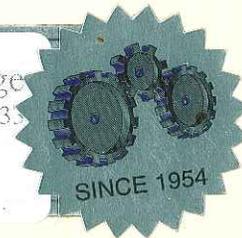


DECKEL

GK

Universal
Engraving and Copy
Milling Machines

Sterling Machinery Exchange
9310 Garvey Ave S. El Monte, CA 91735
626-444-0311
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DECKEL
GK
SYSTEM



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GK — perfection in engraving

GK machines from DECKEL have a long record of successful operation in engraving shops, in the manufacture of tools, moulds and dies for the plastics and metal working industries, in production engraving and copying work from masters, patterns or templates, etc.

Sturdy construction, in conjunction with high-accuracy reproduction and fingertip control, make the GK an extremely useful and handy machine for producing true-to-shape components of superior surface quality requiring little, if any, costly retouching by hand.

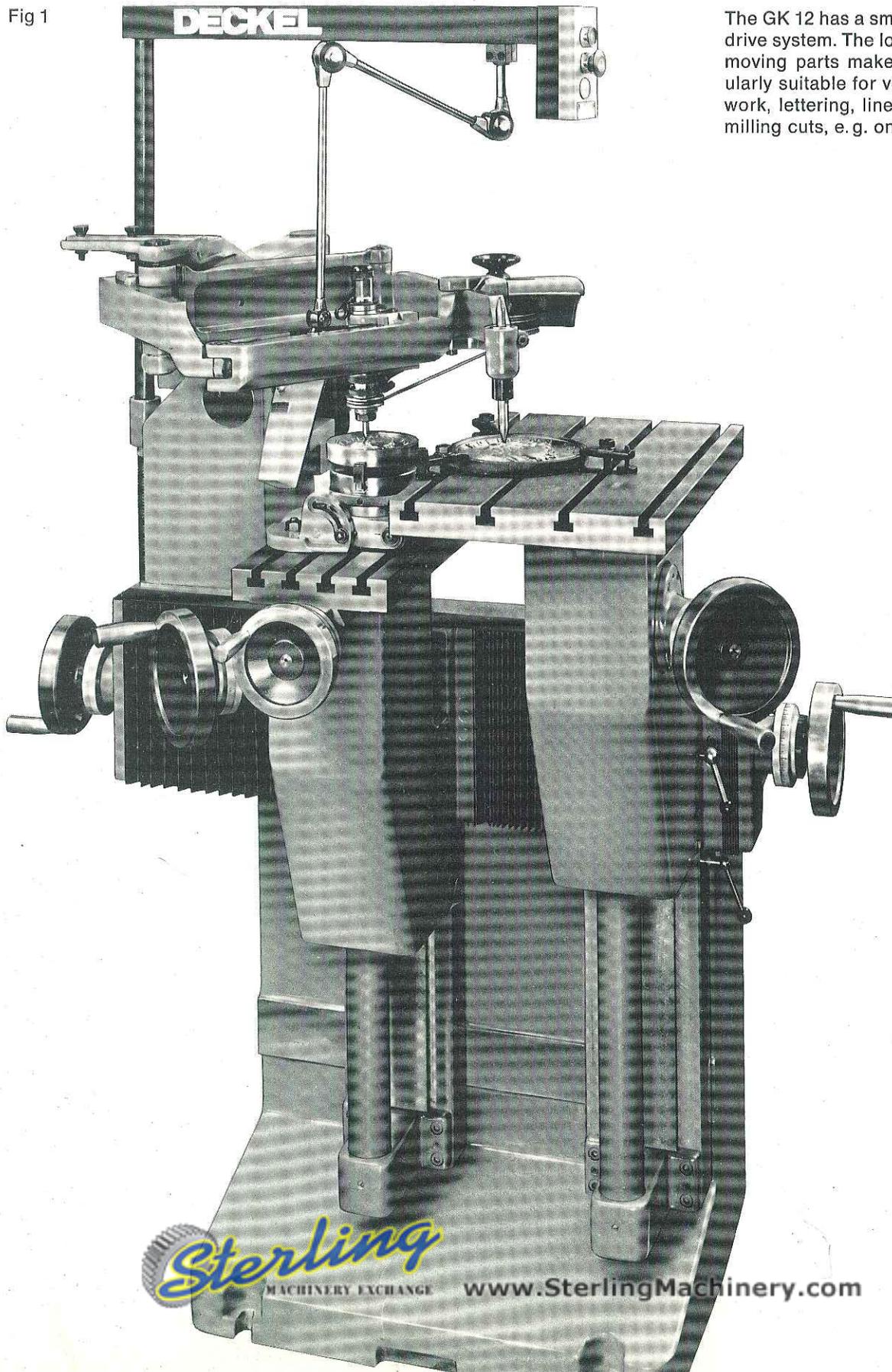
GK machines from DECKEL incorporate the latest engineering improvements. They are available in two sizes — GK 12 and GK 21, and in two degrees of automation — GK 21 for purely manual control and GK 21 A with additional 2½ D automatic optical scanning unit for copying directly from drawings. Supplemented by a broad range of attachments and accessories, the GK line is a versatile system of time-tested mutually complementary engraving and copy milling machines for workshops of all sizes and machining operations of all kinds.



