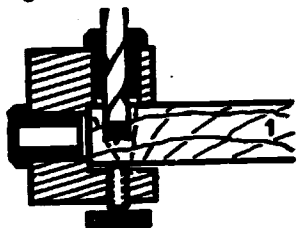
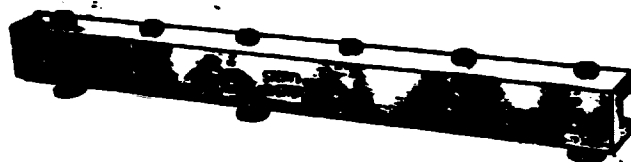
At request also drill sockets of 10 Ø mm may be supplied, but those are suitable only for board thickness 19 mm. TL = 580 mm.

Dowel precision guide rail is adjustable for board thickness of 16, 19, and 22 mm.

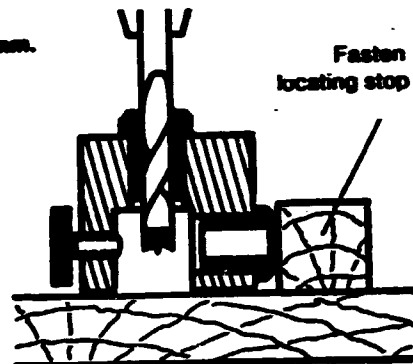
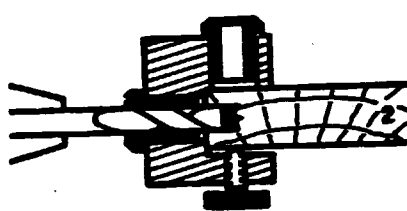
Drill sockets D = Ø mm
Division = mm

8
100

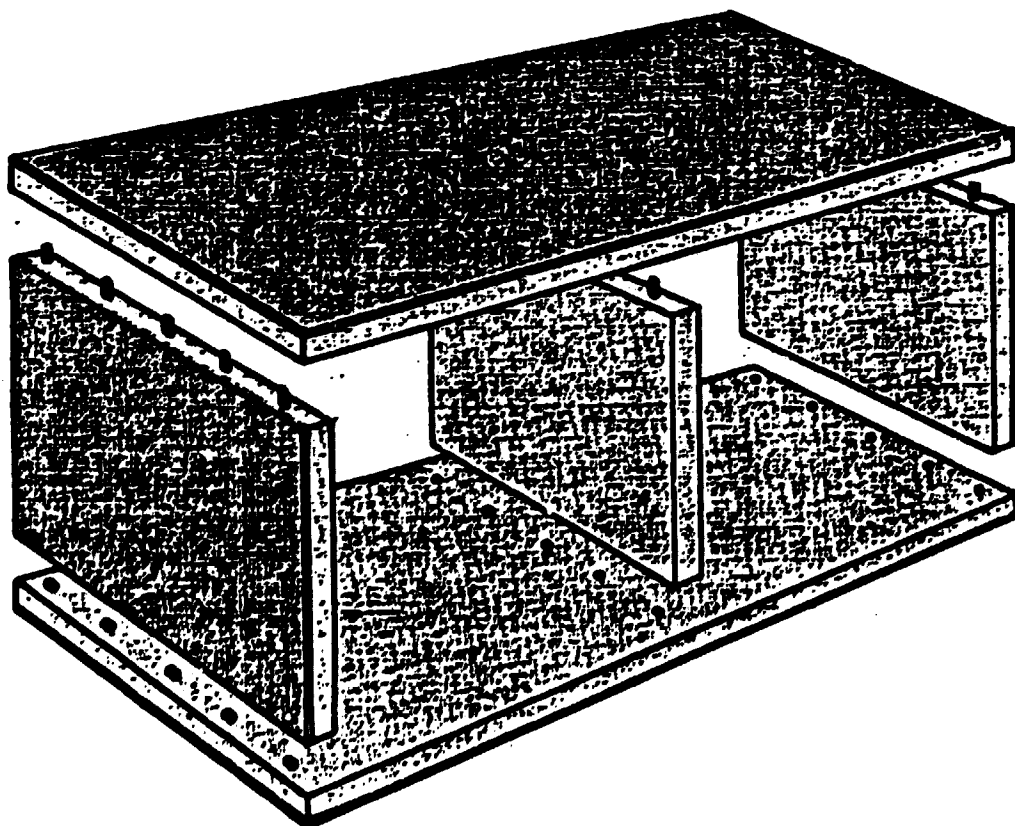
Single drill sockets, 8 and 10 mm Ø



Working on the end



Working on the center head



<u>Item No.</u>	<u>Quantity</u>	<u>Machine description</u>
PE/6	1	<u>Narrow belt sanding machine (stroke belt sander) with sliding table and expandable disk and bobbin sanding (EUMABOIS classification No. 12.721.2, expandable to Nos. 12.731 and 12.741.1)</u>

1. Specification of basic narrow belt sander

- 1.1 Double saw-neck construction to allow sanding of workpieces exceeding the length of the table
- 1.2 Length of table: 3,000 mm. (9' 10")
- 1.3 Width of table: approx. 800 mm (31 1/2")
- 1.4 Width of sanding belt: approx. 150 mm (6")
- 1.5 Length of sanding belt: approx. 7,900 mm (25' 11")
- 1.6 Power of belt motor: approx. 3 kW (4 HP)
- 1.7 Power of rise-and-fall of table motor: approx. 0.375 kW (0.5 HP)
- 1.8 Equipped with overhead platen to allow hand-held sanding over the belt, of items such as assembled drawers and short workpieces
- 1.9 Lubricated-for-life bearings
- 1.10 Overload switch protection
- 1.11 Tropical insulated motor
- 1.12 Provided with self-contained dust extraction unit

2. Attachments for extending the operation of basic narrow belt sander to disk and bobbin sanding

- 2.1 Disk sanding attachment fitted on one of the sander belt pulleys and provided with tilting sanding plate
- 2.2 Bobbin sanding attachment fitted on second belt pulley

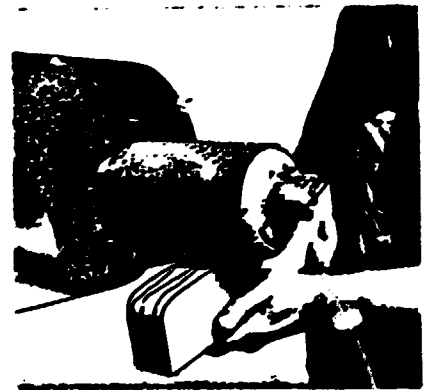
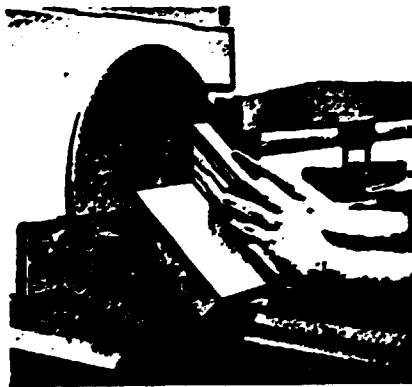
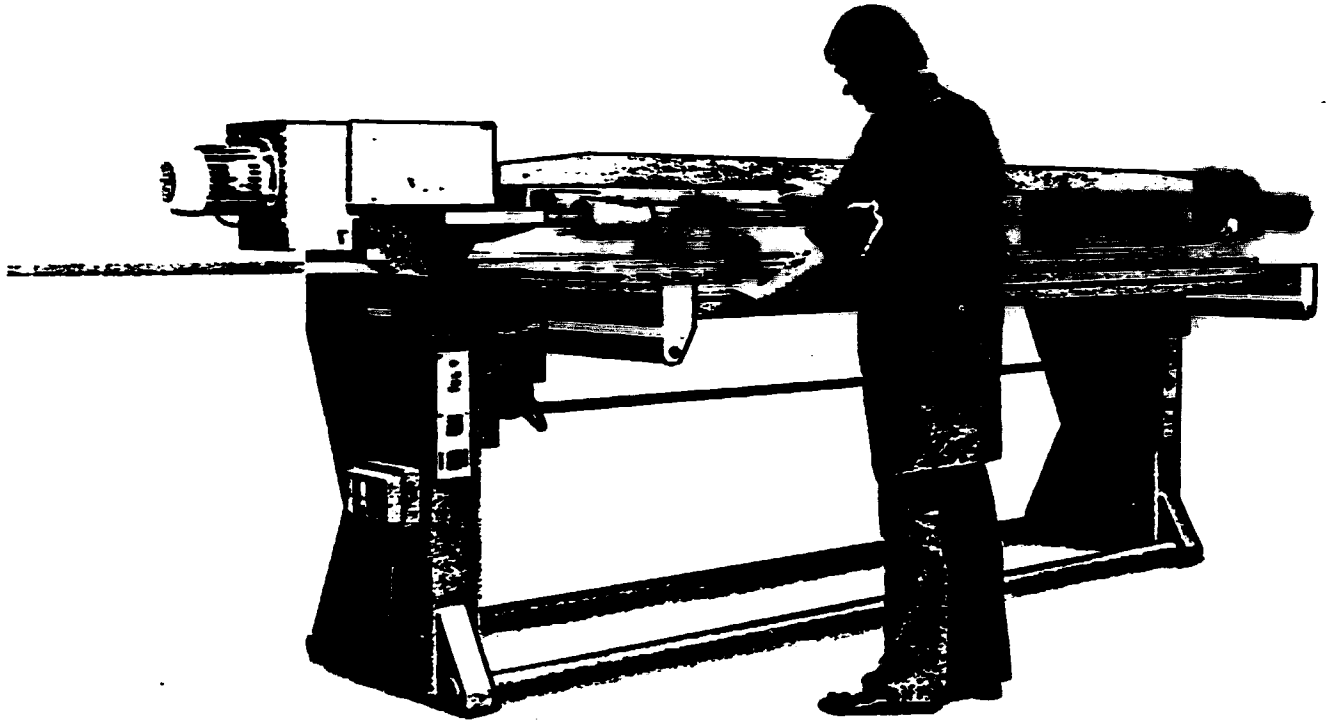
3. Industrial safety equipment

- 3.1 Self-contained dust extraction unit (bag type)

4. Typical equipment suppliers

- WADKIN-BURSGREEN, Mod. BGB 3000

NARROW BELT SANDING MACHINE WITH SLIDING TABLE
AND EXPANDABLE TO DISK AND BOBBIN SANDER



Item No. Quantity
PS/7 1

Routing machine
(SUMABOIS classification No. 12.315.12)

1. Specifications

- 1.1 Spindle speeds: 10,000 and 20,000 r.p.m.
- 1.2 Belt-driven cutting spindle
- 1.3 Tool-holder chucks should preferably be of the taper-shank type
- 1.4 To be provided with both concentric and eccentric collect chucks

Item No. Quantity

- 1.5 Tilting table
- 1.6 Power of motor: minimum 4 KW (5.5 HP)
- 1.7 Greased-for-life spindle bearings
- 1.8 Throat capacity (distance between spindle and column): 600 mm (23 5/8") minimum
- 1.9 Mechanical rise and fall of spindle
- 1.10 Overload switch protection
- 1.11 Tropical insulated motor
- 1.12 Supplied with balancing device for single-edge routing cutters

2. Spares requirements

- 1 set Wearable parts for two-year operation
- 3 sets Various diameter straight routing cutters for use on concentric and eccentric chucks

3. Typical equipment suppliers

- SCM, Mod. R8
- WADKIN Mod. URB
- INTERWOOD

<u>Item No.</u>	<u>Quantity</u>	
PE/8	1	<u>Multi-spindle boring machine</u> (hand-operated) (EUMABOIS classification No. 12.422)

1. Specifications

- 1.1 Suitable for boring both panel components and chair/table parts
- 1.2 Boring beam to be tiltable to allow both vertical and horizontal boring
- 1.3 Manual infeed of boring head(s)
- 1.4 Manual clamping preferred (eccentric clamps)
- 1.5 Standard boring centres: 32 mm (1 1/4") to allow production of panel furniture based on the 32 mm system
- 1.6 Extra boring head with 17 or 20 mm centres required for processing chair parts of narrow width
- 1.7 Overload switch protection
- 1.8 Greased-for-life bearings preferred
- 1.9 Tropical-insulated motor(s)

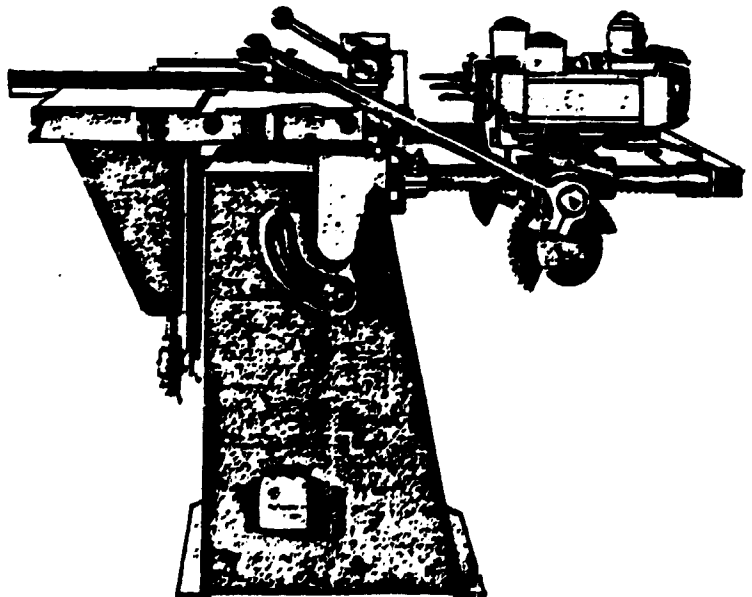
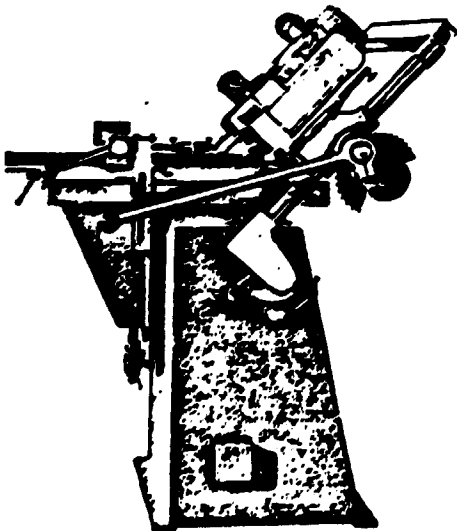
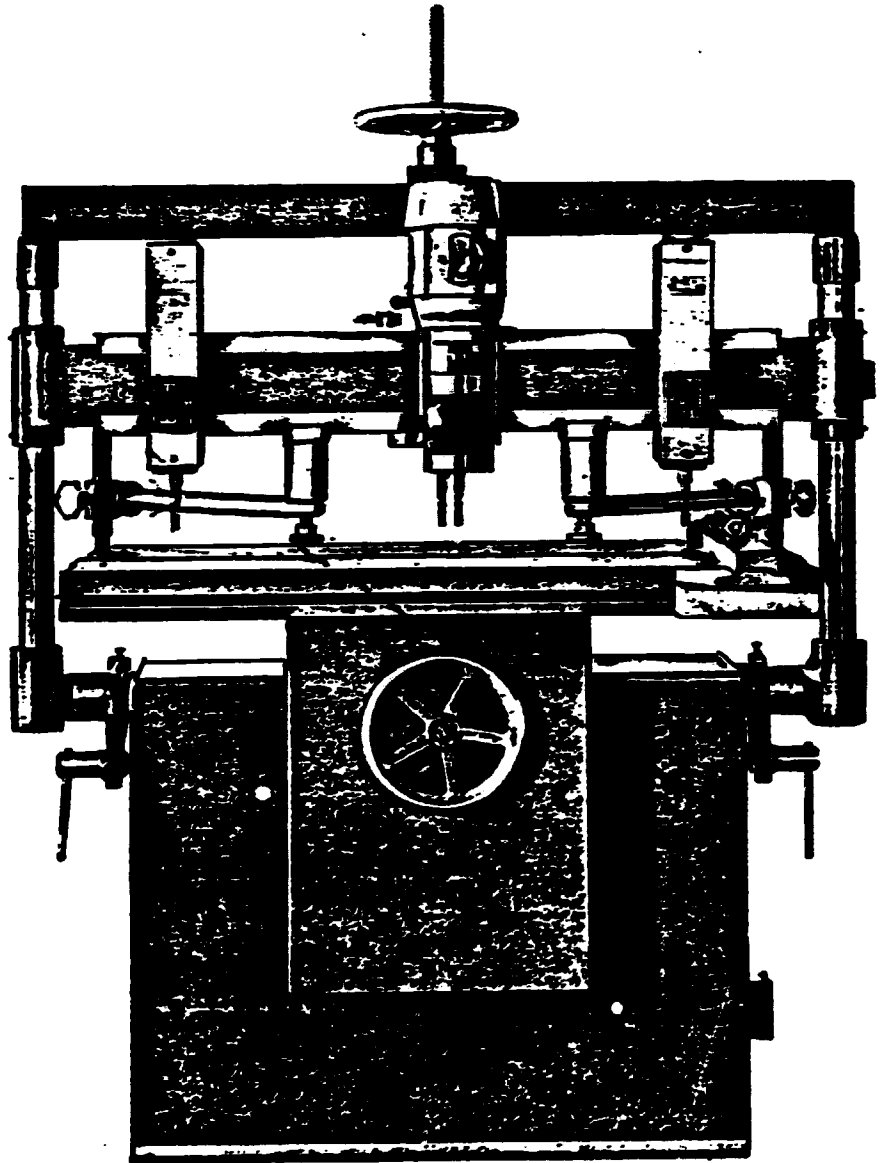
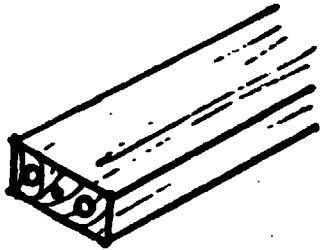
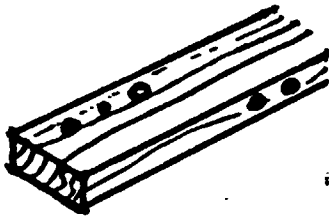
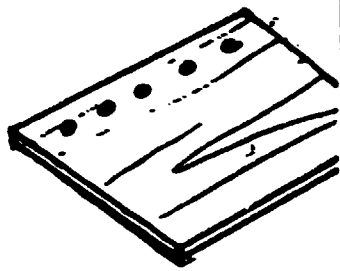
2. Spares requirements

- | | |
|--------|---------------------------------------|
| 1 set | Wearable parts for two-year operation |
| 2 sets | Boring bits of 8 and 10 mm dia. |