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GK 12

Fig 1

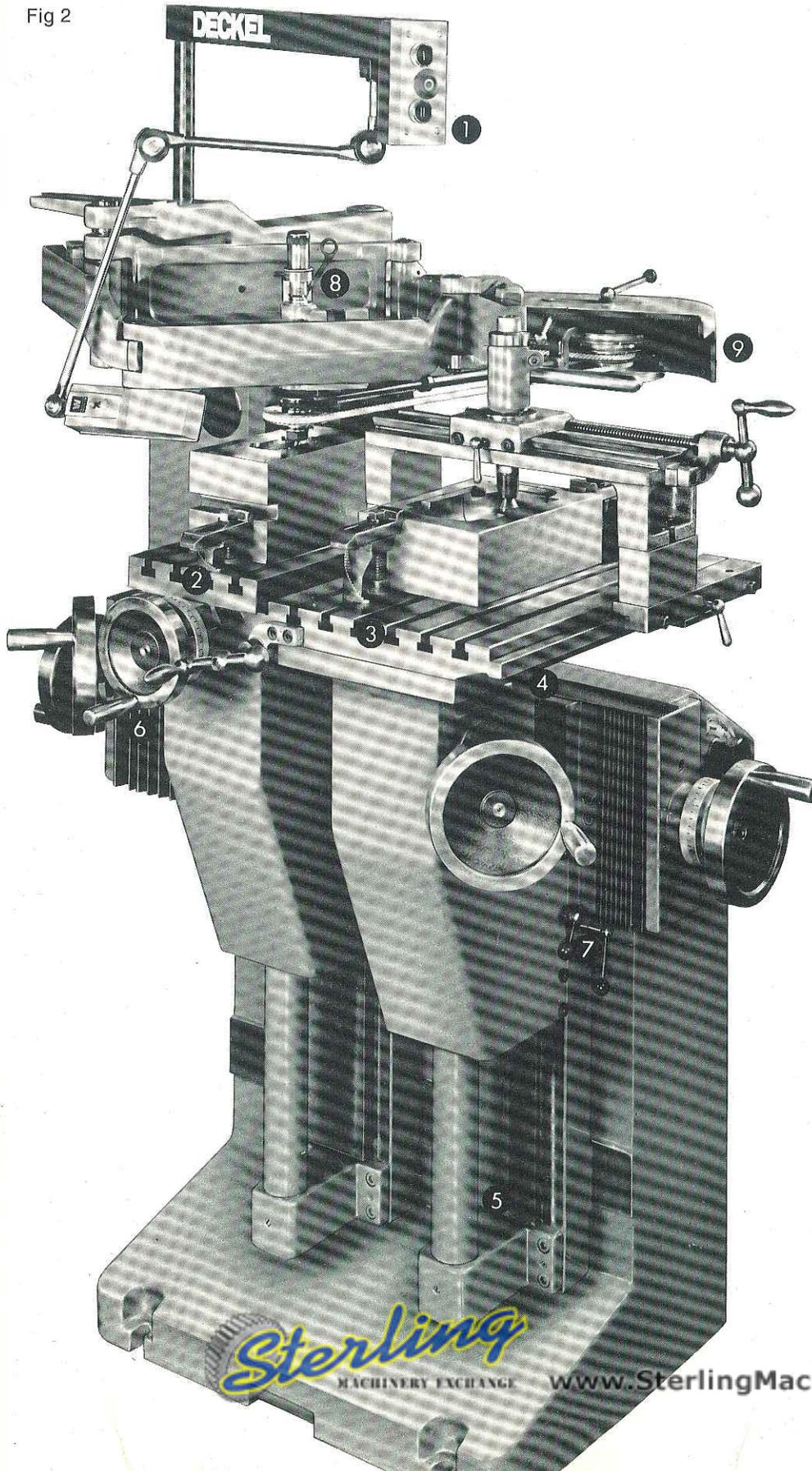


The GK 12 has a small pantograph and drive system. The lower weight of its moving parts make the machine particularly suitable for very delicate relief work, lettering, linear patterns and light milling cuts, e.g. on dies and moulds.