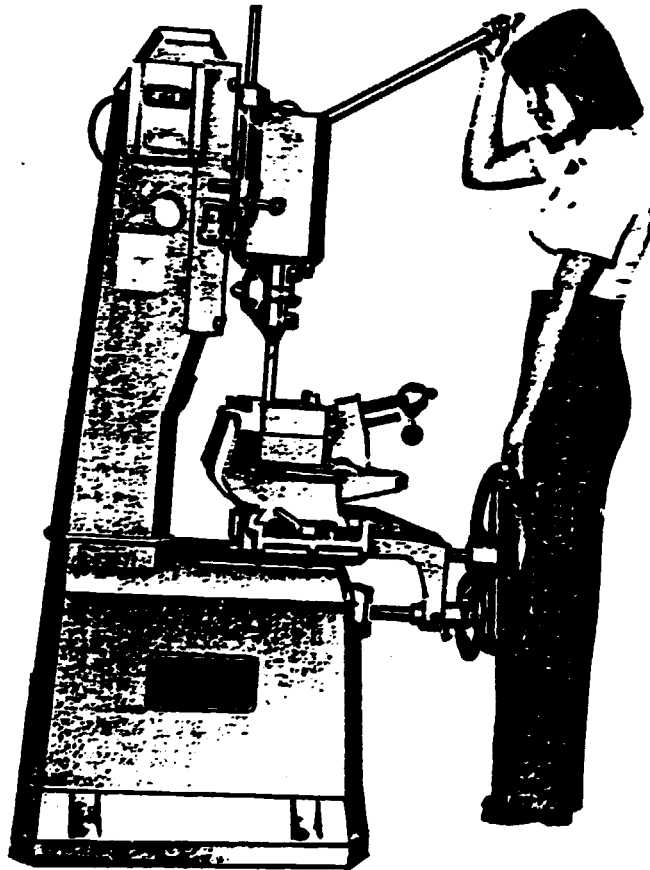
3. Typical equipment suppliers

- MAYER, Mod. DBSH
- GANNOMAT
- SCM, Mod. FM 1250 Manuale
- SCHLEICHER

MULTI-SPINDLE BORING MACHINE



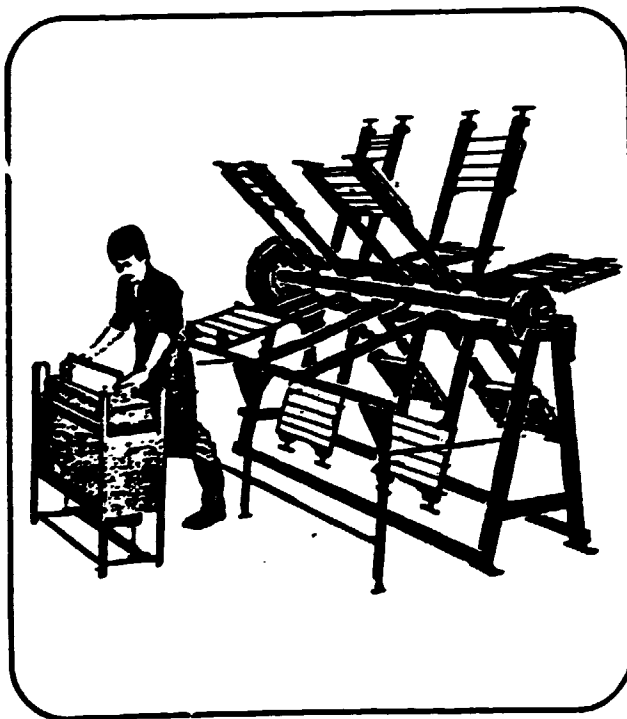
**PE/9: HOLLOW CHISEL MORTISING MACHINE
(EUMABOIS classification No. 12.532)**



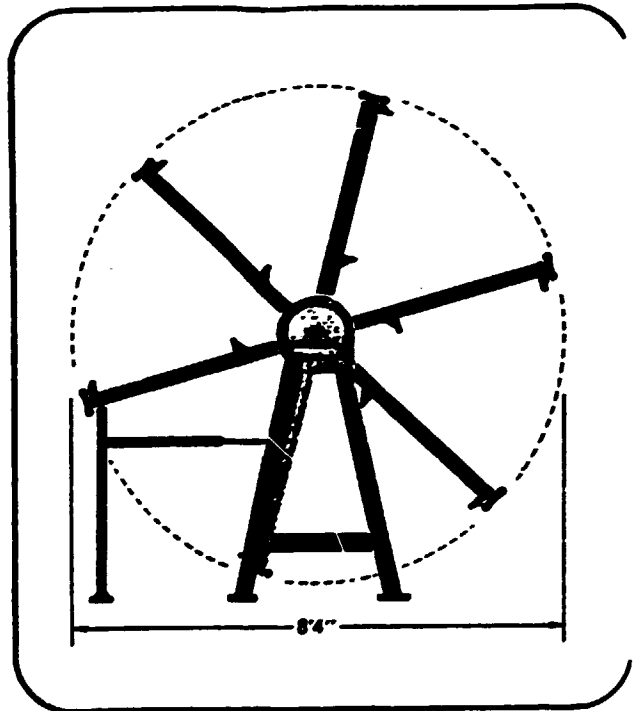
Typical equipment supplier:
- WADKIN, Mod. DM/V

PE/10: CLAMP CARRIER FOR JOINING PANELS, APPLYING EDGES AND
ASSEMBLING FRAMES
(EUMABOIS classification No. 31.13)

Modular Design Permits Easy Expansion



6 Section Clamp Carrier with Plate Spreader



6 Section Clamp Carrier

Typical equipment suppliers:
- TAYLOR, Mod. 6 Section Carrier

Item No. Quantity
PE/11 1

Universal radial cross-cut sawing machine

(Suitable for both as a versatile cross-cut saw in all sizes of plants or as a general purpose machine in building workshops to complement combined planing machines, see item no. PE/2)
(EUMABOIS classification No. 12.131.1)

1. Specifications

- 1.1 Cross-cutting capacity: up to 700 mm (27 1/2") when cutting 1" board
- 1.2 Power of motor: 4.5 kW (6HP)
- 1.3 Saw diameter: 350 to 400 mm (13 3/4" to 15 3/4")
- 1.4 Thickness of workpiece: up to approx. 130 mm (5")
- 1.5 Machine to be equipped with cutting tools and accessories to carry out:
 - Ripping ^{4/}
 - Grooving
 - Mitre-cross cutting
 - Straight cross-cutting
 - Rough moulding work
 - Trenching
 - Rough tenoning work
 - Boring chuck
- 1.6 Saw carriage to revolve through 360° and tilt between vertical and horizontal positions
- 1.7 Diameter of saw spindle 30 mm
- 1.8 Sealed-for-life bearings
- 1.9 Overload switch
- 1.10 Tropical-insulated motor

2. Spares requirements

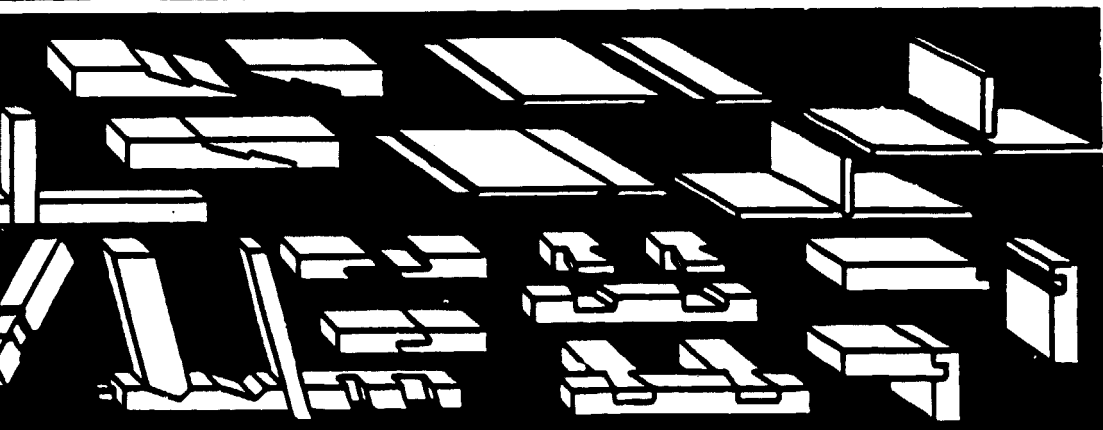
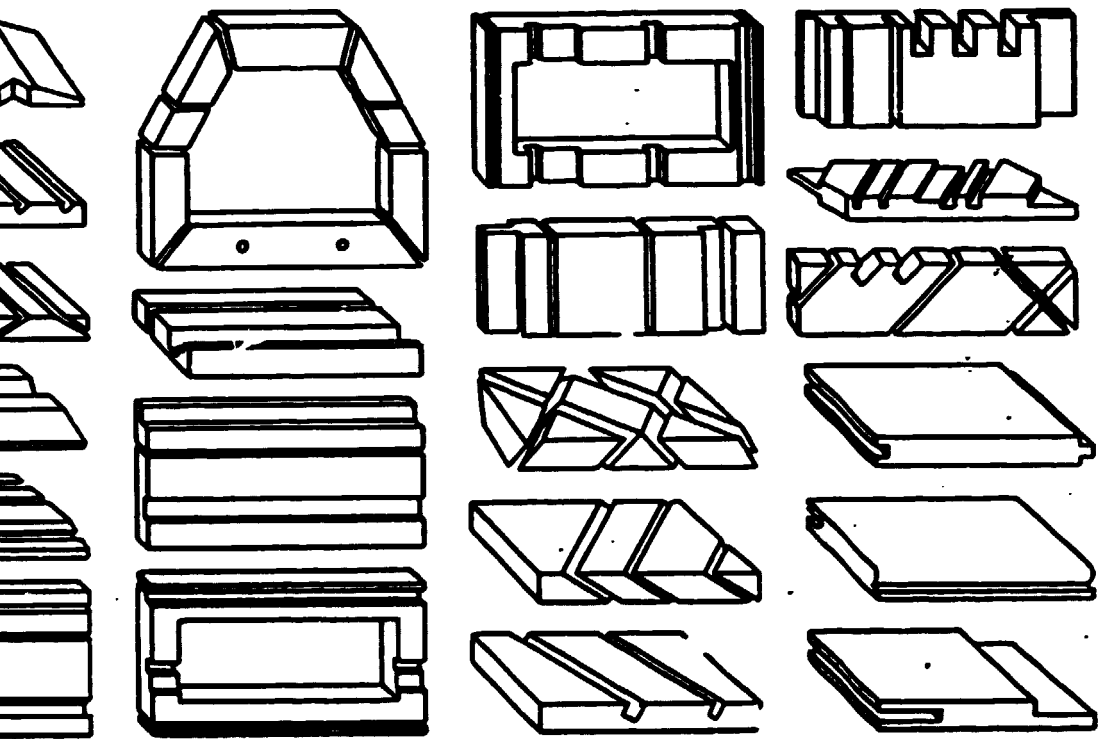
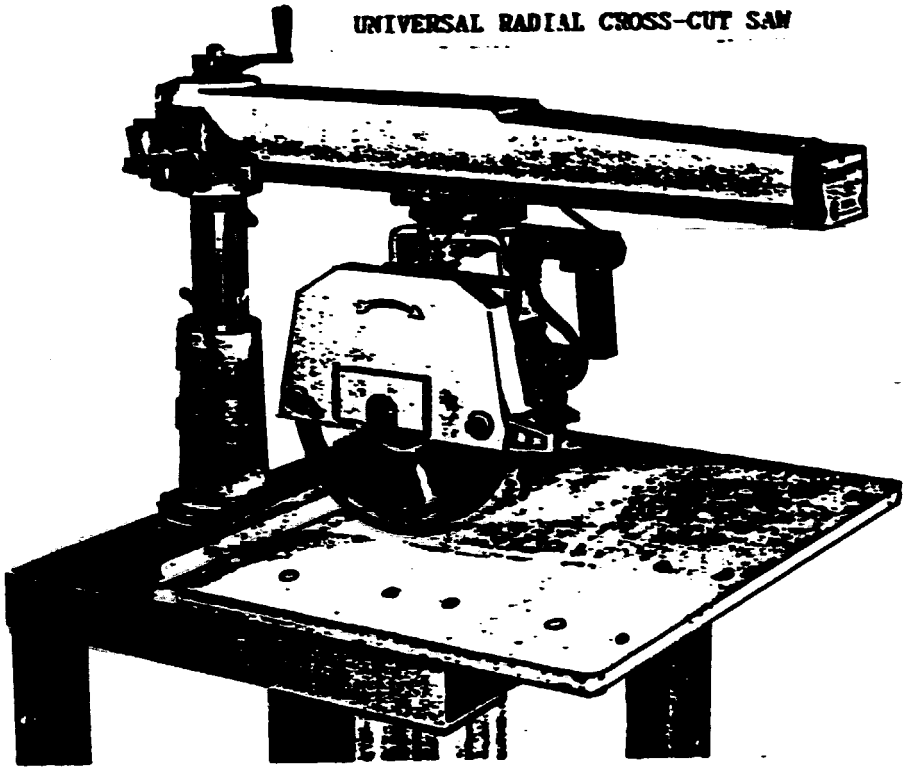
- | | | |
|-------|-----|--|
| 1 set | 2.1 | Wearable spares for two-year operation |
| 1 set | 2.2 | Spare trenching cutters |
| 1 | 2.3 | Spare cross-cutting sawblade (cross cutting) |
| 1 set | 2.4 | Spare moulding cutters |

3. Typical equipment suppliers

- INVICTA
- OMGA, Mod. 700-7
- WADKIN Mod. B.R.A. 400

4/ Riving knife device must be supplied for safety.

UNIVERSAL RADIAL CROSS-CUT SAW



Item No. **Quantity**
PE/12 **1** **Automatic round-end tenoning machine**
(EUMABOIS classification No. 12.312)

1. Specification

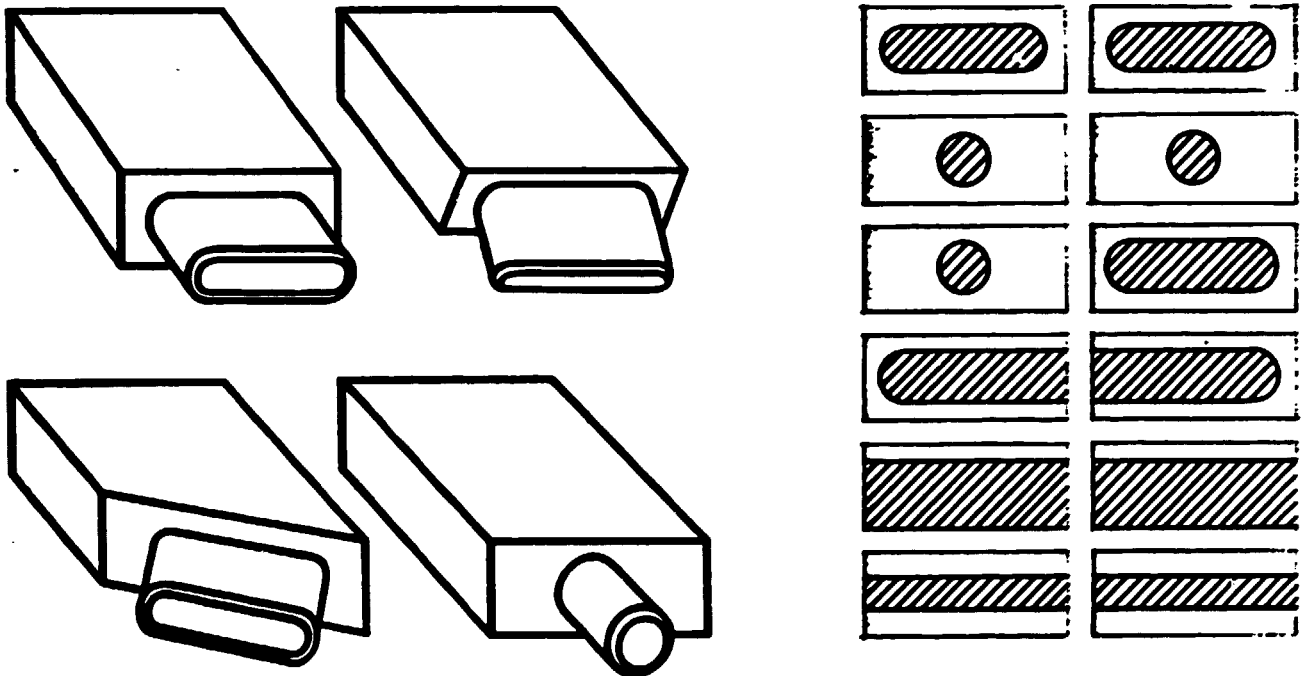
- 1.1 Single table with tilting adjustment
- 1.2 Air operated clamp
- 1.3 Automatic feed of tenoning table
- 1.4 Required size of tenon:
 - width: 90 mm (3 1/2") minimum
 - length: approx. 100 mm (4")
 - thickness: approx. 40 mm (1 9/16")
- 1.5 Cut-off saw combined to tenoning cutter block
- 1.6 Power of tenoning motor: approx. 3 kW (4 HP)
- 1.7 Power of feeding table motor: approx. 0.75 kW (1 HP)
- 1.8 Power of cutter block swinging motor: approx. 1 kW (1.5 HP)
- 1.9 Greased-for-life bearings
- 1.10 Overload switch protection
- 1.11 Tropical-insulated motor

2. Spares requirements

- 1 2.1 Wearable parts for two-year operation
- 3 sets 2.2 Spare knives
- 2 sets 2.3 Spare scribe cutters and chamfer cutters

3. Typical equipment suppliers

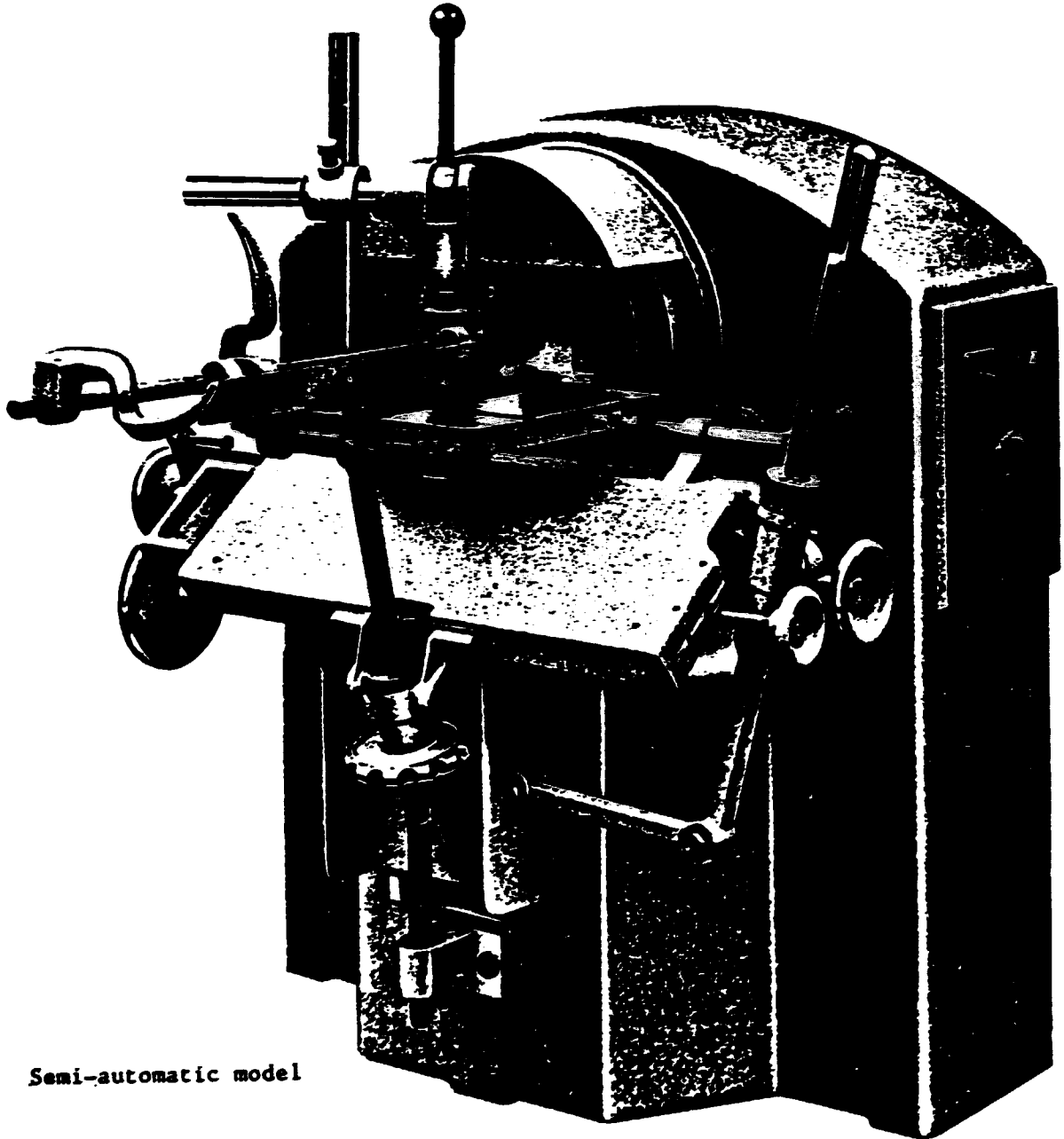
- BACCI Mod, TSG
- RYE
- HEIMA 5/



TYPES OF TENONS OBTAINED ON AN AUTOMATIC ROUND-END TENONING MACHINE

5/ Both automatic and semi-automatic versions available from this supplier.