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Fig 2

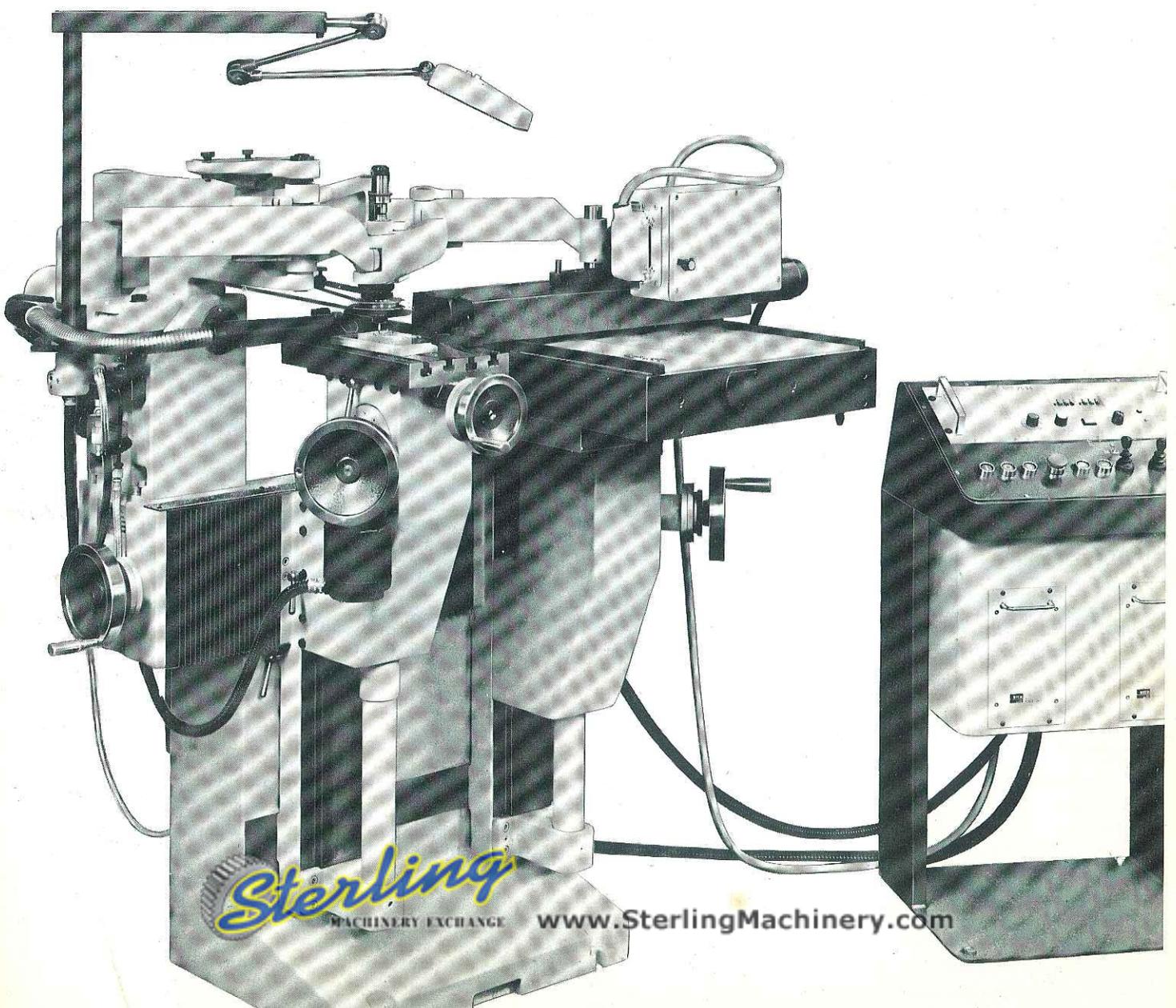


The GK 21 has a larger pantograph and a sturdier cutter spindle and can thus be used for copy milling work on dies and moulds of all kinds up to a total weight of approx 250 kg (550 lb). The positive control of the tracer pin permits a high rate of stock removal in rough milling operations. Many years of experience in the design and application of DECKEL machines have led to constant improvements and continuous adaptation to the ever growing demands of modern shop practice. Thus, apart from the modern styling, the new GK machines incorporate a number of interesting novel features. For example, a swivel-mounted control panel ① was added and the working height of the machine slightly reduced to provide greater handling ease, especially for operators working in a sitting position. The clamping areas of worktable ② and copyholder table ③ were increased, and the latter can be accurately set by means of a scale ④. The handwheel for the copyholder elevating screw is now provided in a convenient location on the copyholder bracket. Added rigidity is provided by the two support brackets ⑤. The longitudinal travel ⑥ of the worktable has been increased, the greater range being usable for components requiring a clear height of up to 230 mm (9"). The table bracket clamps ⑦ were placed at a conveniently accessible point. The cutter spindle of the GK 21 has a larger collet capacity, a greater locating hole for larger tools and an increased fine adjustment range ⑧. Both machines are now equipped with an improved belt guard ⑨. The new GK engraving and copy milling machines are thus a very successful blend of time-tested design elements with practical and convenient novel features—a sound basis for a further improvement in product quality and for even greater economy in the application of these high-efficiency machine tools.

GK 21 A

Fig 3

The GK 21 A is equipped with an optical scanning unit for copying directly from a drawing: the cutting tool is automatically guided at a preset reduction ratio, a preselected rate of feed, with automatic infeed increments and adjustable diameter correction. The machine provides a maximum of production economy in job work and small-batch production. The control system is highly versatile, handling even complicated contours, matching or mirror-image patterns, on plane or curved work-piece surfaces. The optical scanning unit can be easily removed for conventional two or three-dimensional copying operations.