AUTOMATIC ROUND-END TENONING MACHINE



Semi-automatic model

<u>Item No.</u>	<u>Quantity</u>
PE/13	1

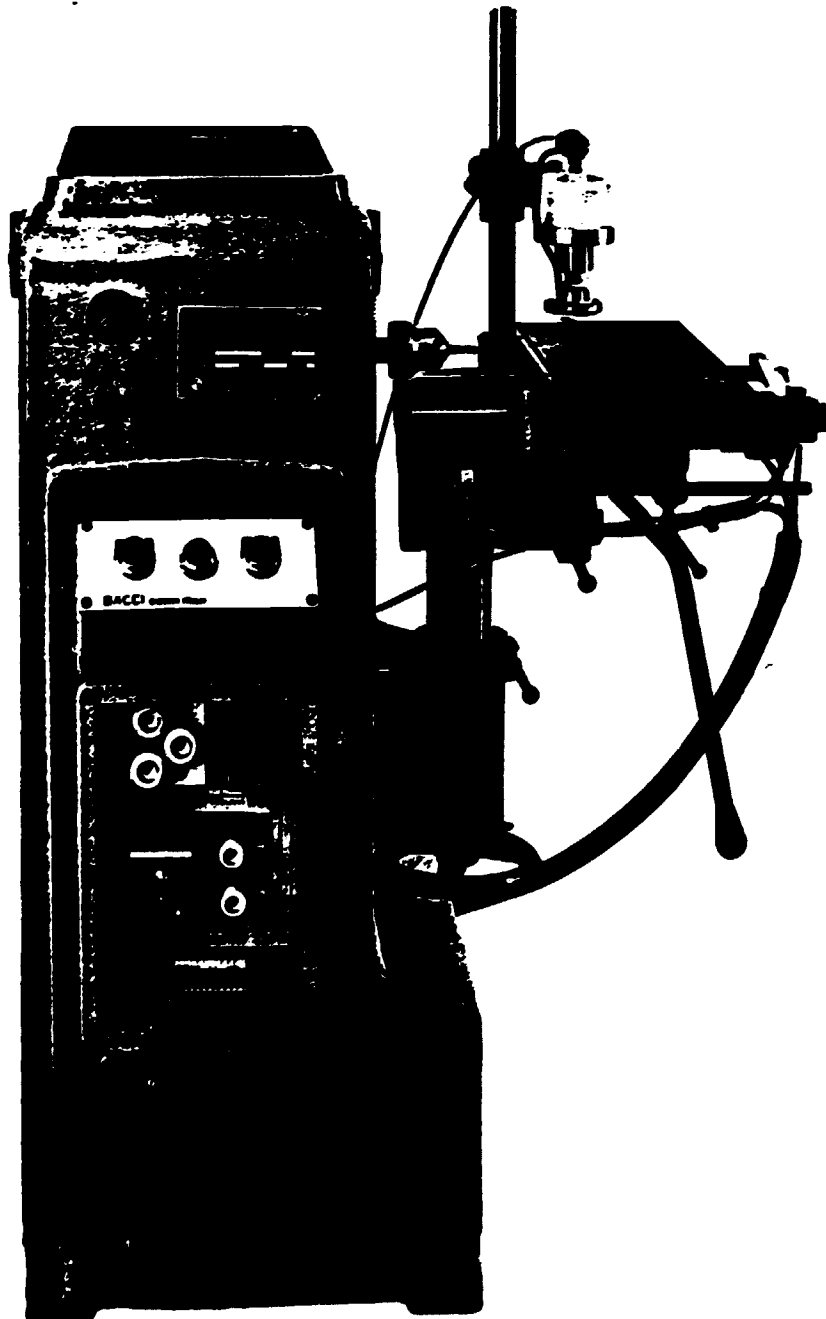
Automatic slot mortising machine
(Suitable also for single boring)
(EUMABOIS classification No. 12.531.1)

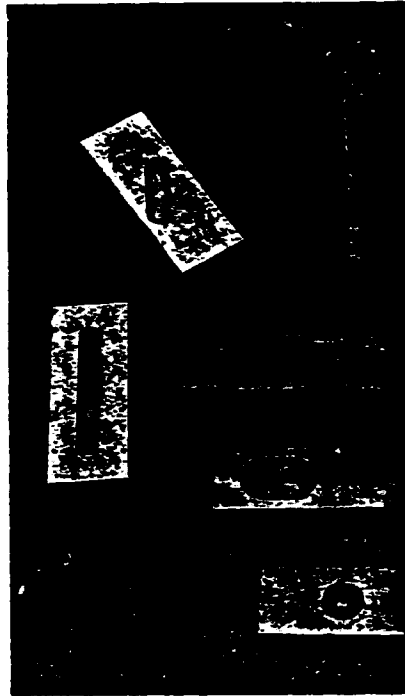
1. Specifications

- 1.1 Single table with lifting adjustment
- 1.2 Automatic feed
- 1.3 Pneumatic clamp
- 1.4 Length of mortise: up to 110 mm (4 5/6")
- 1.5 Self-centering chuck

- | <u>Item No.</u> | <u>Quantity</u> | |
|-----------------|-----------------|--|
| | | 1.6 Vertical adjustment of table: up to 80 mm (3 1/8") |
| | | 1.7 Greased-for-life bearings |
| | | 1.8 Overload switch protection |
| | | 1.9 Tropical-insulated motor |
| | | <u>2. Spare requirements</u> |
| 1 set | 2.1 | Wearable parts for two-year operation |
| 6 sets | 2.2 | Spare mortising bits 10 mm dia. |
| 4 sets | 2.3 | Spare mortising bits 8 mm dia. |
| 2 sets | 2.4 | Spare mortising bits 12 mm dia. |
| | | <u>3. Typical equipment</u> |
| | - | BACCI Mod. MOA |
| | - | HELMA |
| | - | RYE |

AUTOMATIC SLOT MORTISING MACHINE ALSO SUITABLE FOR SINGLE BORING

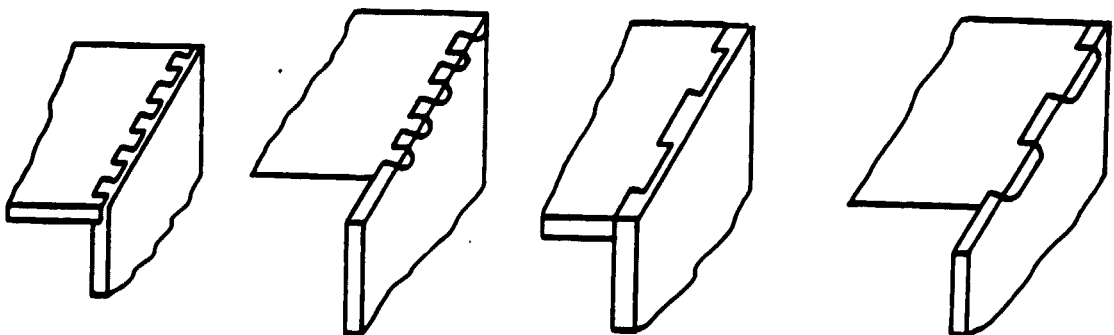
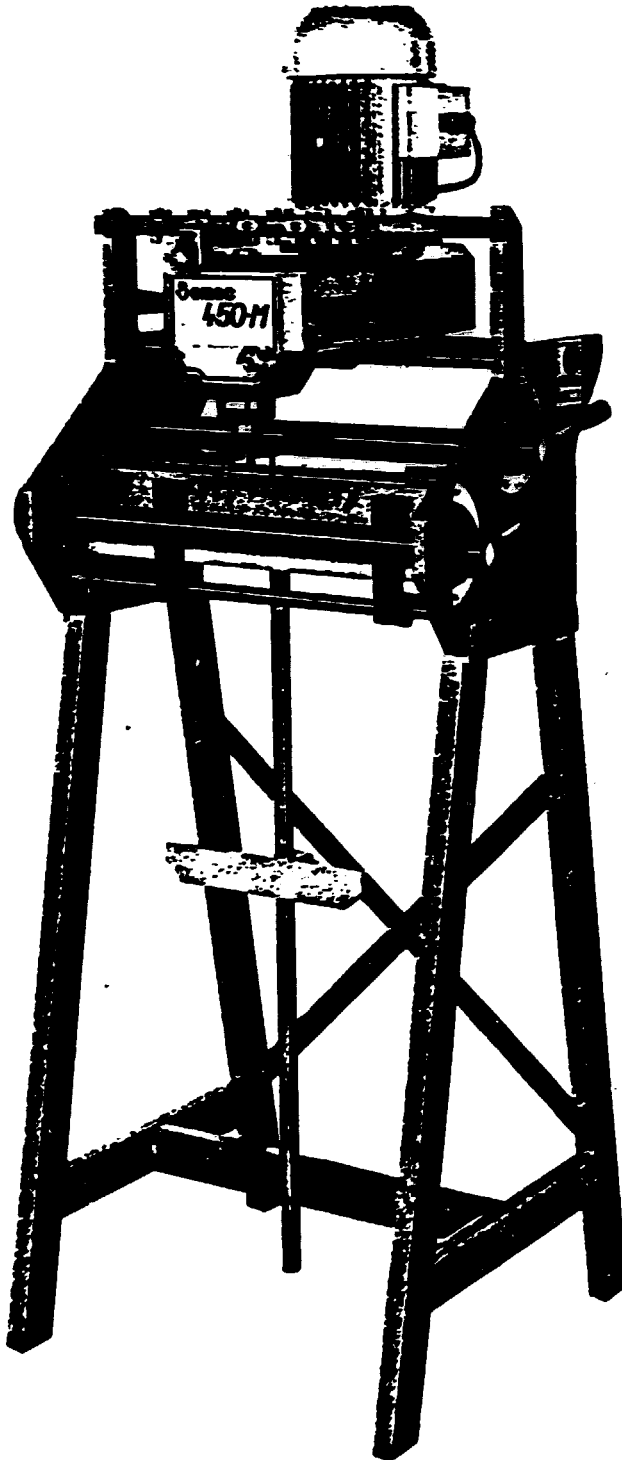




<u>Item No.</u>	<u>Quantity</u>	
PE/14	1	<u>Hand-operated dovetailing machine (Single-spindle) 6/</u> (EUMABOIS classification No. 12.313.2)
		<u>1. Specifications</u>
		1.1 Width of boards: up to 280 mm (11")
		1.2 Thickness of boards: up to 30 mm (1 3/16")
		1.3 Manual clamping of work pieces
		1.4 Power of motor: 1.11 KW (1.5 HP)
		1.5 Tropical insulated motor
		1.6 Sealed for life bearings
		1.7 Overload switch protection
		<u>2. Spare parts requirements</u>
	1 set	2.1 Wearable spares for two-year operation
	6 sets	2.2 Of each size spare dovetailing cutters
		<u>3. Typical equipment suppliers</u>
		- OMEC Mod. 450-M

6/ Multi-spindle machines not acceptable

HAND OPERATED DOVETAILING MACHINE
(single-spindle)



Item No. Quantity
PE/15 1

Four-side moulding machine
(with 5 or 6 heads)
(BUMABOIS classification No. 12.34)

1. Specifications

- 1.1 Width of workpiece: up to 170 mm (6 3/4")
- 1.2 Thickness of workpiece: up to 120 mm (4 3/4")
- 1.3 Throughfeed by power-driven pressure rollers
- 1.4 Extra long infeed table is required (about 2000 mm (6'5")) for handling of long workpieces
- 1.5 Desirable dia. of bore or cutting spindle: 40 mm
- 1.6 Power of motor spindles: minimum 4 kW (5.5 HP)
- 1.7 Power of feed motor: approx. 2.3 kW (3.25 HP)
- 1.8 Moulder with 5 cutter heads suitable for most furniture production work
- 1.9 Moulder with 6 cutter heads (one extra fence-side vertical head) required for complex moulding work such as in the manufacturing of window profiles
- 1.10 In both moulder types (with 5 or 6 heads) the last head is to be of the universal type, that is adjustable to bottom, top and tilted positions
- 1.11 Overload switch protection
- 1.12 Tropical insulated motors

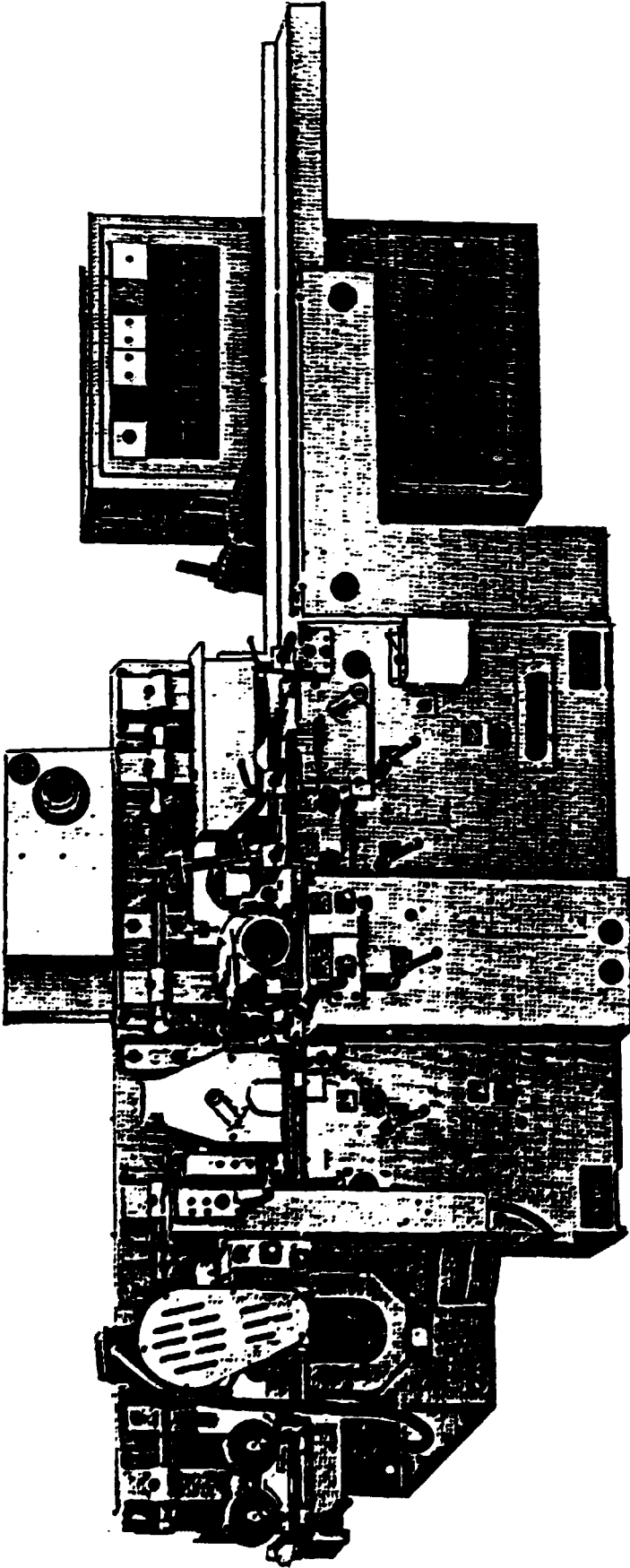
2. Spare parts requirements

- 1 set Wearable parts for two-year operation
- 2 sets Spare straight knives
- 1 set Splitting saws for use on the last universal head

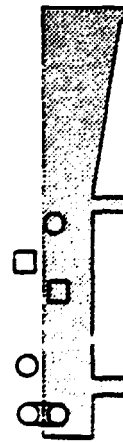
3. Typical equipment suppliers

- SCM, Models:
 - P170-2K (5 heads)
 - P170-4 (6 heads)
- WADKIN, Models:
 - 170-1U (5 heads)
 - 170-1SU (6 heads)

FOUR-SIDE MOULDING MACHINE

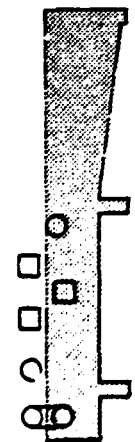


5 HEADS MOULDER



- HEADS SEQUENCE :
- 1. BOTTOM HORIZONTAL HEAD
 - 2. FENCE-SIDE VERTICAL HEAD
 - 3. LEFT VERTICAL HEAD
 - 4. TOP HORIZONTAL HEAD
 - 5. UNIVERSAL TOP/BOTTOM/TILTING HEAD

6 HEADS MOULDER



- HEADS SEQUENCE
- 1. BOTTOM HORIZONTAL HEAD
 - 2. 1ST FENCE-SIDE VERTICAL HEAD
 - 3. LEFT VERTICAL HEAD
 - 4. 2ND FENCE-SIDE VERTICAL HEAD
 - 5. TOP HORIZONTAL HEAD
 - 6. UNIVERSAL TOP/BOTTOM/TILTING HEAD

1437

SG-TEST
 ZU-3100

Profile cutter combination

2 wings – for skirtings, picture framing etc.

HSS- or carbide-tipped

Technical details

Cutterset consisting of 4 profile cutters No. 1437-1/2/3/4 each with 2 shaped cutting edges; soft steel body. With chip-thickness limitation for reduced kickback (see page 222 – safety requirements), for manual feed. Upon request, set may be enlarged with additional cutters No. 1437-5/6/7 or 8.

Set of 4 cutters supplied in wooden case. Application single or in combination with each other to produce fancy profiles for skirtings, picture framing or specially shaped furniture parts. One or more working operations may be necessary to achieve profiles.

HSS-tipped for soft- and hardwood without glue lines. Carbide-tipped for abrasive hardwood, with or without glue lines.

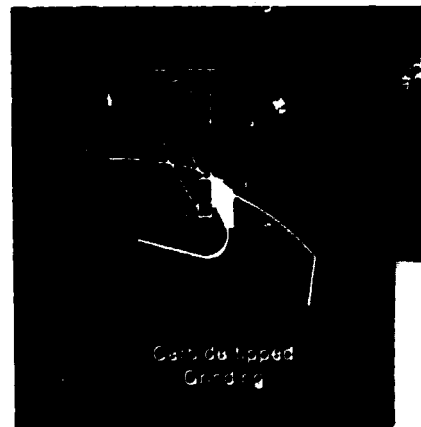
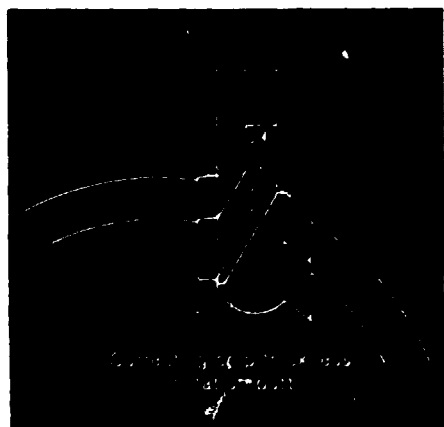
Advantage

Clean surface – no sanding necessary.

Maintenance

Grinding parallel to original face only.

Chip-thickness limitation: butt to be reduced occasionally.



Dimensions

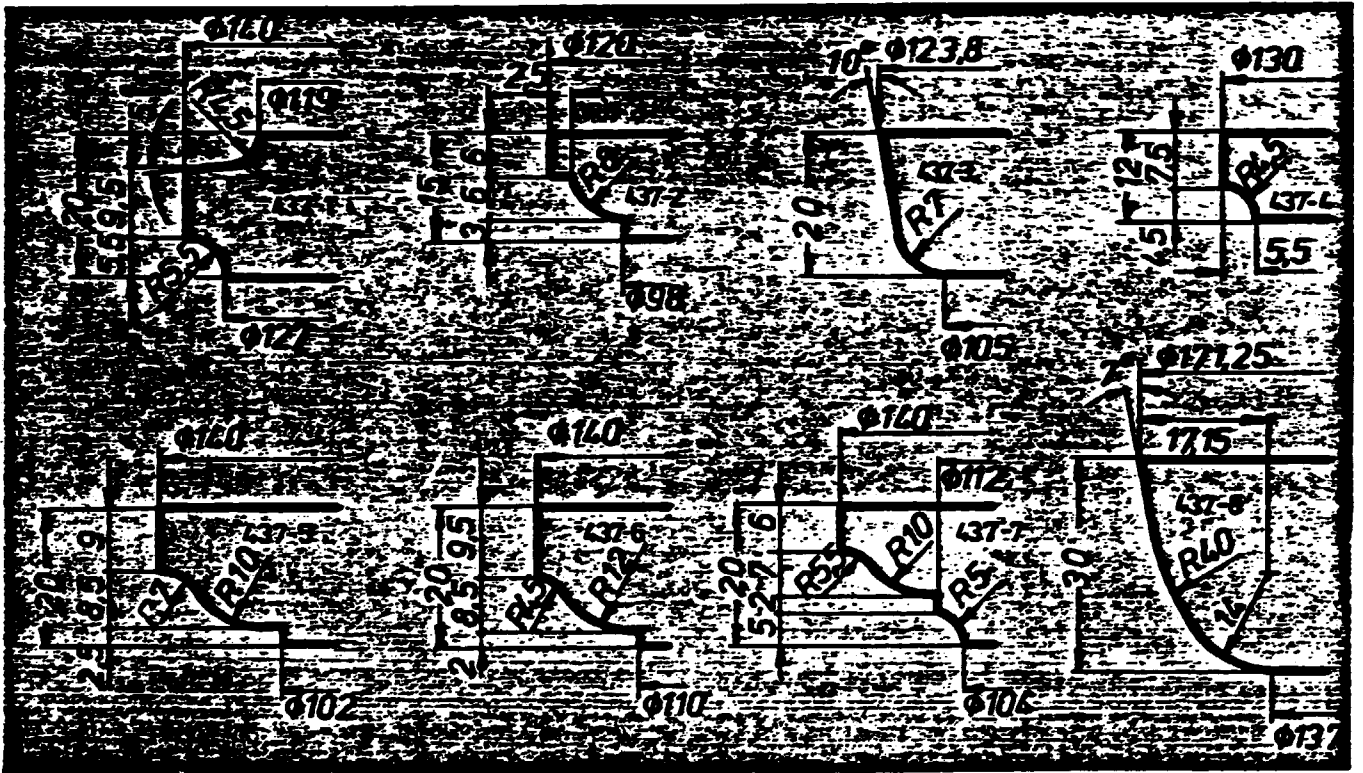
Cutter No.		1	2	3	4	5	6	7	8
Dia meter	D = mm	140	127	122	130	140	130	140	170
Cutting width	B = mm	20	15	20	12	20	20	20	25
Max. R.P.M.		9000	9000	9000	9000	9000	9000	9000	9000
Standard bore	φ = mm	30	30	30	30	30	30	30	30
Max. bore	φ = mm	40	40	40	40	40	40	40	40

Profiles and application
 see pages 45/46.

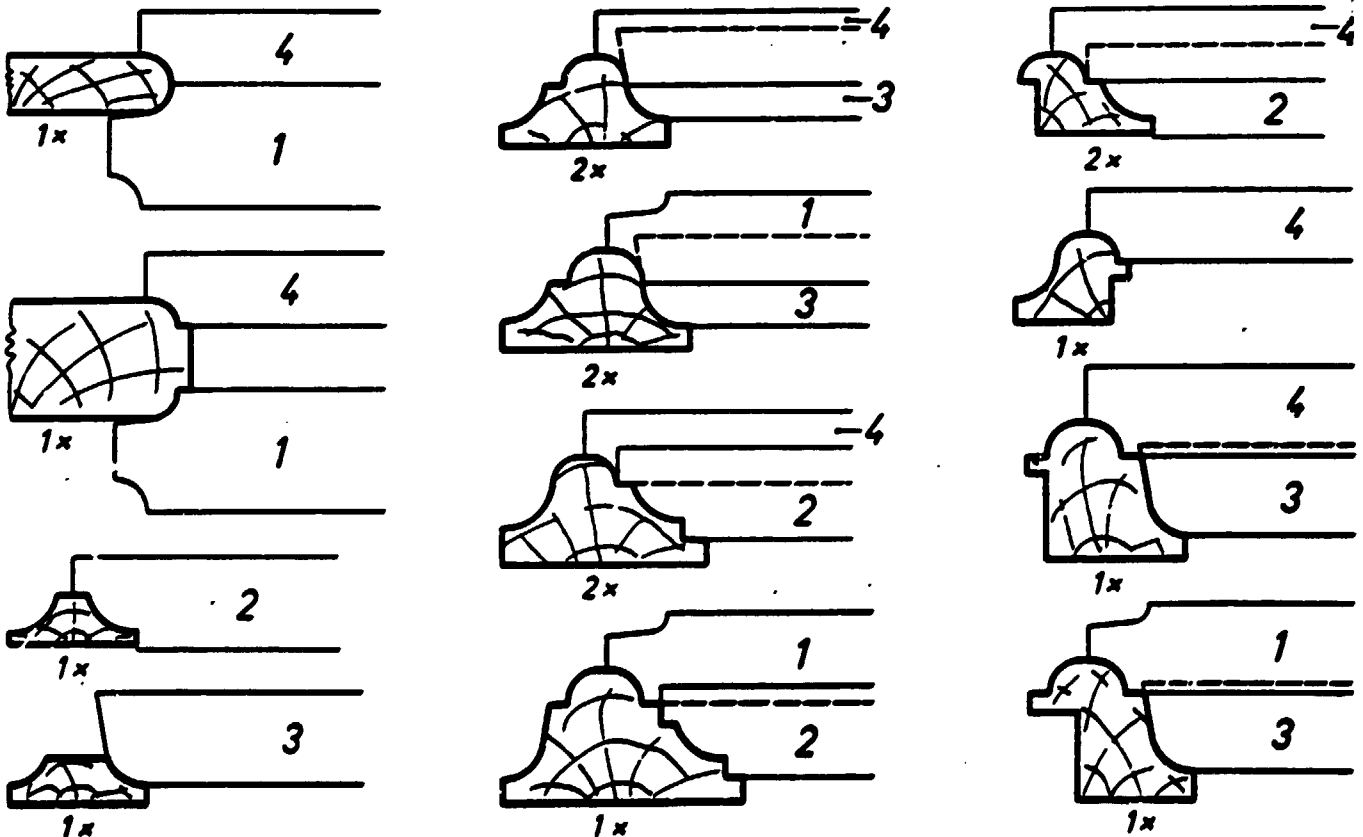
Available with 1 1/2" bore. Typical equipment supplier:
 - Leitz, Type 1437

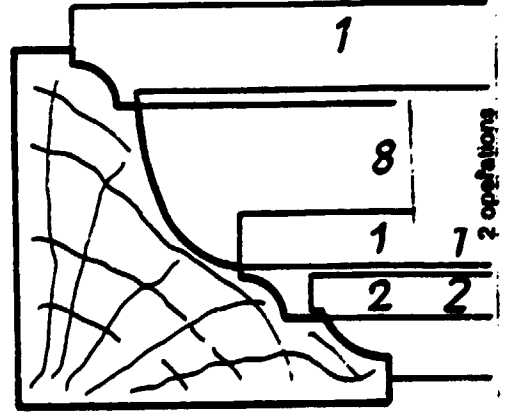
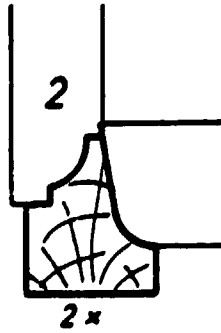
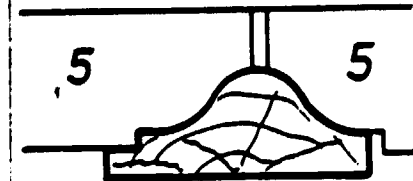
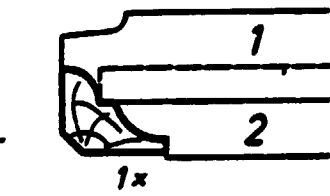
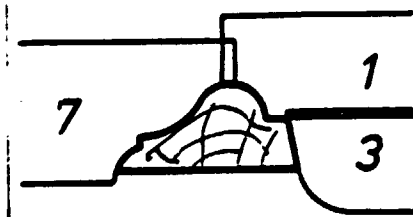
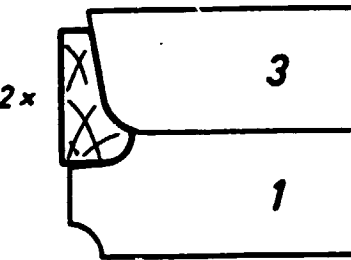
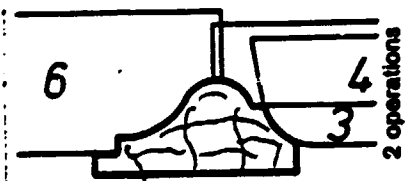
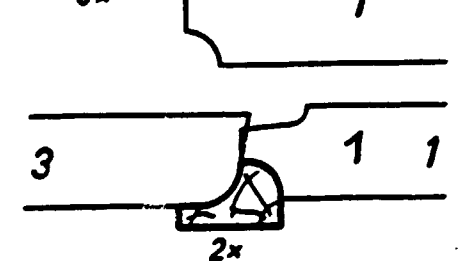
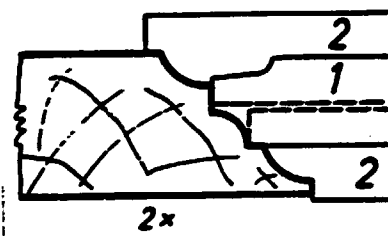
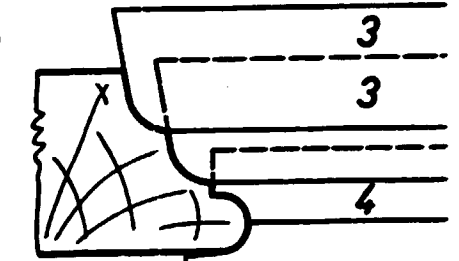
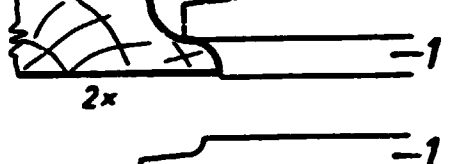
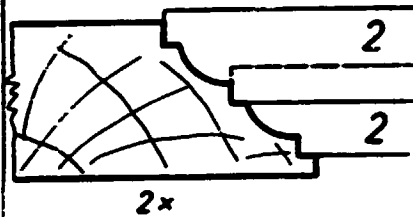
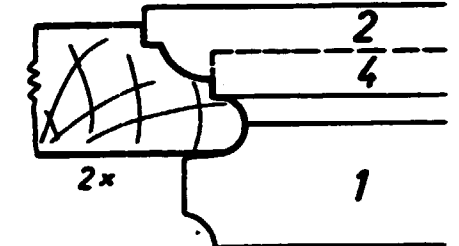
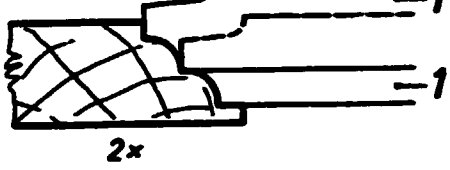
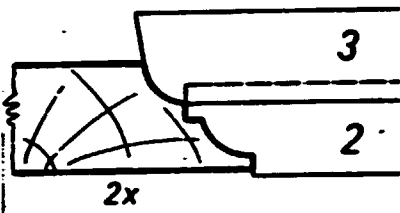
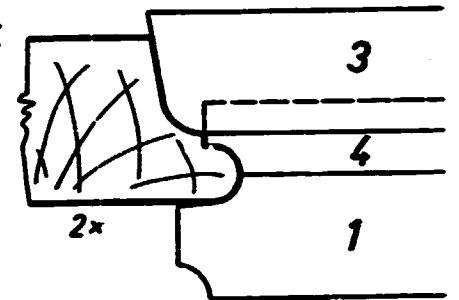
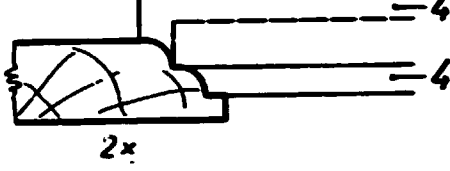
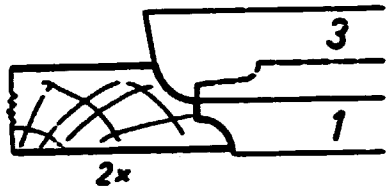
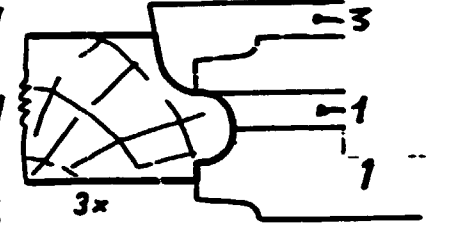
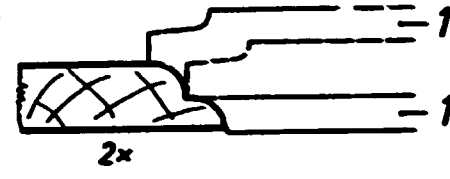
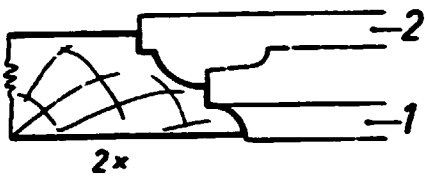
Selection of up-to-date shaping cutters which provide advantages in easy of maintenance, safety of operation, and quality of finish

Profiles of cutterset No 1437 - true to size



Application of cutterset No. 437 - true to size





PE/17: MULTI-PURPOSE CUTTERBLOCKS FOR MITRE AND EDGE JOINTS
RABBETING AND BEVELLING

Tool No. 511 BG

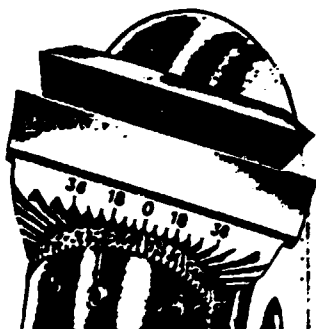
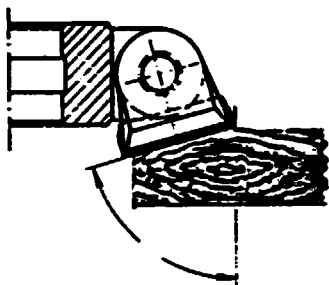
Multi-Purpose cutter head with 1° adjustment of beveling feature

Applications:

Rabbeting, facing and every angle of beveling from 60° top to 60° bottom.

Design:

A serrated disc between blade section and cutter body enables the fine adjustment of beveling in 1° steps. Blade sections available with HSS and carbide tipped.



Tool No. 517 BG

Glue joint cutter head

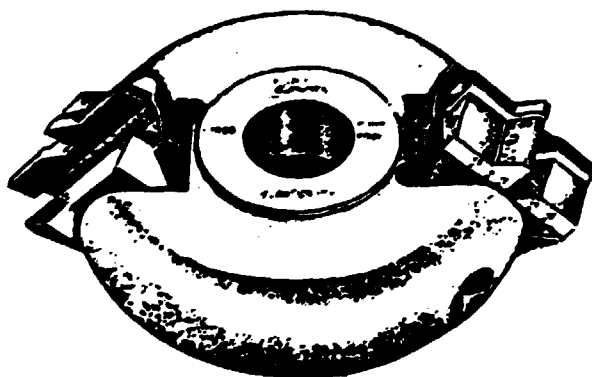
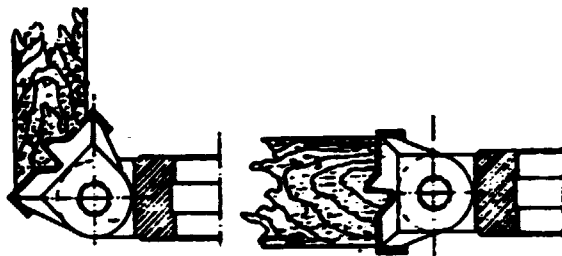
BG-TEST
ZU-4722

Applications:

Adjustable for straight as well as mitre locking glue joint.

Design:

Two profiled HSS or carbide tipped blade sections mounted with precision serrations in a dynamically shaped and balanced cutter body; swiveling 45° to each side in 5° steps. Profiled blade sections for locking joints can also be mounted in cutter bodies no. 510 BG or no. 515 BG.



Tool No.	Diameter (closest metric equi- valent to:)	Cutting width (closest metric equi- valent to:)	Bore	No. of teeth	Tool No.	Diameter (closest metric equi- valent to:)	Cutting width (closest metric equi- valent to:)	Bore	No. of blades	Material thickness range	
										Straight locking joint	Mitre locking joint
511	5"	1 9/16"	1 1/4"	2	517	5 1/2"	1 7/16"	1 1/4"	2	3/8" - 1 1/2"	1/2" - 1 1/2"
511	5 1/2"	2"	1 1/4"	2	517	6 5/16"	2"	1 1/4"	2	3/8" - 2"	1/2" - 1 3/4"
511	6 5/16"	2 1/8"	1 1/4"	2	517	7 1/8"	2"	1 1/4"	2	3/8" - 2"	1/2" - 1 3/4"

Typical equipment supplier:

- Stehle, Types 511B and 517 BG

Item No. Quantity
PS,18 1 Universal mortising/boring machine

1. Specifications

- 1.1 Suitable for furniture and door/window manufacture
- 1.2 Provided with cutting heads to perform the following operations:
 - 1.2.1 Chisel mortising with oscillating cutters
 - Thickness of mortises: 2 to 14 mm
 - Length of mortises: 28 to 100 mm
 - Depth of mortises: 38 to 98 mm
 - 1.2.2 Chain mortising
 - Thickness of mortises: 8 to 40 mm
 - Length of mortises: 26 to 50 mm
 - 1.2.3 Single boring
 - 1.2.3 Slot mortising
- 1.3 Power of motor: 3 HP (2.2 kW)
- 1.4 Overload switch protection
- 1.5 Tropical insulated motor