Pantograph for reducing and enlarging work in two and three

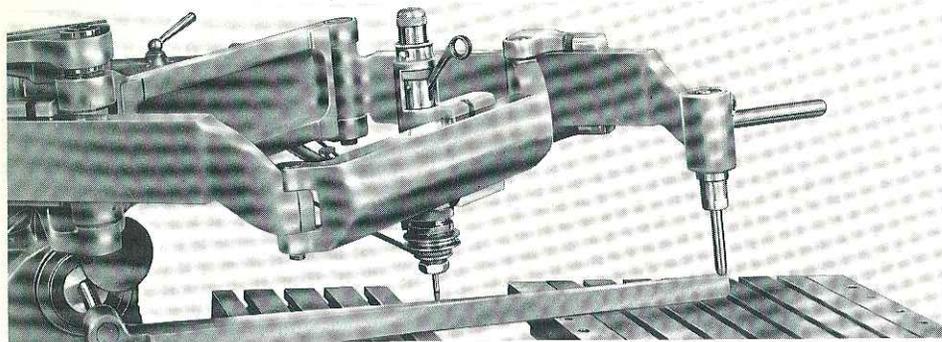


Fig 4 Aligning cutter and tracer pin with straightedge attachment

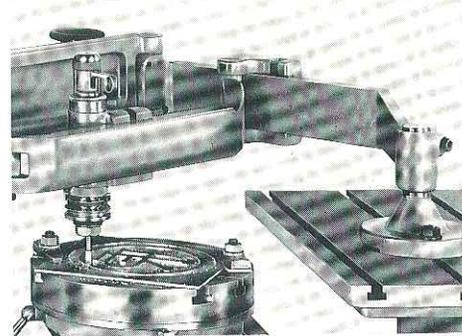


Fig 5 Pantograph locking attachment

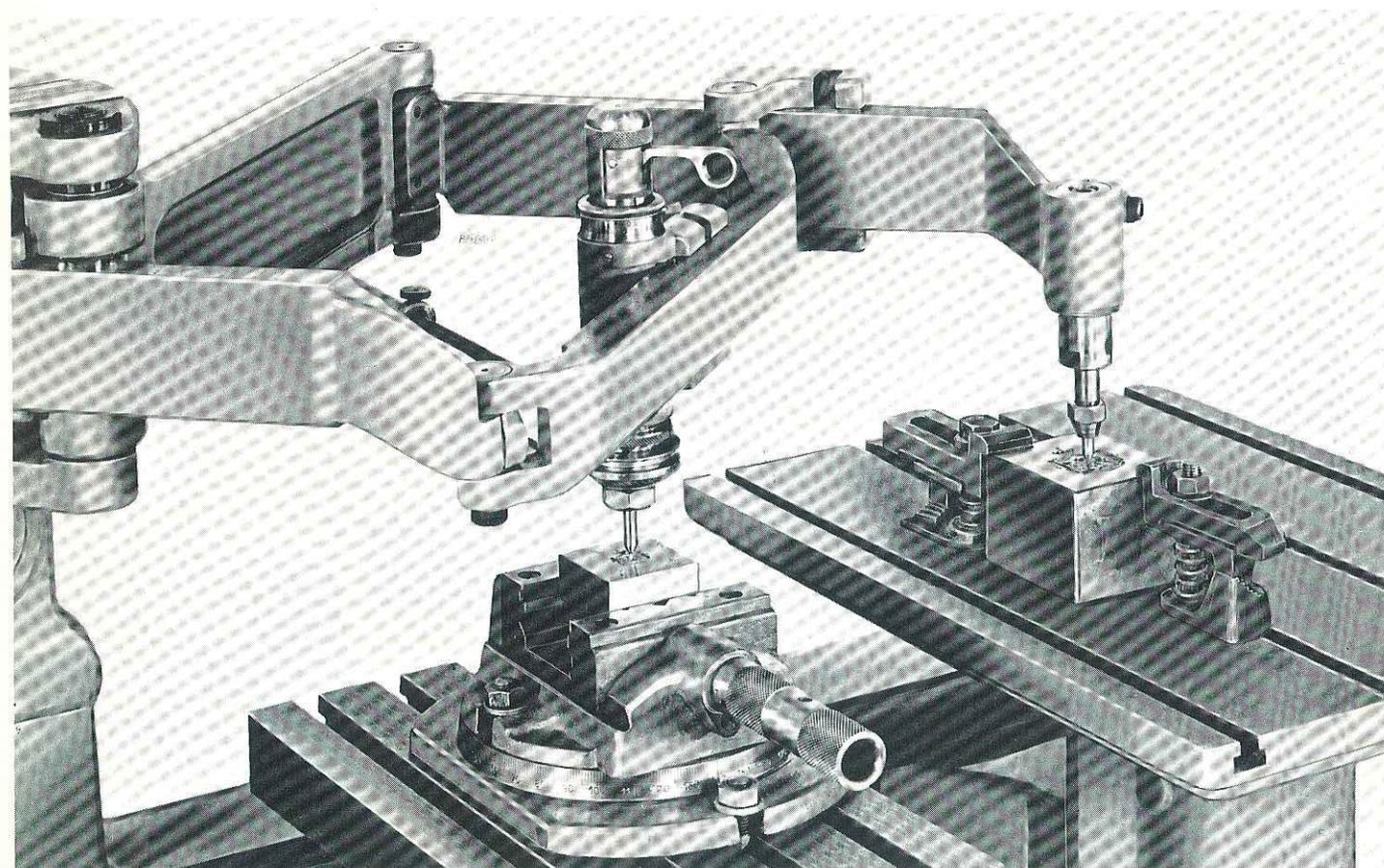


Fig 6 Reducing an escutcheon die from a steel master (GK 12)

The basic design feature of the GK machines is a pantograph which transfers all 3-dimensional tracer pin motions to the cutting tool, in the same direction and at a preset duplicating ratio. The pattern or master and the workpiece are always clamped in conjugate positions at roughly the same level, right in front of the operator, for maximum convenience and ease of operation.

or pattern contours if the diameters of tracer pin and cutter are selected in accordance with the duplicating ratio and if the points of tracer pin and cutter are in alignment with the axis of the horizontal pivot shaft. This latter condition can be met with the aid of a straightedge attachment (Fig 5). The weight of the pantograph assembly is counterbalanced in all positions by

antifriction bearings in all joints provide a high degree of accuracy and sensitivity in duplicating operations. The pantograph can be locked in the horizontal plane for 2-dimensional work or immobilized completely for plain tracing work without a pattern or master, e.g. by scribed lines (Fig. 6). The feed motions will then be performed by the workpiece. The duplicating ratio can be set directly

dimensions, with cutter spindle and spindle drive system

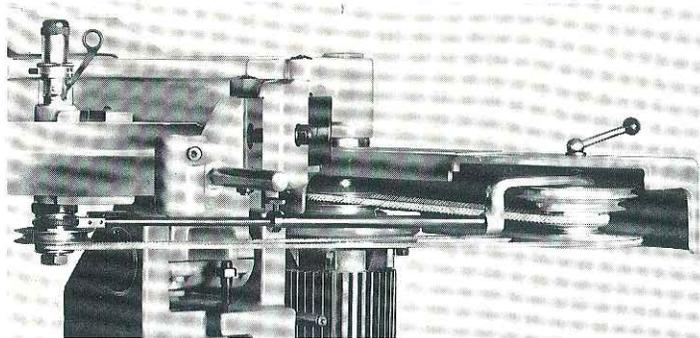


Fig 7 Spindle drive system

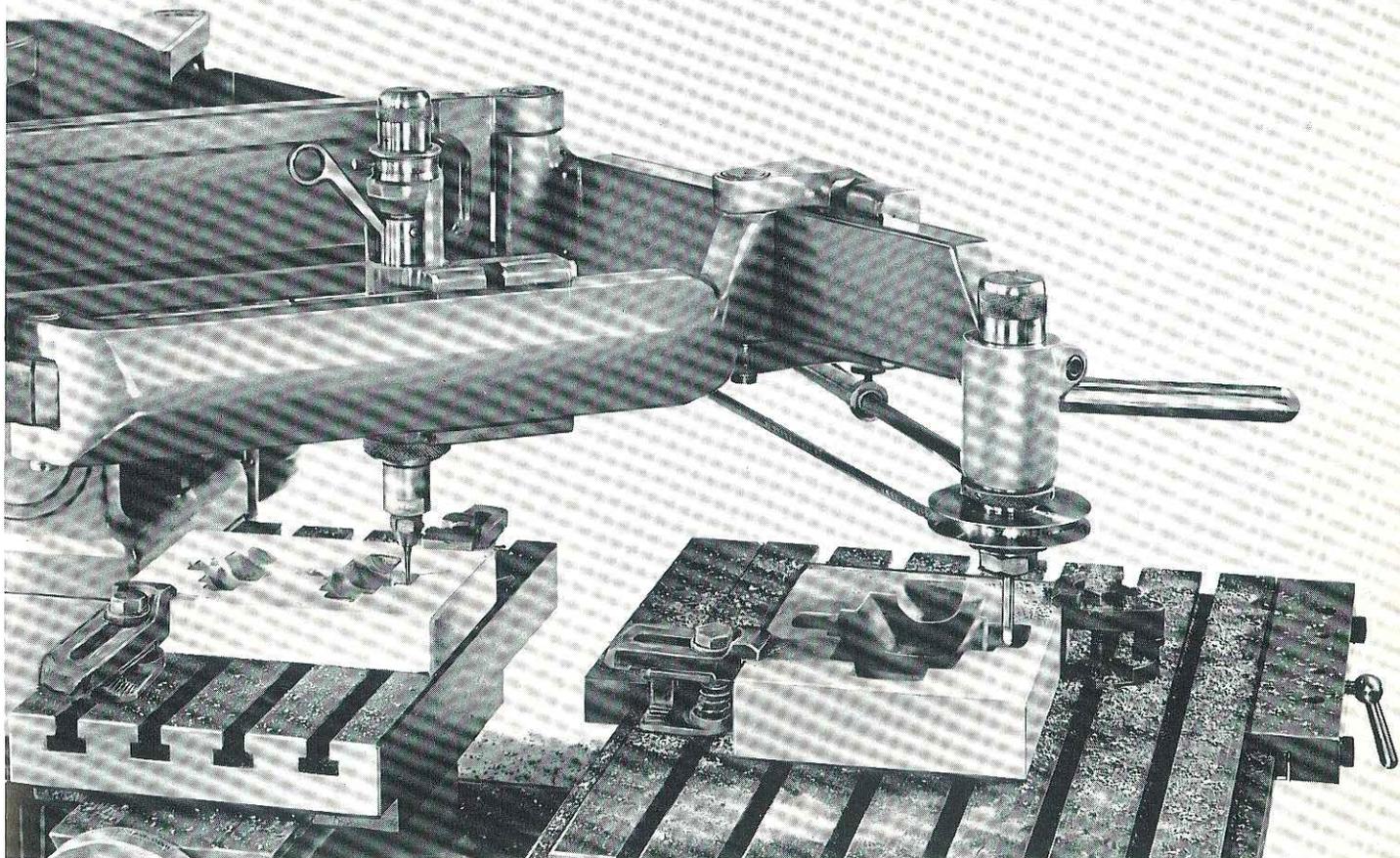


Fig 8 Enlarging a permanent casting mould from a cast resin master (GK 21)

machine has been designed for handling reducing (Fig 6) and enlarging (Fig 8) operations within a range of duplicating ratios from 1 : 1.5 to 1 : 10, the cutter spindle and tracer assembly being interchangeable as required.