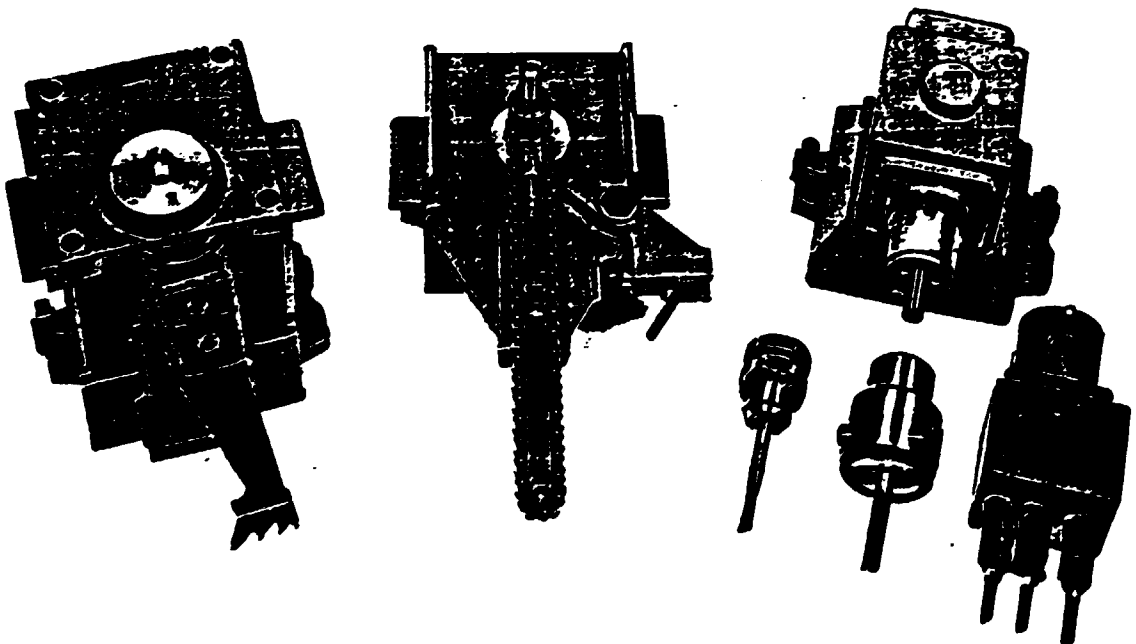
2. Spare parts requirements

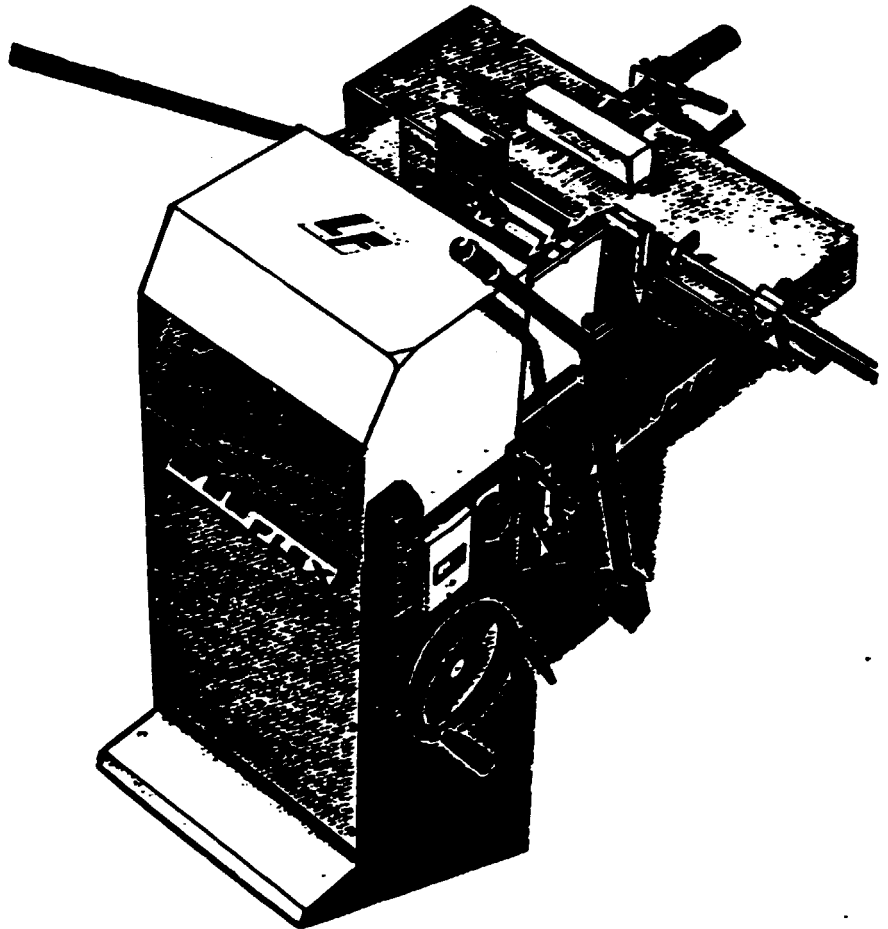
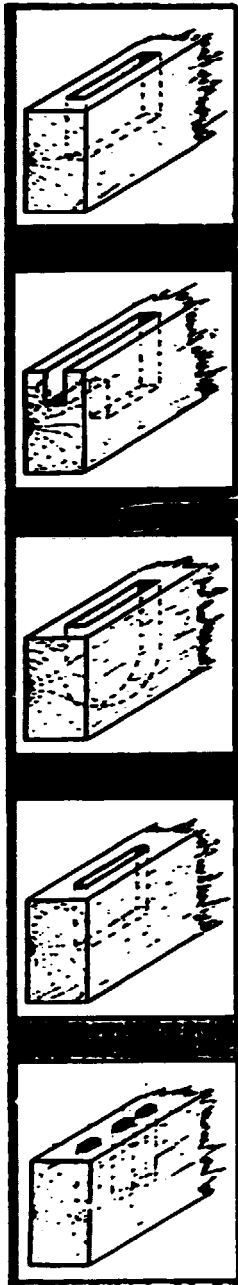
- 1 set Wearable spare parts for two-year operation
- 3 Spare cutting tools of each type and size

3. Typical equipment supplier

- LYON FLEX, Mod. POLYVAL

UNIVERSAL MORTISING/BORING MACHINE





E.2 Maintenance Equipment (ME)

<u>Item No.</u>	<u>Quantity</u>
ME/1	1

General purpose bench grinder

(Minimum sharpening equipment to meet requirements of smaller furniture/joinery workshops, provided outside maintenance services are already available for the sharpening of machining tools such as circular sawblades, moulding cutters, etc.)

1. Specifications

- 1.1 Double end spindle to take 125 mm (5") or 150 mm (8") grinding wheels

- 1.2 Suitable for off-hand grinding of moulding knives
- 1.3 Sliding tool-rest attachment for precision sharpening of chisels, hand-planer knives and short planing knives of approx. 100 mm (4") length

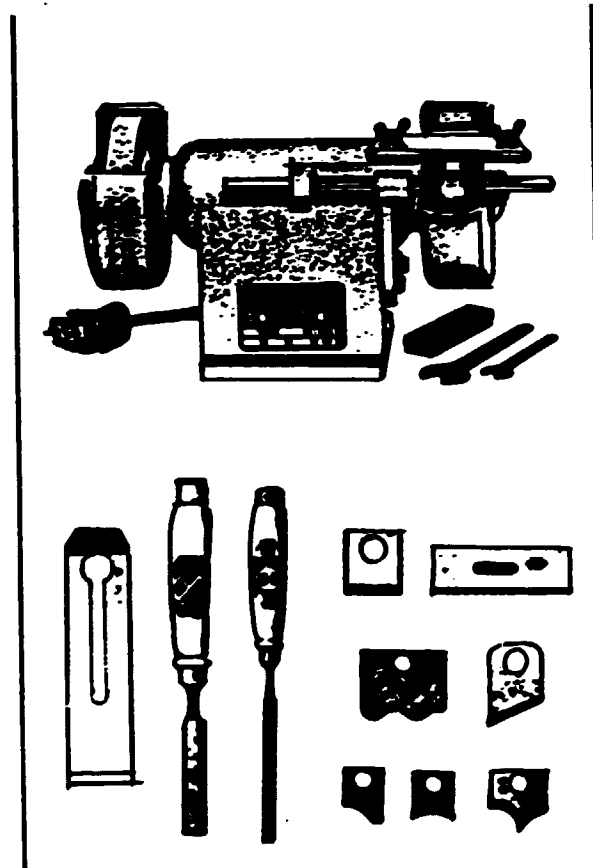
2. Spare parts requirements

- 2 sets 2.1 Rough and fine carborundum grinding wheels each with thickness of 8, 13 and 18 mm
- 2 sets 2.2 Dough and five silicon carbide grinding wheels each thickness 8 and 13 mm

3. Typical equipment supplier

- VOLMER, Order No. 2310

GENERAL PURPOSE BENCH GRINDER



Item No. Quantity
ME/2 1

Universal tool sharpening machine for cutters and sawblades
(Suitable for smaller furniture/joinery workshops)

1. Specifications

- 1.1 Equipped to sharpen the following tools:
 - 1.1.1 Planing knives of length up to 600 mm (24")
 - 1.1.2 Saw blades up to 400 mm (15 3/4") dia
 - 1.1.3 Narrow sawblades of width up to 40 mm (1 9/16")
 - 1.1.4 Moulding cutters
 - 1.1.5 Boring bits and routing bits
- 1.2 Automatic feed of circular and band sawblades
- 1.3 Bevel grinding of front and back edges of sawblade teeth is preferred, but not an essential requirement
- 1.4 Two separate grinding-wheel heads to allow simultaneously sharpening of cutters and blades
- 1.5 Sealed-for-life bearings
- 1.6 Overload switch protection
- 1.7 Tropical-insulated motor

2. Extra optional equipment

Attachment for sharpening carbide-tipped circular saws, with set of diamond grinding wheels

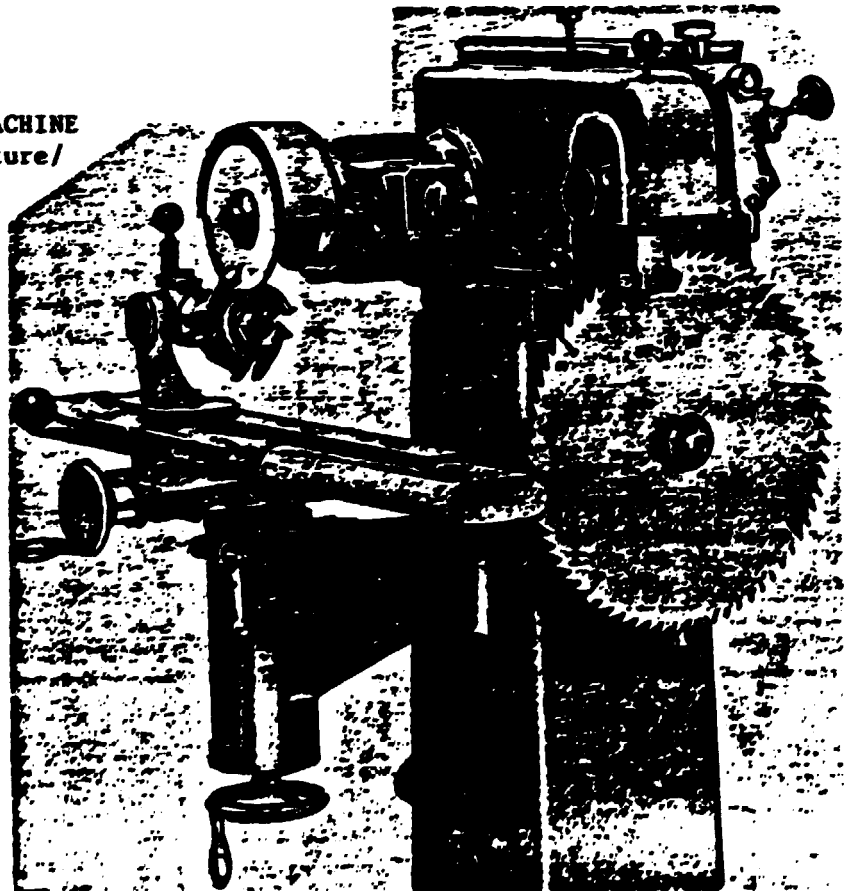
3. Spare parts requirements

- 1 set Wearable parts for two-year operation
- 2 sets Each type standard grinding wheels to sharpen tools listed in 1.1 above

4. Typical equipment supplier

- WIDMA, Mod. MFS/II

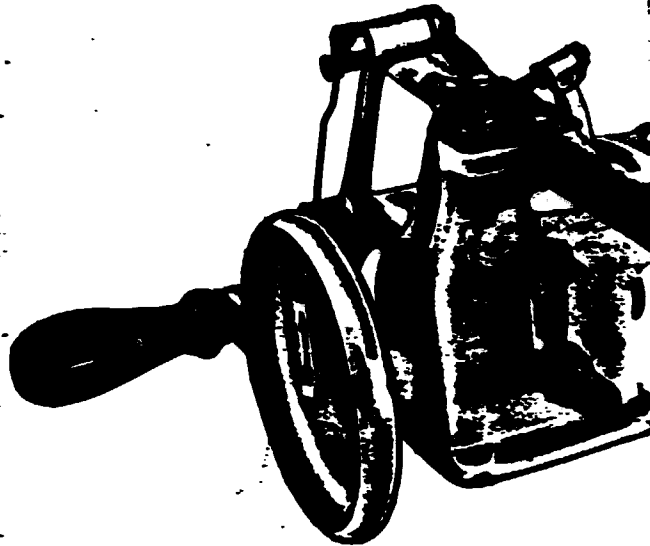
UNIVERSAL TOOL SHARPENING MACHINE
(Suitable for smaller furniture/
joinery workshops)



Item No. **Quantity**
ME/3 **1**

Hand-operated device for narrow band sawblades

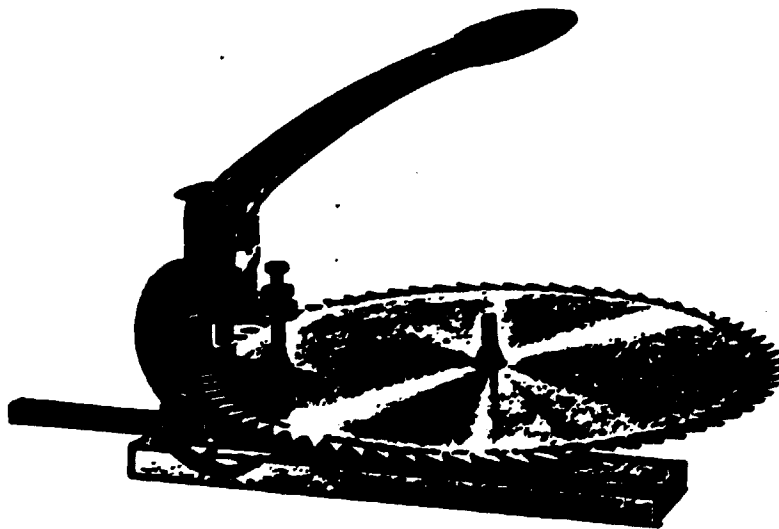
1. Bandsaw blade width up to 45 mm (1 3/3")
2. Tooth pitch 3 to 24 mm (1/8" to 15/6")
3. Blade thickness: up to 0.9 mm (20 gauge)
4. **Typical equipment suppliers**
 - VOLIMER (Biberach), Mod. An
 - LOROCH, Mod. F 398
 - SPEAR & JACKSON



ME/4 **1**

Hand-operated setting device for circular sawblades 7/

1. Blade diameter: 140 to 600 mm (5 1/2" to 23 5/8")
2. Blade thickness: up to 4 mm (5/32") 8 gauge
3. Cone assembly for bore sizes 20 to 50 mm (25/32"-2")
4. **Typical equipment suppliers**
 - VOLIMER, Mod. PH 700
 - LOROCH, Mod. KS 2
 - SPEAR & JACKSON

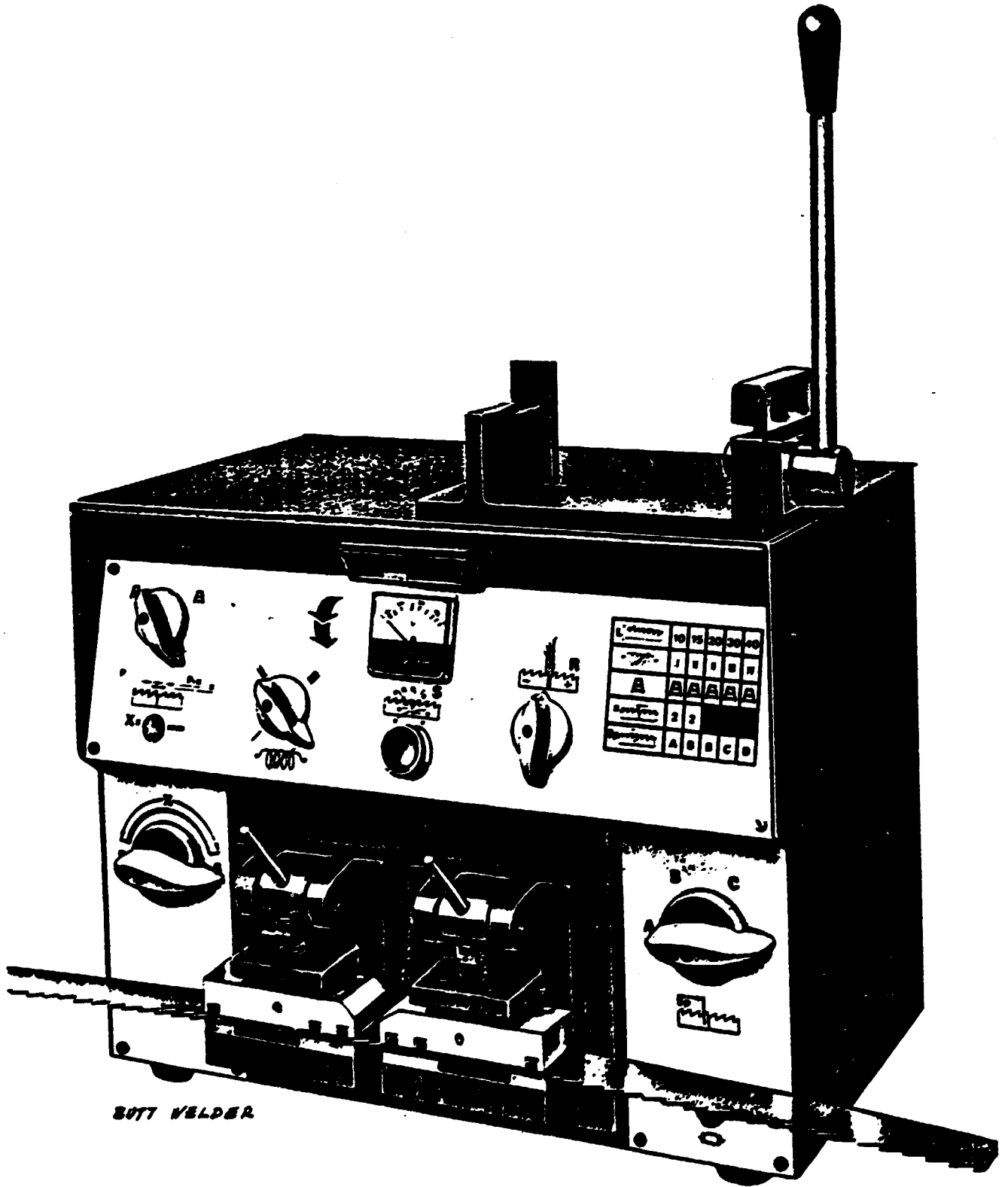


7/ In the case of smaller woodworking shops, the two setting devices can be substituted by setting pliers and/or slot-type setting bars.

<u>Item No.</u>	<u>Quantity</u>	
ME/5	1	<u>Flash butt-welding machine for narrow band sawblades</u> (With manual control of welding process) (EUMABOIS classification No. 55.14)
		<u>1. Specifications</u>
		1.1 To weld wood cutting blades of width: 5 to 40 mm (3/16" to 1 9/16")
		1.2 To weld metal cutting blades of width 3 to 25 mm (1/8" to 1") 8/
		1.3 To be provided with 'Flashing cycle' preceeding the actual butt welding operation in order to reduce the need for accuracy in preparing the blade ends to be joined
		1.4 Power input requirement: kW 4.5
		1.5 Equipped with blade shear
		1.6 Equipped with safety fuse
		<u>2. Spare parts and supplies requirements</u>
2		2.1 Spare fuses
		<u>3. Typical equipment suppliers</u>
		- VOLLMER, Mod. BAS 040 9/
		- IDEAL, Mod. BAS 40

8/ Feature useful if machine to be used by tool maintenance centres.
9/ Capacity of blade width: up to 35 mm only.