The cutter spindle can be conveniently removed from its bayonet-type holder for maintenance purposes. Running in adjustable antifriction bearings designed for long life and high running accuracy

to withstand all the loads caused by high operational speeds and the use of single-lip cutters. The cutting tools are held by exchangeable spring collets.

The spindle top is provided with a combined coarse and fine vertical feed adjustment for rapid rising and lowering of the cutter in engraving interrupted linear patterns, characters, lettering and the like. The cutting depth is controlled by a stop in conjunction with a microm

The cutter spindle drive elements of the GK machine are easily movable within the full cutting range without being affected by the weight of the drive motor. Transmission of power to the cutter spindle is completely free of vibration. These are important prerequisites for a clean cut and a high degree of surface finish (Fig 7).

GK 21 A – automated copying directly from the drawing

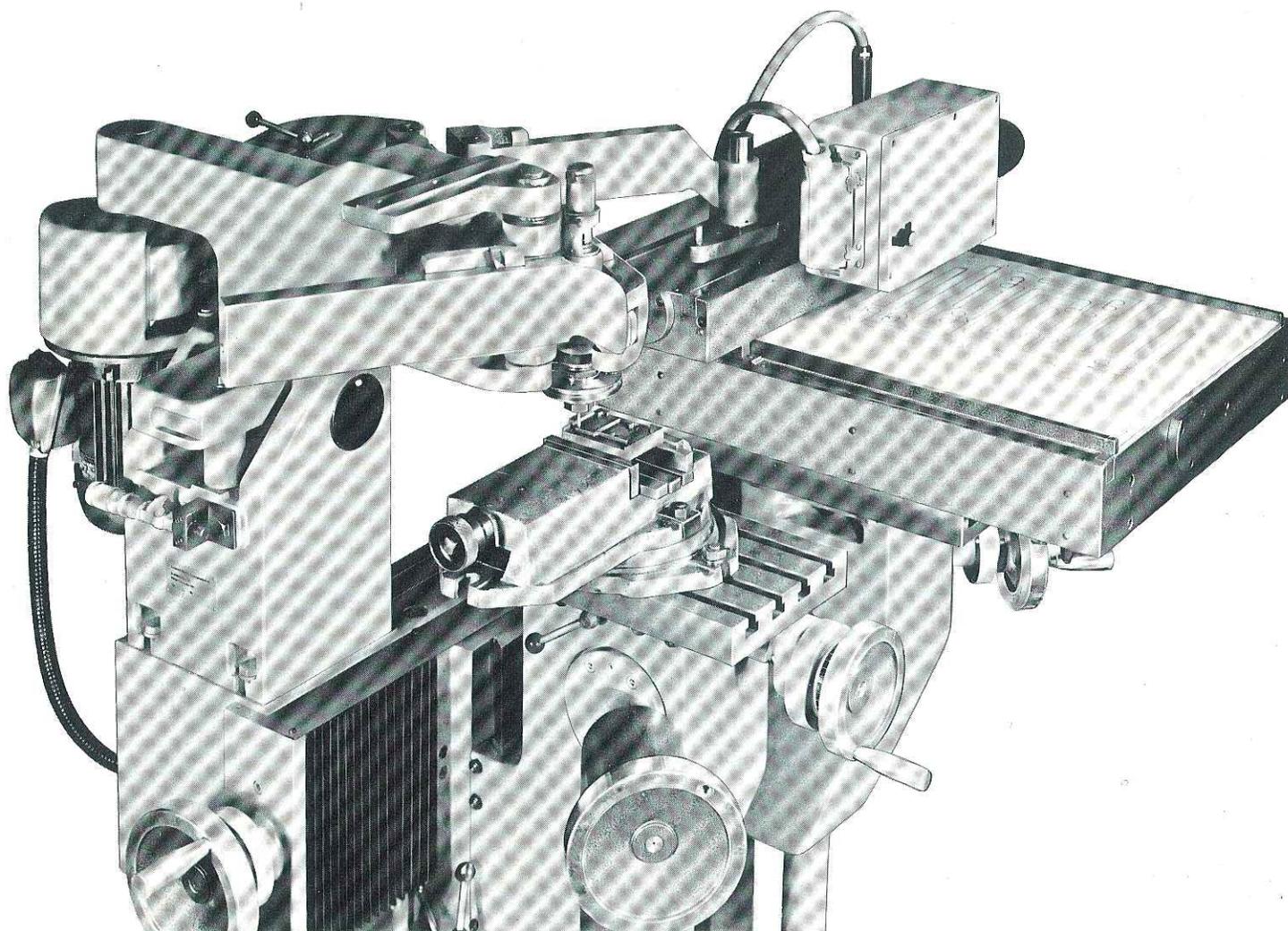
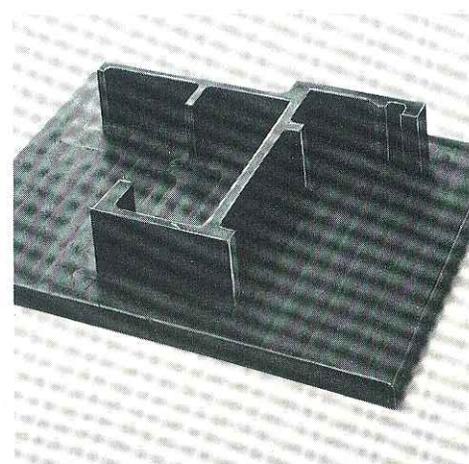


Fig 9 Copy milling of a graphite electrode, automatic, directly from drawing



Component: graphite electrode

Typical components

Fig 10

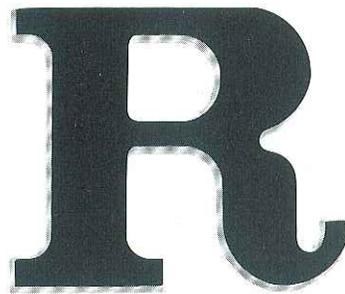


Fig 11

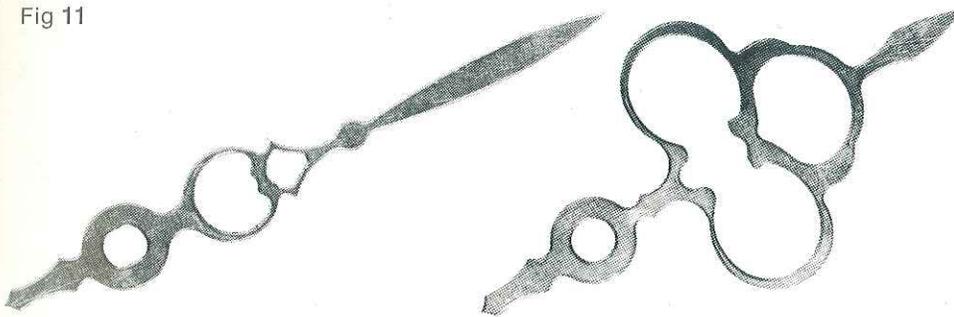


Fig 12



The GK 21 A has been designed for copy milling directly from a drawing. This introduces an element of rationalization into an operation so far characterized by extensive and costly manual work. The step from the drawing of freely selected patterns (e.g. ornaments, fancy lettering, etc.) or technically conditioned contours (e.g. close-tolerance punches and the corresponding blanking dies for complicated components) to the finished workpiece so far always involved the machining of highly accurate templates which had to be carefully marked out and then cut and often filed to size.

This is now a thing of the past: a simple drawing, true to scale, without dimensions, will be sufficient for controlling the machine. Additional control marks and lines for automatic withdrawal (and stop), downfeed (and feed motion) of the tool and for automatic change of contours (upon withdrawal) may be added as required.

This optical scanning unit not only saves the trouble of preparing templates but also reduces the machining time (because of automated operation) and the setup time (because of simple change of drawings). All operations can be repeated at any time without difficulty because drawings are easy to store and easy to reproduce.

The optical scanning system guides the tool automatically at a preselected reduction ratio and with adjustable tool diameter correction. The feed motion and the continuous depth feed can be set to suitable values for the job on hand. The duplicating ratio lies between 1 : 1.5 and 1 : 10. Other ratios are obtainable e.g. by photographic enlarging or reducing of the drawing. A mirror-image replica of the part will be easily produced by just using the reverse side of a transparent drawing.

The machine is not only suitable for milling and engraving jobs on plane surfaces (Fig 9) but can also be employed in conjunction with the forming attachment or roll engraving attachment. Similarly, this copying method directly from the drawing can be used together with the electromarking unit, an etching needle, etc.

Upon removal of the optical scanning unit, the machine will perform all normal engraving and copy milling operations of the standard GK model.

Forming attachment (Fig 13 and 14)

Roll engraving attachments (special equipment, Fig 15 and 16)

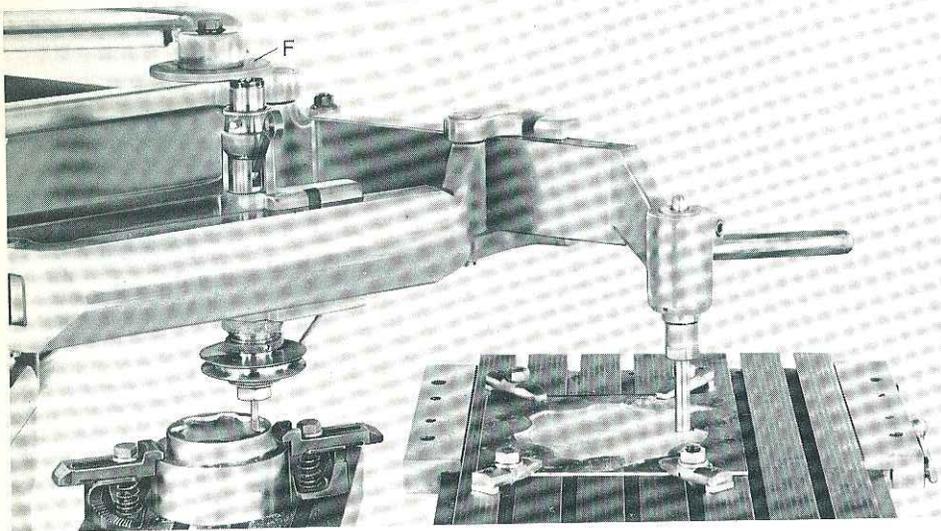


Fig 13 Milling of a convex compression mould with forming attachment. Convex shape obtained from forming guide (F), contour from template.