FLASH BUTT-WELDING MACHINE FOR NARROW BAND SAWBLADES



Item No. Quantity
ME/6 1

Semi-automatic planing knife sharpening machine
(For smaller woodworking shops, as an alternative to sharpening knives on universal sharpening machines)
(EUMABOIS classification No. 55.2)

1. Specifications

- 1.1 Maximum length of knives: 630 mm (24 3/4") or 830 mm (32 3/4")
- 1.2 Must be equipped for sharpening up to 4 knives simultaneously in order to ensure that knives mounted in same cutterblock retain equal weight
- 1.3 Automatic longitudinal feed of grinding wheel carriage
- 1.4 Manual vertical infeed of grinding wheel
- 1.5 Equipped for wet grinding with filter to separate particles from coolant
- 1.6 Greased-for-life bearings
- 1.7 Overload switch protection
- 1.8 Tropical insulated motor

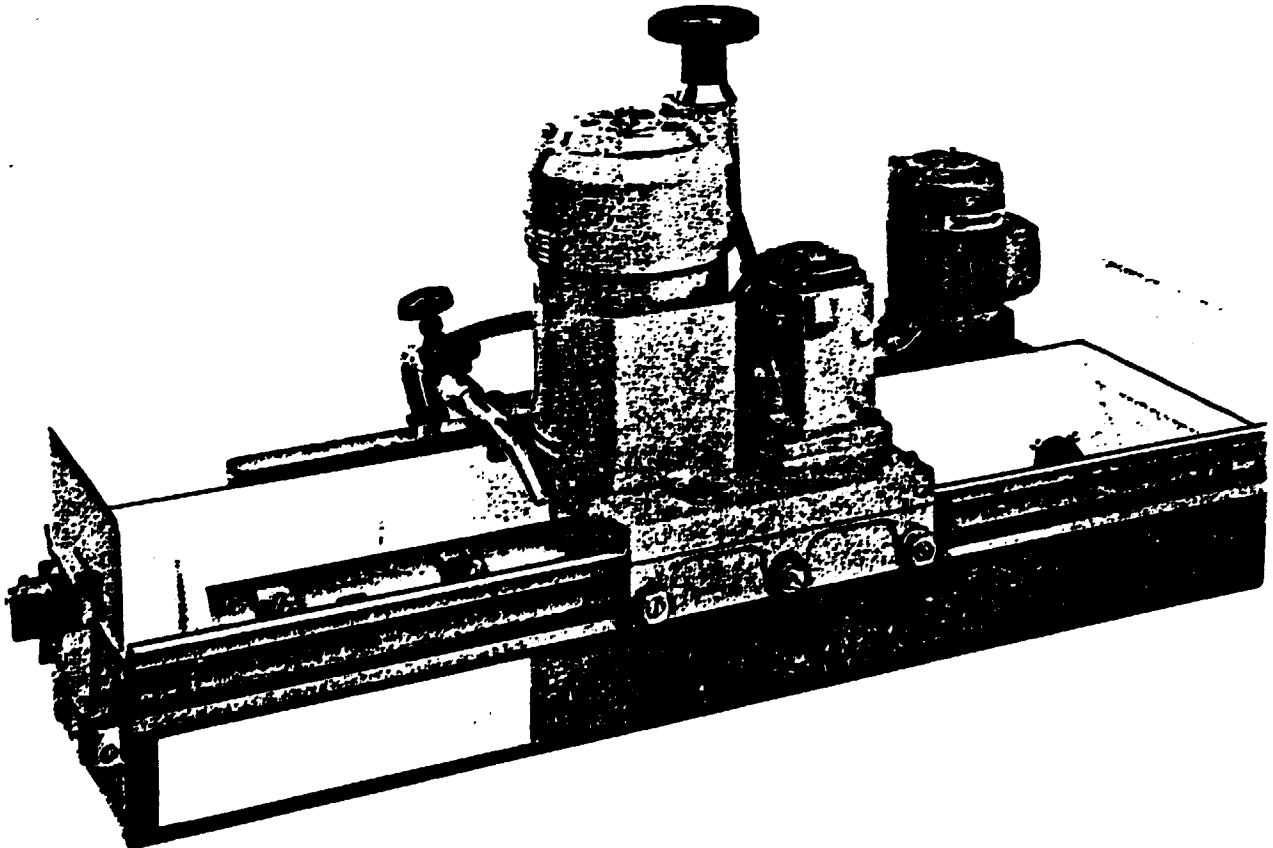
2. Spare parts requirements

- 1 set Wearable parts for two-year operation
- 3 sets Spare grinding wheels

3. Typical equipment suppliers

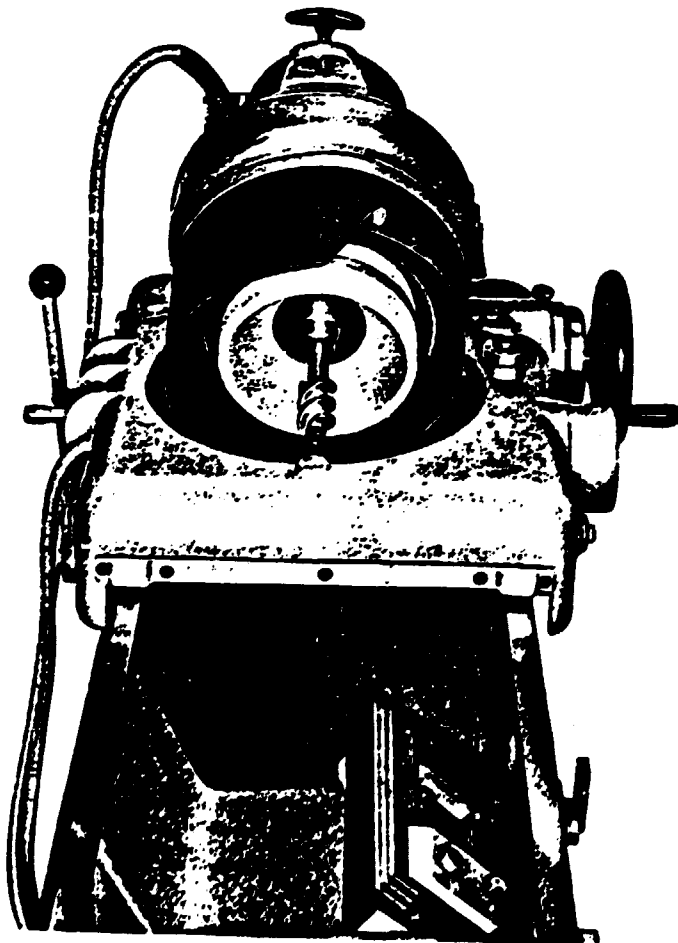
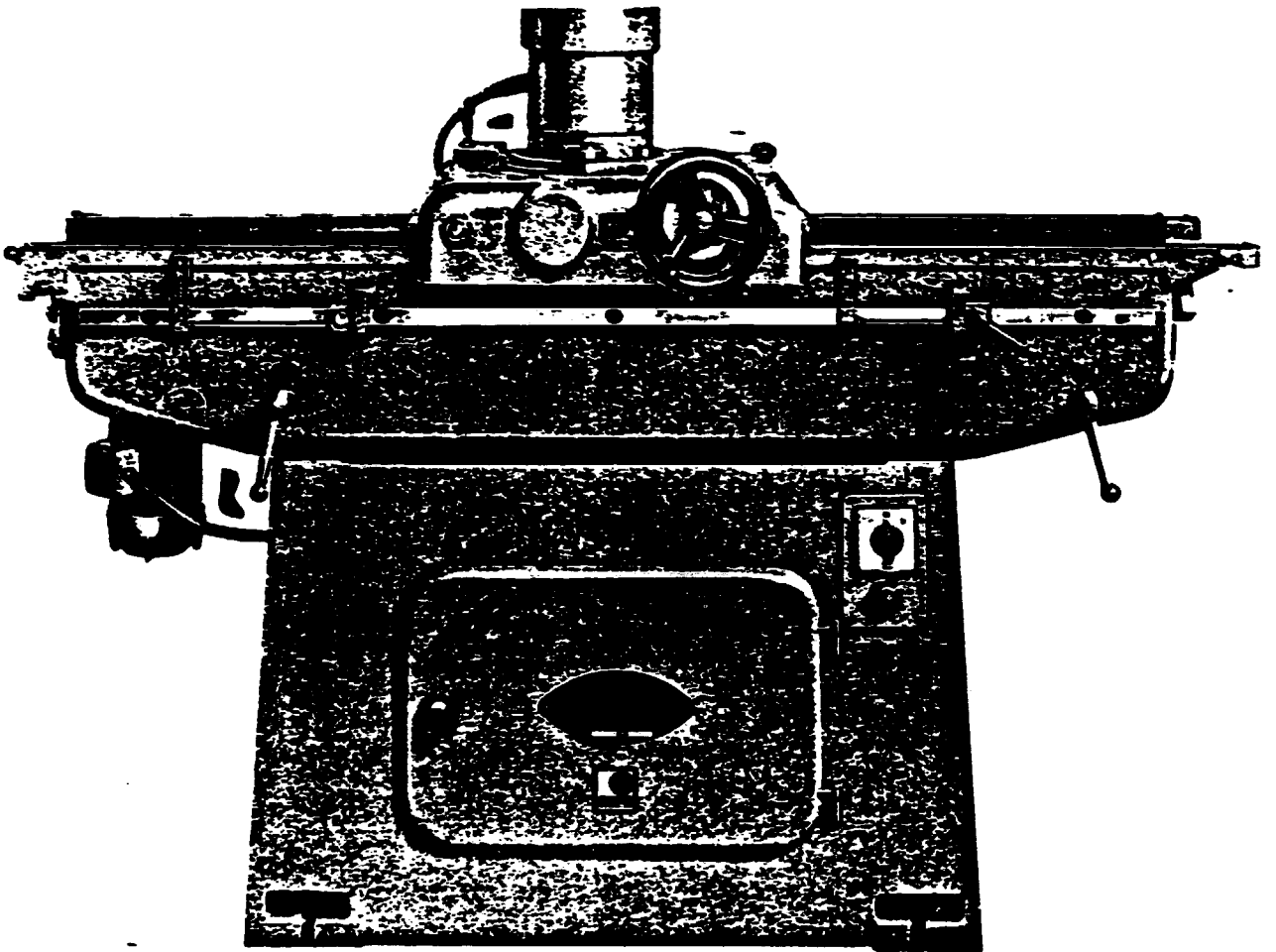
- MVM, Mod. X 6.3 or X 8.5, depending on whether capacity required is 630 mm (24 3/4") or 850 mm (33 1/2")

SEMI-AUTOMATIC PLANING KNIVES SHARPENING MACHINE
(For smaller woodworking shops)



<u>Item No.</u>	<u>Quantity</u>	
ME/7	1 set	<u>Levelling and tensioning equipment for circular sawblades up to 600 mm (23 5/8") dia.</u>
		<u>1. Description</u>
1		1.1 Dog-head hammer
1		1.2 Cross-head hammer
1		1.3 Steel straight edges
1		1.4 Levelling anvil block
		<u>2. Typical equipment suppliers</u>
		- ARMSTRONG
		- SPEAR & JACKSON
		- VOLLMER (Biberach)
ME/8	1	<u>Automatic planing knife sharpening machine</u> (For larger woodworking factories and tool maintenance centres) (EUMABOIS classification No. 55.2)
		<u>1. Specifications</u>
		1.1 Maximum length of knives: 630 mm (24 3/4") or 830 mm (32 3/4")
		1.2 Must be equipped for sharpening up to 4 knives simultaneously in order to ensure that knives mounted in same cutterblock retain equal weight
		1.3 Automatic longitudinal feed of grinding wheel
		1.4 Automatic vertical infeed of grinding wheel
		1.5 Canting of grinding wheel spindle to allow variation in grinding angle
		1.6 Greased-for-life bearings
		1.7 Overload switch protection
		1.8 Tropical insulated motor
		1.9 Equipped for wet grinding
		<u>2. Spare parts requirements</u>
	1 set	Wearable parts for two-year operation
	3	Spare grinding wheels
		<u>3. Typical equipment suppliers</u>
		- GRIFO, Mod. RR 830
		- MVM, Mod. LX 6.3 or LX 8.5
		- VOLLMER, Mod. DR 60 V

AUTOMATIC PLANING KNIFE SHARPENING MACHINE
(For larger woodworking factories and tool maintenance centres)



<u>Item No.</u>	<u>Quantity</u>	
ME/9	1	<u>Manual universal tool sharpening machine for cutters and carbide tipped circular sawblades</u> (Suitable for larger furniture and joinery plants and tool maintenance centres) (EUMABOIS classification No. 55.7)

1. Specifications

- 1.1 Equipped to sharpen the following tools:
 - 1.1.1 Moulding cutters
 - 1.1.2 Boring bits, routing and dovetailing bits
 - 1.1.3 H.S.S. and carbide tipped knives of length up to 100 mm (4")
- 1.2 Two speed grinding spindle, to be obtained either by belt-change or a reduction-gear attachment. The higher speed (about 7,000 rpm) is required by the small diameter grinding wheels when sharpening routing, boring and dovetailing cutters
- 1.3 Dividing (indexing) head with interchangeable division
- 1.4 Range of cutter-holding mandrels and chucks (preferably with taper shank) to be provided
 - 1 1.4.1 Collect chuck for bits with shank dia. 6, 8, 9.5, 10 and 12 mm (1/4", 5/16", 3/8", 7/16", 7/16" and 1/2" dia.) as required
 - 1 1.4.2 Standard three-jaw drill chuck for bits with shank dia. 3 to 16 mm (1/8" to 5/8")
 - 1 1.4.3 Mandrel to hold cutters with bore dia. 30 mm (1 3/16"). Cutter-holding: up to 75 mm (3") min
 - 1 1.4.4 Mandrel to hold cutters with bore dia. 16 mm (5/8"). Cutter-holding length: 25 mm (1") min.
 - 1 1.4.5 Mandrel to hold boring bits with threaded shank M 8 and M 10
- 1 1.5 Device for setting cutters at 0° on the dividing head
- 1 1.6 Dust extraction unit
- 1 1.7 Dial indicator with holder to check concentricity of cutting edges
- 1.8 Power of grinding wheels spindle: approx. 0.44 kW (0.6 HP)
- 1.9 Tropical-insulated motor
- 1.10 Greased-for-life bearings
- 1.11 Overload switch protection
- 1 1.12 Wheel dressing stick (diamond) preferably mounted on stand

2. Spare parts requirements

- 1 set Wearable parts for two-year operation
- 3 sets Each size and type grinding wheels for H.S.S. and carbide tipped tools

Item No. Quantity

3. Extra optional attachments

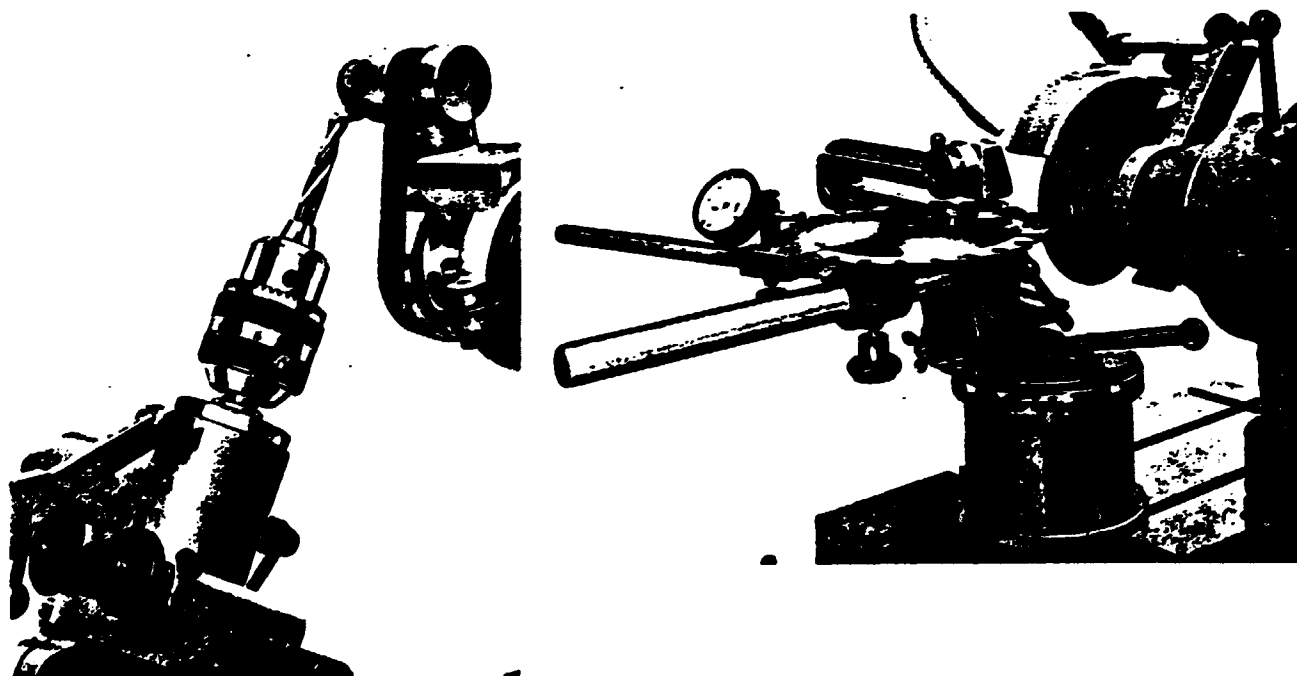
- 1 Wet grinding arrangement (water pump and tray)
- 1 Attachment for sharpening carbide-tipped circular saws of dia. up to 250 mm (9 7/8"), min. 10/
- 1 set Each type of diamond grinding wheels for above
- 1 Guide finger for sharpening tools with spiral edges
- 1 Attachment (including tail stock) for sharpening finger-joint cutters in a set
- 1 Attachment for sharpening chain mortiser cutters
- 1 Attachment for grinding hollow frout edges of carbide tips on circular sawblades

4. Typical equipment suppliers

- GRIFO, Mod. UION
- VOLLMER, Mod. FS 70 F
- LOROCH, Mod. HS/A2

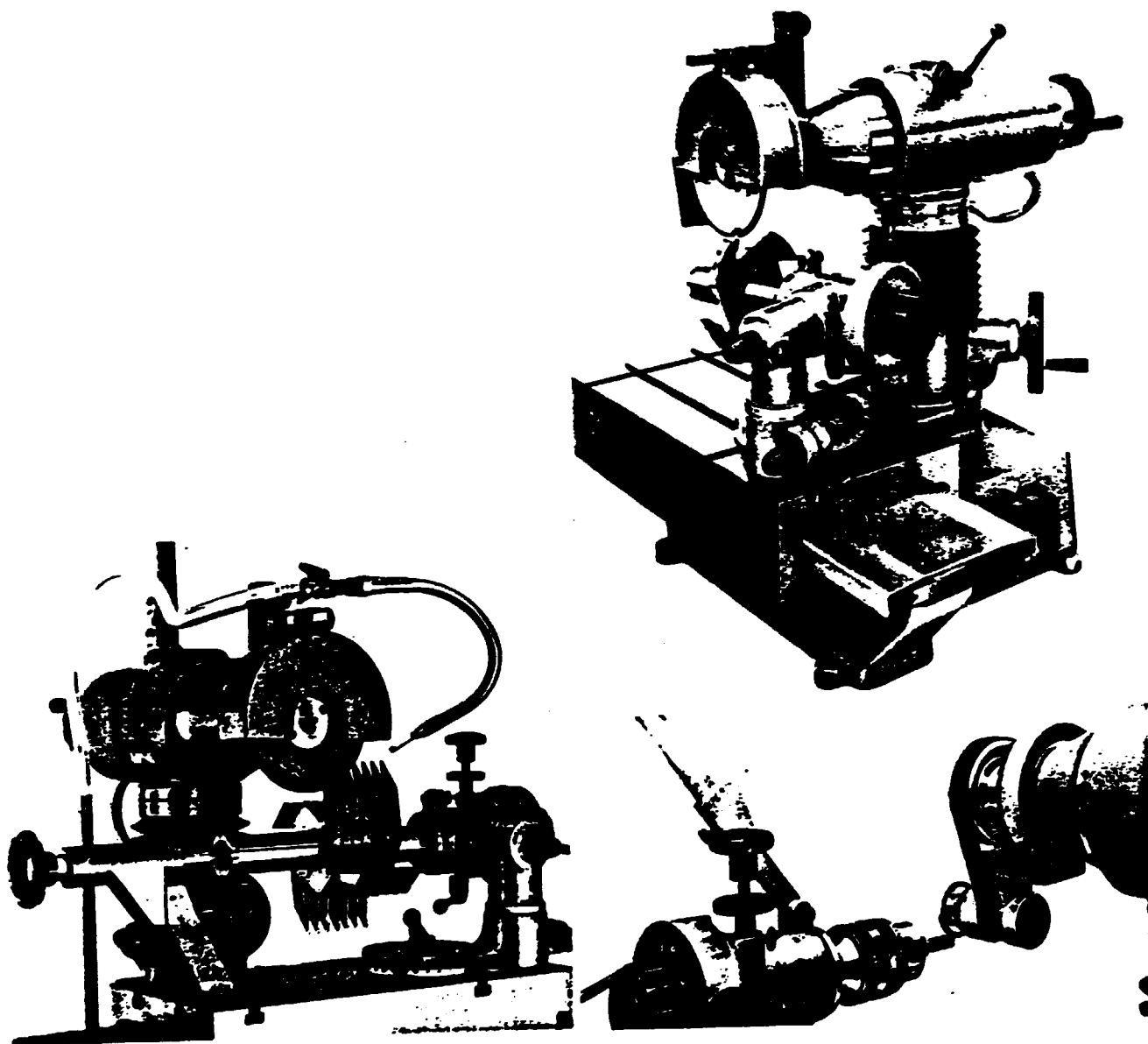
UNIVERSAL TOOL SHARPENING MACHINE

(For larger woodworking factories and tool maintenance centres)



10/

Equipped with centering bushes to accommodate the following choice of blade bore diameters: 25, 30, 32, 40, 50, 60, 70, 75, 80 and 85 mm, as well as 1", 1 1/4", 1 1/2" and 2 1/4" to be selected according to the needs of the individual buyers.



<u>Item No.</u>	<u>Quantity</u>
ME/10	1

Sharpening machine for straight and bevel grinding of circular sawblades and narrow bandsaws

(Expandable if necessary to sharpen wide bandsaw blades, hand saws, hack saws, metal cutting circular saws, gangsaws and planing knives)

(EUMABOIS classification No. 55.11 expandable to 55.21)

1. Specifications

- 1.1 Range of circular sawblade diameters: 60 mm (2 3/8") to 600 mm (23 5/8")
- 1.2 Range of bandsaw blade widths: 5 to 60 mm (3/16" to 2 3/8")

Item No. Quantity

- 1.3 Range of bore dia. of circular saws: 10 mm (3/8") to approx. 80 mm (3 1/8")
- 1.4 Range of tooth pitch: 5 to 40 mm (3/16" to 3/8")
- 1.5 Range of tooth heights: 3 to 30 mm (1/8" to 1 3/16")
- 1.6 Range of hook angles: negative 10° to positive 30°
- 1.7 Cams for four tooth shapes as illustrated in the machine's illustration on page .
 - 1.8 Equipped with double pawl finger arrangement to grind broken teeth
 - 1.9 Bevel grinding capacity: up to 20°
 - 1.10 Range of feeding speeds: 30 to 80 teeth/min.
 - 1.11 Built-in dust extraction unit with filter
 - 1.12 One or two motors (approx. 0.37 kW-0.52 HP) depending on make of machine
 - 1.13 Grinding wheel balancing device
 - 1.14 Lubricated-for-life bearings
 - 1.15 Overload switch protection
 - 1.16 Tropical-insulated motor

2. Spare parts requirements

- 1 set Wearable parts for two-year operation
- 3 sets Each type and size of standard grinding wheels

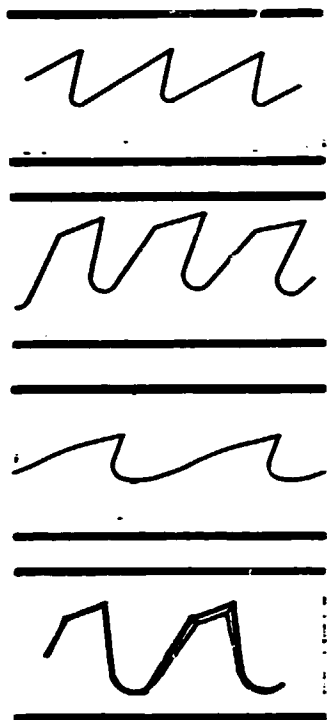
3. Extra choice of attachments to expand the range of operations of the basic sharpening machine

- 1 3.1 Attachment to sharpen hand saws
- 1 3.2 Attachment to sharpen hack saws
- 1 3.3 Attachment to sharpen planer knives up to 600 mm (23 5/8") length
- 1 3.4 Attachment to sharpen metal cutting circular sawblades
- 1 3.5 Attachment to sharpen gang sawblades (without index bar feed)
- 1 3.6 Attachment to sharpen bandsaw blades of width 60 to 150 mm (2 3/8" to 5 7/8"), with standard saw guide
- 1 3.7 Indexing-plate attachment designed to:
 - (a) sharpen 'Combination' type circular sawblades; and
 - (b) re-condition blades with broken or irregularly sharpened teeth

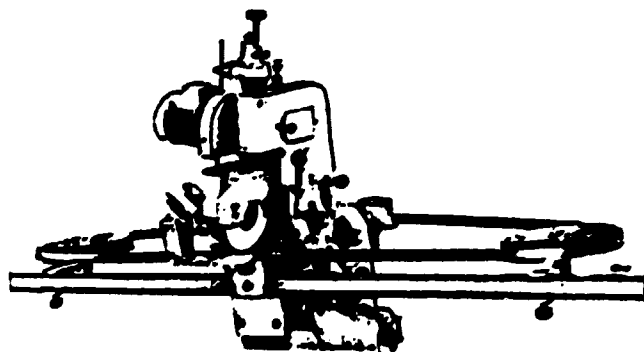
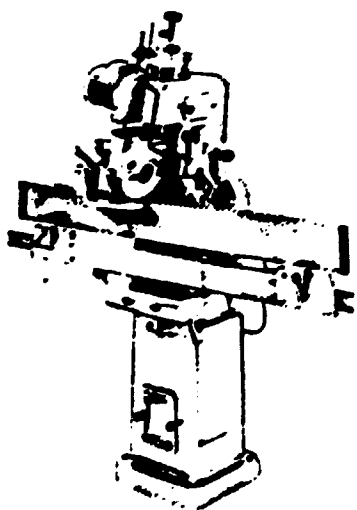
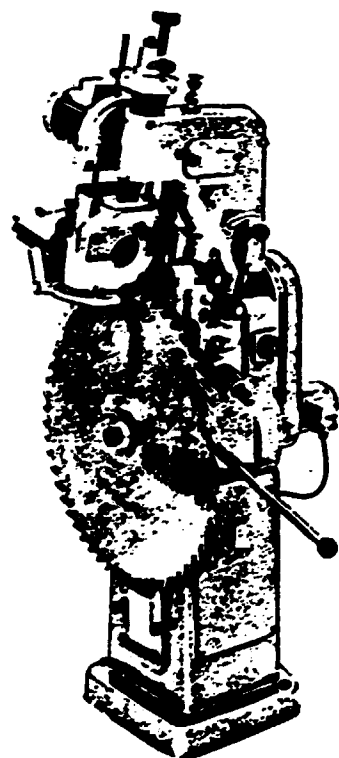
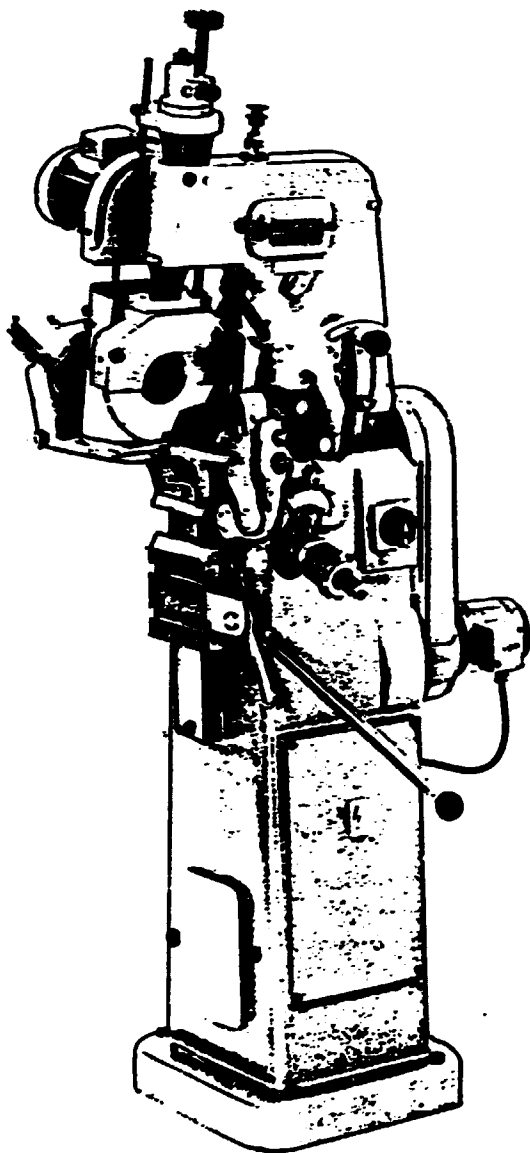
4. Typical equipment suppliers

- VOLLMER, Mod. Cne
 - LOROCH, Mod. JLM B50
- (Band sawblade width capacity: up to 60 mm (2 3/8") only. This machine has no attachment for gang saws and hand saws.)

SHARPENING MACHINE FOR STRAIGHT AND BEVEL GRINDING OF
CIRCULAR SAW BLADES AND NARROW BAND SAW BLADES

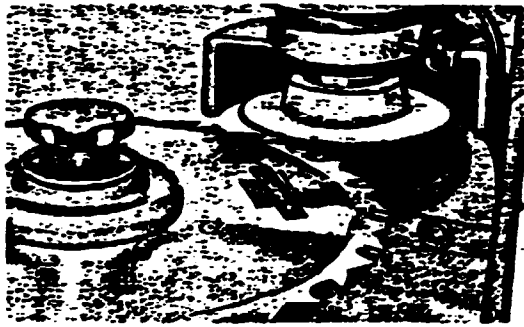


REQUIRED TOOTH SHAPES

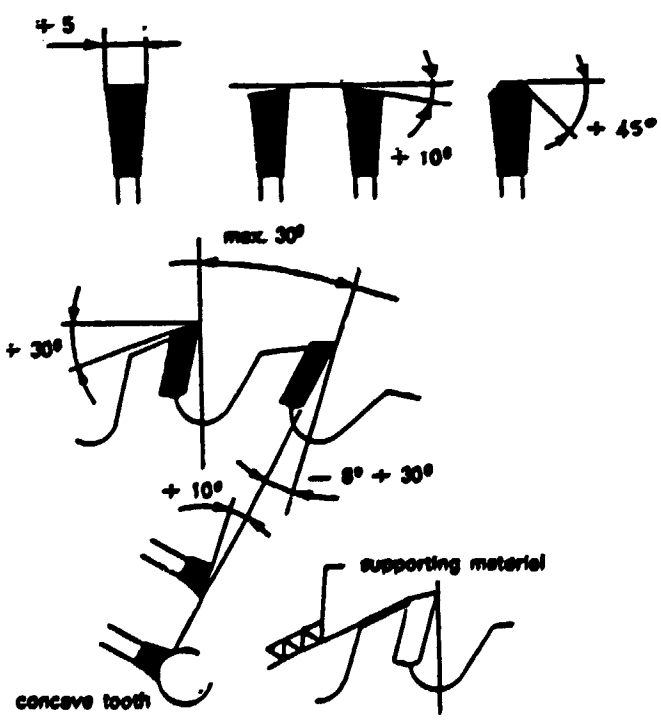
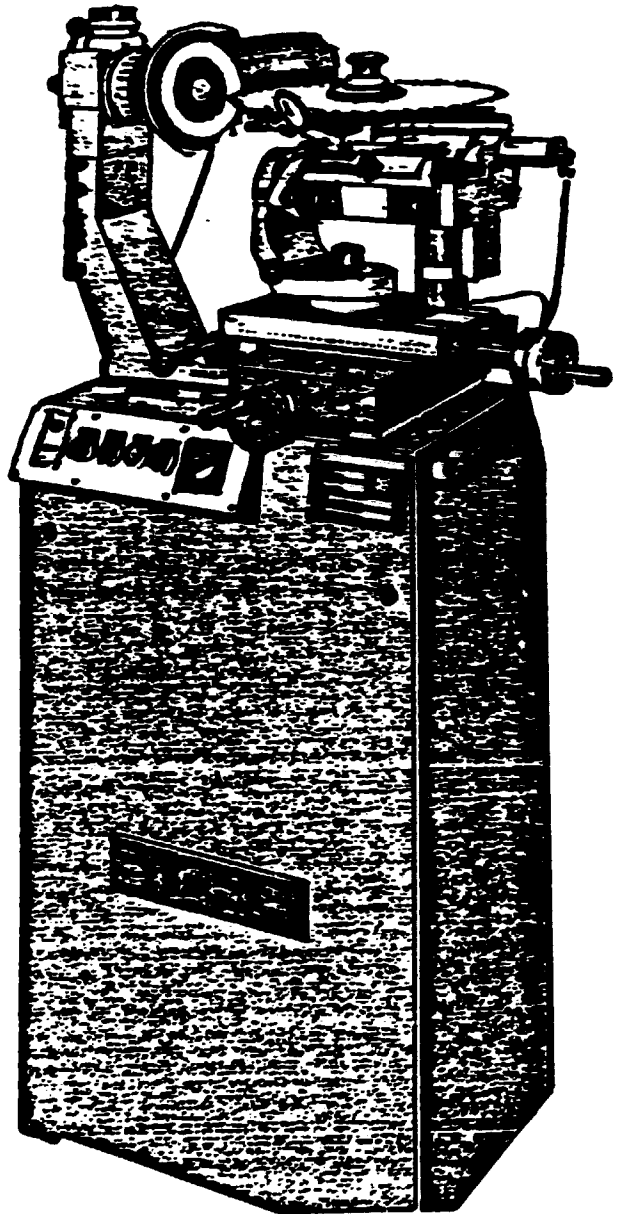


<u>Item No.</u>	<u>Quantity</u>	
ME/11	1	<u>Automatic sharpening machine for carbide tipped circular sawblades</u> (Sharpening of front, top and side edges of carbide tips) (EUMABOIS classification No. 55.17)
		<u>1. Specifications</u>
		1.1 Saw blade with dia. capacity: approx. 120 to 600 mm (4 3/4" to 23 5/8")
		1.2 Equipped for automatic grinding of: (a) front and top of carbide tips in routine sharpening; (b) sides of carbide tips when sawblades are re-tipped; (c) supporting material of sawblade teeth, and (d) carbide tips with concave front profile (extra optional feature)
		1.3 Cutting angle (hook angle) capacity: -8° to 30°
		1.4 Required bevel-grinding capacity: (a) top bevel: up to 30° (b) front bevel: up to 10° (c) top alternate cross bevel: up to 10° (d) top cross bevel on triple-chip carbide tips: up to 45°
		1.5 Blades' bore diameter range: 25 mm, 30 mm, 32 mm, 40 mm, 50 mm, 55 mm, 60 mm, 70 mm, 75 mm, 80 mm, 85 mm, in addition to 1", 1 1/4", 1 1/2", and 2 1/4"
		1.6 Automatic feed-stopping device based on pre-selection of number of teeth
		1.7 Approximate power requirement of grinding and feed motors: 0.55 kW (0.73 HP)
		1.8 Overload switch protection
		1.9 Tropical-insulated motor
		<u>2. Spare parts requirements</u>
	1 set	Wearable spares for two-year operation
	1 set	Each type and size of diamond grinding wheels
		<u>3. Extra optional equipment</u>
	1	Cone assembly for small circular sawblades of dia. up to 200 mm (7 7/8") and bore dia. 12 to 30 mm (15/32" to 1 3/16")
		<u>4. Typical equipment supplier</u>
		- STEHLE, Mod. HS 600

AUTOMATIC SHARPENING MACHINE FOR CARBIDE TIPPED CIRCULAR SAW BLADES



grinding the flanks of re-tipped teeth



<u>Item No.</u>	<u>Quantity</u>	<u>Resistance brazing machine for removing and brazing of carbide tips on circular sawblades</u>
ME/12	1	

1. Specifications

- 1.1 Range of circular sawblades dia.: 100 to 600 mm (4" to 23 5/8")
- 1.2 Cone assembly for sawblades bore dia. 25 to 85 mm (1" to 3 5/32")
- 1.3 Range of widths of carbide tips: 2 to 6 mm
- 1.4 To accomodate blades with hook angle (cutting angle) from -10° to 30°
- 1.5 Connected power load: 0.7 kW (1 HP)

2. Spare parts requirements

- 2.1 Spare copper electrodes
- 2.2 Silver solder

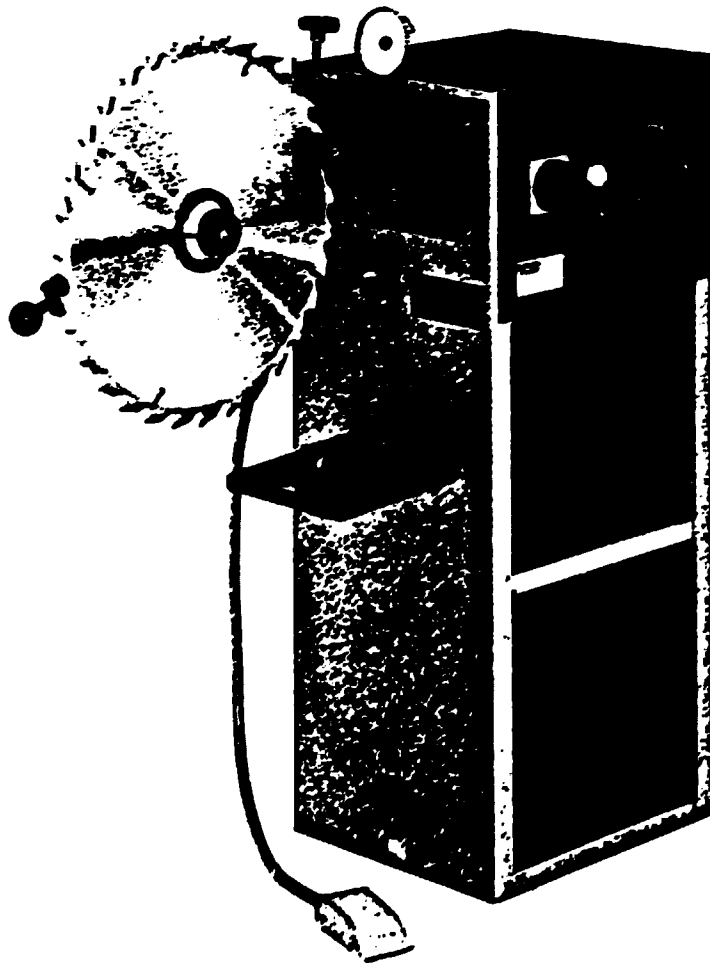
3. Extra optional equipment

Cone assembly for small circular sawblades of dia. up to 200 mm (7 7/8") and bore dia. 12 to 30 mm (15/32" to 1 3/16")

4. Typical equipment suppliers

- GRIFO, Mod. GAF 1
- LOROCH, Mod. WLG/T
- VOLLMER, Mod. LG21H

RESISTANCE BRAZING MACHINE FOR REMOVING AND BRAZING OF CARBIDE TIPS ON CIRCULAR SAW BLADES



<u>Item No.</u>	<u>Quantity</u>	
ME/13	1	<u>Double-handled lever-type setting tool for gangsaw blades</u> (Used when spring setting is required instead of swage setting) 1. <u>Specifications</u> 1.1 To be provided with slots to set blades of thickness up to 13 gauge (2.41 mm) 2. <u>Typical equipment suppliers</u> - ARMSTRONG - VOLIMER - SPEAR & JACKSON
ME/14	1	<u>Setting pliers for gang sawblades</u> (Used as an alternative to lever-type setting tool) 1. <u>Specifications</u> 1.1 For blade thickness up to 13 gauge (2.41 mm) 2. <u>Typical equipment suppliers</u> - ARMSTRONG - VOLIMER, Order 1201 - SPEAR & JACKSON
ME/15	1	<u>Light-weight angle grinder power tool</u> (For cleaning joints of wide band saw blades after welding) 1. <u>Specifications</u> 1.1 To take 100 or 110 dia. grinding disks 1.2 Fitted with rubber backing pad 2. <u>Spare parts requirements</u> 24 Resin bonded grinding disks suitable for grinding steel 100 Abrasive paper disks 80 grit aluminium oxide 3. <u>Typical equipment suppliers</u> - BLACK & DECKER, WOLF, BOSCH
ME/16	1	<u>Welding clamps for wide band resaw blades^{11/}</u> 1. <u>Specifications</u> 1.1 Forging anvil must be easily raised and lowered by foot or hand lever 1.2 Capacity: up to 127 mm (5") 2. <u>Typical equipment suppliers</u> - ARMSTRONG, Mod. 62 - SPEAR & JACKSON - VOLIMER, Mod. 3500

11/

As required by the Whitney Sawmill in Belize. Welding clamps for sawblade with up to 400 mm (16") are also available.

Item No. Quantity
ME/17 1 Lightweight oxy-acetylene welding equipment for sawblades

1. Required for:

- (a) weld jointing of wide bandsaw blades instead of brazing
- (b) repairing of cracked circular and wide bandsaw blades
- (c) stellite tipping of wide bandsaw blades -even if not an immediate requirement

2. Consisting of:

- 1 set Light weight torch with nozzle sizes 1-10, complete with nozzle cleaners, spanners and storage box
- 3m Black lightweight connecting hose about 3 metres long
- 3m Red lightweight connecting hose about 3 metres long
- 1 Acetylene regulator, low range (up to 15 lb/in²)
- 1 Oxygen regulator, low range (up to 15 lb/in²)
- 1 Spark lighter
- 1 Regulator spanner
- 1 Spindle key
- 1 Welding goggles

3. Typical equipment suppliers

- B. O. C.
- VOLIMER, Biberach

ME/18 1 Hand-operated shears for wide bandsaw blades

1. Required for

- (a) cutting sawblade coils to required lengths prior to gas welding or brazing, and
- (b) cutting damaged sawblades prior to re-welding or re-brazing

2. Specifications

- 2.1 Band sawblade widths up to 160 mm (6 5/16")^{12/}
- 2.2 Should have a clamp to secure blade during the cutting
- 2.3 Should incorporate a back stop to ensure cuts at a right angle

3. Typical equipment suppliers

- VOLIMER, Mod. A 160
- LOROCH, Mod. A 3
- IDEAL, Mod. A 4

^{12/} Suitable for the band resaw machine of the Whitney Sawmill, Belize, having blades 5" wide. Shears of capacity up to 360 mm also available.

Item No. Quantity
ME/19 1 Levelling and tensioning equipment for wide bandsaw blades of width up to approx. 130 mm (5") and gang sawblades

1. Specifications

1.1 Stretch roller machine

- 1.1.1 The blade hook stop to be provided with a graduate scale showing the position of the rollers in relation to the edge of the blade;
- 1.1.2 The two top and bottom power-driven rollers to be provided with two speeds to facilitate training
- 1.1.3 Overload switch protection
- 1.1.4 Tropical-insulated motor (connected load: approx. 0.6 - 0.9 kW (0.85 - 1.28 HP))

Typical equipment suppliers

- ARMSTRONG
- LOROCH, Mod. WA 200
- VOLLMER Biberach, Mod. VM

1 1.2 Steel levelling plate

- 1.2.1 With both working surfaces precision ground

Typical equipment suppliers

- ARMSTRONG
- VOLLMER
- SPEAR & JACKSON

1 1.3 Tensioning bench

To hold stretch roller machine and levelling plate (items 1.1 and 1.2 above). This item to be manufactured locally in timber on the basis of drawings to be provided by the supplier of the stretch-roller machine and the levelling plate.

1 set 1.4 Tensioning hammers

Possible suppliers: same as in items 1.1 and 1.2 above

1 set 1.5 Tension gauges and back gauges

Possible suppliers as above

ME/20 1 Hand-operated swaging tool for wide bandsaw blades up to 127 mm (5")

1. Specifications

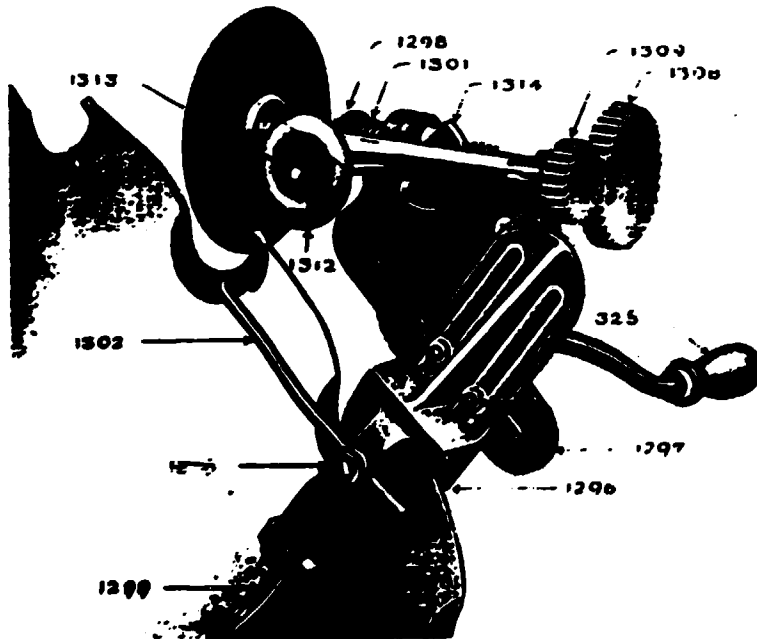
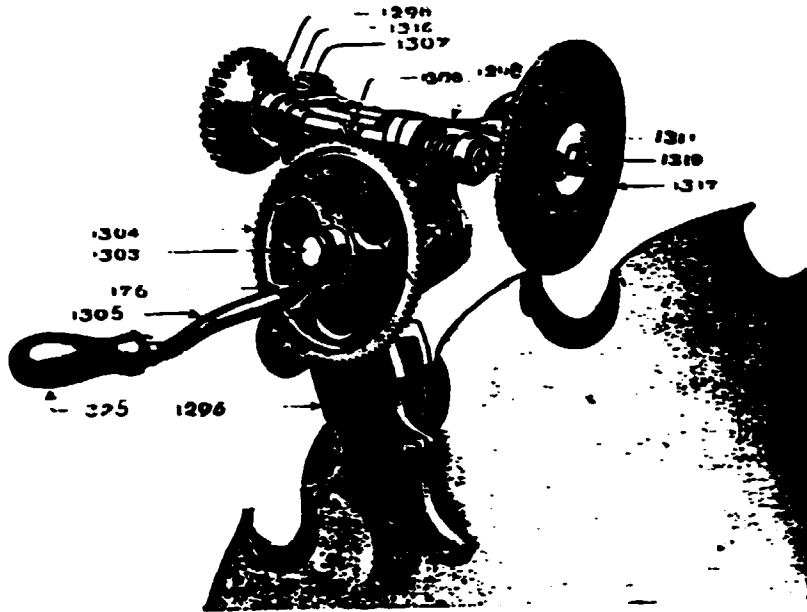
For blades up to 18 gauge (1.25 mm)

2. Spare parts requirements

- 4 Spare dies
- 4 Spare anvils
- 2 Stationary clamp screws
- 2 Moving clamp screws

<u>Item No.</u>	<u>Quantity</u>	
		3. <u>Typical equipment suppliers</u>
		- ARMSTRONG
		- VOLLMER, Order No. 1104
		- LOROCH, Mod. HSN
ME/21	1	<u>Hand-operated side dressing tool for wide bandsaw blades up to 127 mm (5")</u>
		1. <u>Specifications</u>
		For blades up to 18 gauge (1.25 mm)
		2. <u>Spare parts requirements</u>
	2	Spare dies
	2	Spare tooth stops
		3. <u>Typical equipment suppliers</u>
		- ARMSTRONG
		- LOROCH, Mod. HKA
		- VOLLMER, Order No. 1105
ME/22	1	<u>Hand-operated swaging tool for gang sawblades</u>
		1. <u>Specifications</u>
		Suitable for blade thickness from 17 to 13 gauge (1.5 to 2.4 mm)
		2. <u>Spare parts requirements</u>
	4	Spare dies
	4	Spare anvils
	2	Stationary clamp screws
	2	Moving clamp screws
		3. <u>Typical equipment supplier</u>
		- VOLLMER, Order No. 1101
ME/23	1	<u>Hand-operated dressing tool (shaper) for gang sawblades</u>
		1. <u>Specifications</u>
		Suitable for blade thickness from 17 to 13 gauge (1.5 to 2.4 mm)
		2. <u>Spare parts requirements</u>
	2	Spare dies
	2	Spare tooth stops
		3. <u>Typical equipment suppliers</u>
		- VOLLMER, Order No. 1103

HAND-OPERATED SHARPENING DEVICE FOR INSERTED TEETH



Typical equipment supplier:
ARMSTRONG, Mod. 15 Sharpener

EQUIPMENT SPECIFICATION SHEETS

E.3 Miscellaneous maintenance tools (MMT)

Item No. Quantity

1. Consisting of

MMT 1 1

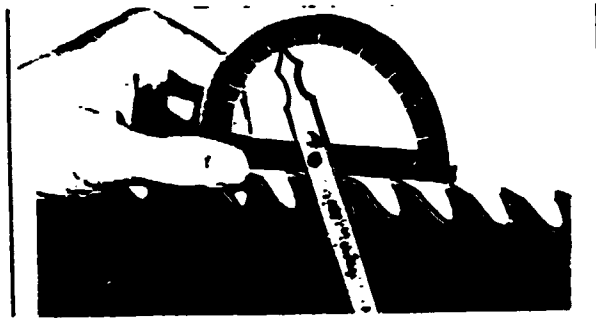
1.1 Vernier caliper

- Reading up to 150 mm (6"), dial type
- Typical equipment supplier
VOLLMER, Mod. MW-10-U

MMT 2 1

1.2 Protractor

- Reading up to 180°
- Length of leg: 150 mm (6")
- Typical equipment supplier
VOLLMER, Mod. MW-13-U



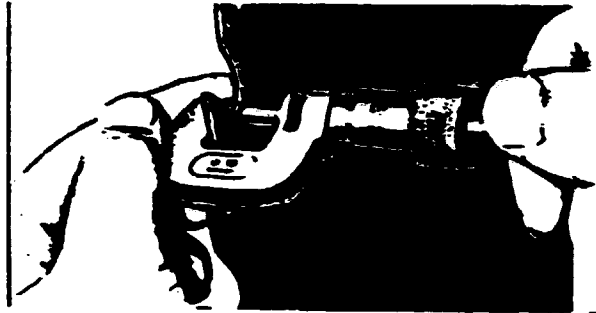
MMT3 1

1.3 Dial type set gauge

- (for measuring tooth set, metric)
- Typical equipment supplier
VOLLMER, Mod. MU-10-U



<u>Item No.</u>	<u>Quantity</u>	
MMT4	1	1.4 <u>Grinding goggles with safety glass lenses</u> -Typical equipment supplier VOLLMER
MMT5	1	1.5 <u>Micrometer^{13/}</u> -Reading up to 15 mm -Typical equipment supplier VOLLMER, Mod. MW-11-U



^{13/} Not required in the instance of smaller workshops equipped with Level I maintenance equipment.

ANNEX I

ADDRESSES OF SUPPLIERS OF TYPICAL EQUIPMENT

1. ARMSTRONG
Armstrong Manufacturing Co.
Portland, Oregon 97208
U. S. A.
2. BACCI
P. Bacci Via Tosco-Romagnola, 230
I-56021 Cascina (Pisa)
ITALY
Tel.: (050) 70-24-03, Telex: 500 308 bacci
3. BLACK & DECKER
Black & Decker GmbH
Black & Decker Strasse 40
Postfach 1202
D-6270 Idstein
Federal Republic of Germany
Tel: (0620) 210, Telex: 4 18 220
4. B.O.C.
British Oxygen Company Ltd.
Great West House
P. O. Box 39
Brentford TW8 9DQ
United Kingdom
Tel.: (01) 560 5166, Telex: 24981
5. BOSCH
Robert Bosch GmbH
Geschäftsbereich Kraftfahrzeugausstattung 6
Hydraulic Pneumatik
Postfach 30 02 40
D-7000 Stuttgart 30
Federal Republic of Germany
Tel: (0711) 811-0, Telex 72 527-306
6. CENTAURO
Centauro, S.p.A.
Via Carpi-Ravarino 87
I-41010 Limidi di Soliera (Mo)
ITALY
Tel: (59) 561 630, Telgr. centauro, Telex: 510634 cent
7. GANNOMAT
Maschinenfabrik Ganner
Weissenbach Strasse 21
A-6410 Telts (Tirol)
Austria
Tel: (05265) 25-32, Telex 5305521

8. GRIFO
Grifo, S.r.l. Costruzioni Meccaniche
Via Montello 135
C.P. 83
I-20038, Seregno (MI)
ITALY
Tel: (0362) 231001, Telex 331301 grifo
9. HEIMA TEGELEN
Helma Tegelen B.V.
Pater Peterstraat 1
Postfach 31 55
NL-5930 AD Tegelen
Holland
Tel: (077) 73-21-46, Telex 5 8 211
10. IDEAL
Ideal-Werk C. + E. Jungeboldt GmbH + Co.
Bunsenstrasse 1
Postfach 15 08
D-4780 Lippstadt
Federal Republic of Germany
Tel: (029491) 16-66-68, Telegr. Idealwerk, Telex (17) 2941308
11. INTERWOOD
Interwood Limited,
Stafford Avenue, Horchurch
Essex RM 11 2ER
United Kingdom
Tel: (04024) 52591, Telex 896 801
12. INVICTA
Invicta Maquinas para Madeira Ltda.
Av. Major Jose Levy Sobrinho 2500
BR-13480 Limeira SP
Brazil
Tel.: (0194) 411500, Telex: 191107 INMD
13. LYON-FLEX
Lyon-Flex-Est. Prost Dame
100, rue Baraban
F-69395 Lyon Cedex 3
FRANCE
Tel: (7) 853 13 68, Telex 3 40 393
14. LOROCH
Jos. Loroach, GmbH u. Co. Maschinenfabrik
Weinheimer Str. 64
Postfach 12 49
D-6942 Morlenbach
Federal Republic of Germany
Tel: (06209) 2 44, Telex 4 65 588

15. MAYER
Paul & Eugen Mayer, Maschinenfabrik
Hanns Klenum Str. 30
Postfach 16 49
D-7030, Boblingen
Federal Republic of Germany
Tel: (7031) 27 35 37, Telex: 7265711 FRG
16. MVM
MVM SpA
Via della Chimica 13
I-41012 Capri
ITALY
Tel: (059) 69 03 53, Telex 5 11 329
16. OMEC
OMEC S.r.l.
Via Fiorentina 127/a
Loc. Petriccio C.P.10
I-50052 Certaldo (FI)
ITALY
Tel: (0571) 66 86 50, Telegr. OMEC, Telex: 5 71 664
18. OMGA
OMGA, SpA, Costruzioni Meccaniche
Via Capri - Ravarino 146
I-41010, Limidi (MO)
ITALY
Tel: (059) 56 17 00, Telex 5 10 410
19. R. C. M.
R. C. M. Srl
Via Enrico Mattei, 3, C.P. 19
I-21040 Venegono Interiore (Va)
ITALY
Tel: (0331) 86 64 50, Telegr. r.c.m. Telex: 3 80 054 per rcn
20. RYE
RYE Machinery Ltd.
Lincoln Road
High Wycombe
Bucks HP12 3TR
United Kingdom
Tel: (0494) 4 12 11, Telex: 8 3 218 rugemac
22. SCHLEICHER
Schleicher Maschinenbau und Vertrieb GmbH
Wallensteinstrasse 4
Postfach 7 05
D-8192 Gerenstried
Federal Republic of Germany
Tel: (08171) 3 10 38/39, Telex 5 26 354

22. SCM INTERNATIONAL
SCM International SpA
Via Casale 384
I-47040 Villa Verucchio
ITALY
Tel: (0541) 67 70 61, Telex: 5 50 142
23. SPEAR & JACKSON
Spear & Jackson Industrial Ltd.
Aetna Works
Saville Street East
Sheffield S4 7UR
United Kingdom
Tel.: (0742) 20202, Telex: 54578 Spear G
24. STEHLE Memmingen
Werkzeug und Maschinenfabrik Stehle, GmbH & Co.
Dugauer Strasse 51-53
Postfach 18 65
D-8940 Memmingen 1
Federal Republic of Germany
Tel: (08331) 859-0
25. TAYLOR
James L. Taylor Mfg. Co.
Box 712, 108-128 Parker Avenue
Poughkeepsie, New York 12602
U. S. A.
Tel: (914) 452 3780
26. VOLLMER WERKE
Vollmer Werke Maschinenfabrik GmbH
Wilhelmstrasse 20/22
Postfach 17 60
D-7950, Biberbach/Riss 1
Federal Republic of Germany
Tel: (07351) 5 71 0
27. WADKIN
Wadkin PLC
Green Lane Road,
Leicester LE5 4PF
United Kingdom
Tel: (0533) 76 91 11, Telex: 34 646
28. WIDMA
H. u. E. Widmann GmbH & Co. KG
Maschinenfabrik
Helfensteinerstrasse 26
Postfach 11 48
D-7902, Blaubeuren-Gerhausen
Federal Republic of Germany
Tel: (07344) 70 87, Telex: 7 12 586

29. WOLF
WOLF GmbH, Kranbau
Postfach 1160
D-7155, Oppenweiler
Federal Republic of Germany
Tel: (07193) 361, Telex: 7 245 949

ANNEX II

LIST OF ASSOCIATIONS OF WOODWORKING EQUIPMENT MANUFACTURERS

AUSTRIA

Fachverband der Maschinen- und Stahlbauindustrie Oesterreichs
Bauernmarkt 13
A-1011 Vienna
Tel.: (0222) 65 57 63
Telex: 74235 BKS
Cable address: MASCHINENBAU

BELGIUM

Comite Europeen des Machines a Bois 'FABRIMETAL'
Rue des Drapiers 21
B-1050 Brussels

DENMARK

Sammenslutningen af Maskinfabrikanter for Traeindustrien, SMT
P. O. Box 45
DK-3520 Farum
Tel.: (02) 98 19 17

FEDERAL REPUBLIC OF GERMANY

Fachgemeinschaft Holzbearbeitungsmaschinen im
Verband Deutscher Maschinen- und Anlagenbau e.V.
Lyonerstrasse 18
Postfach 71 01 09
D-6000 Frankfurt am Main - Niederrad 71
Tel.: (061) 66 03 340
Telex: 4 13 119 HOLZ

FRANCE

Syndicat de la Machine-outil, de l'Assemblage et de
la Productique Associee (SYMAP)
150 Boulevard Bineau
F-92200 Neuilly-sur-Seine
Tel.: (1) 47 45 43 43
Telex 610 460 SYMOFRA
Cable address: SYMOFRA

ITALY

Associazione Costruttori Italiani Macchine e
Accessori per la Lavorazione del Legno (ACIMALL)
Centro Commerciale Milanofiori
Prima Strada
Palazzo F-3
Casella 37
I-20090 Assago (Milano)
Tel.: (02) 8242101
Telex: 341267 ACIMALL
Telefax: (02) 825 5019

JAPAN

The Japan Woodworking Machinery Association
2nd Floor, Kikai-Shinko Building
3-5-8 Shiba Koen
Minato-Ku
Tokyo
Tel.: (03) 4336511
Cable Address: JAPAN WOOD MACHI

PORTUGAL

Uniao dos Industriais de Maquinas para Trabalhar
Madeira Portugeses (UNIMAP)
Largo Ferreira Lapa No. 70 - 3º Esq.
P-4100 Porto
Tel.: 64679
Telex: 22280 PINHAL

SPAIN

Asociacion Nacional de Fabricantes de Maquinaria para
trabajar la Madera (AFEMMA)
Calle Universidad 4-5-2a
Apartado de Correos 1748
E-46003 Valencia
Tel.: (96) 352 58 54
Telex: 64653 AFMM

SWITZERLAND

Verband Schweizerischer Holzbearbeitungsmaschinenfabrikanten (VSHF)
Ringstrasse 2
CH-4600 Olten
Tel.: (062) 211246

UNITED KINGDOM

Woodworking Machinery Suppliers' Association
P. O. Box 10
Epping (Essex) CM 16 \$\$
Tel.: Epping 78873
Telex: 21792

UNITED STATES OF AMERICA

Woodworking Machinery Manufacturers' Association
1900 Arch Street
Philadelphia (PA) 19103
Tel.: (215) 564 3484