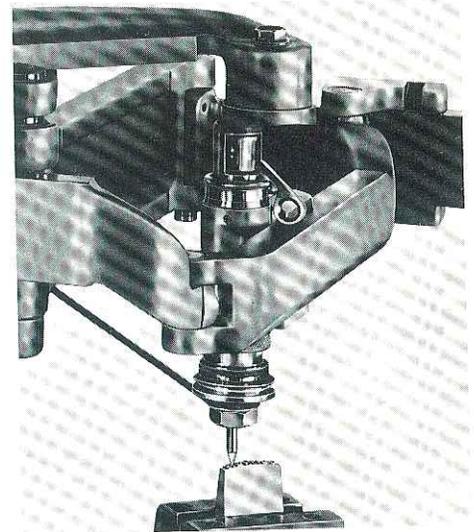


Fig 14 Engraving a curved marking die

The forming attachment permits engraving of linear patterns, lettering, etc., on curved surfaces with a uniform cutting depth. The cutter spindle, which is

spring-loaded in an upward direction in the pantograph set up for 2-dimensional milling, is urged against a forming guide F corresponding to the workpiece

surface. Any horizontal movement of the tracer pin will thus be converted to a curved motion of the cutter.

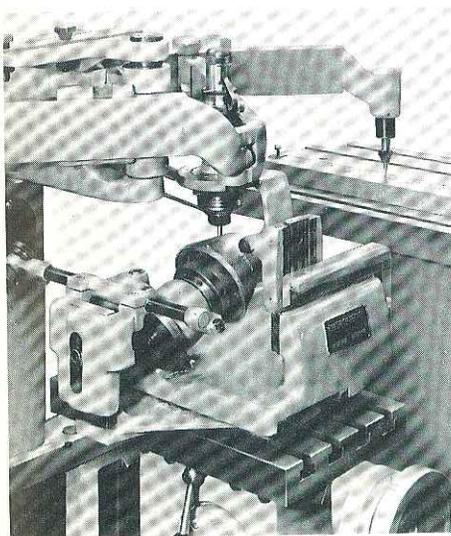


Fig 15 Engraving tapered component on roll engraving attachment

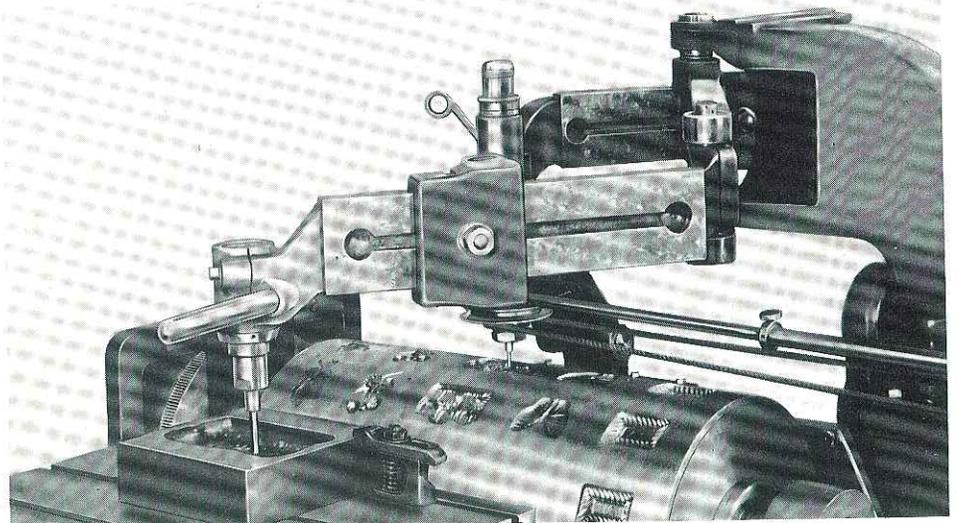


Fig 16 Engraving a biscuit roll on large roll engraving attachment. Table and pantograph mounted on raising blocks.

These attachments permit the use of normal templates or masters for engraving characters, linear patterns and designs, or 3-dimensional shapes on the entire circumference of cylindrical or tapered components without resetting the work. The template contours can be reproduced true to size, in a spread

Specification of roll engraving attachments

Work diameter	Max length of work	Weight, approx	Stock No.
20 ... 100 mm (3/4" ... 3 7/8")	240 mm (9 3/8")	27 kg (60 lb)	6021 000000
33 ... 150 mm (1 1/4" ... 5 7/8")	250 mm (9 3/4")	41 kg (90 lb)	6022 000000
130 ... 300 mm (5 1/4" ... 11 3/4")	500 mm (19 3/4")	88 kg (195 lb)	6024 000000 ²

¹ Component arranged for angular adjustment through 90°; suitable for tapered work and (up to a certain size) for engraving end faces.

² Raising blocks required for pantograph and copyholder table. Stock No. (set of 2): 6038 000013.

Rough milling attachment (special equipment for GK 21, Fig 17)

Electromarking unit (special equipment, Fig 18)

The rough milling attachment permits the use of multi-edge cutters up to 10 mm ($\frac{3}{8}$ ") diameter for obtaining high stock removal rates. The unit facilitates and accelerates the cutting operation and protects the pantograph, cutter spindle and cutting tool. The rough milling attachment consists of a compound slide rest of bridge design provided with feed screws for positively guiding the tracer pin along the contours of the pattern or master in a line-by-line operation.

Capacity, longitudinal feed:
350 + 180 mm ($13\frac{3}{4}$ " + $5\frac{7}{8}$ ");
cross feed: 280 mm (11").

Net weight: approx 65 kg (143 lb).

Stock No.

4611 000000 (metric)

4611 200000 (inch model)

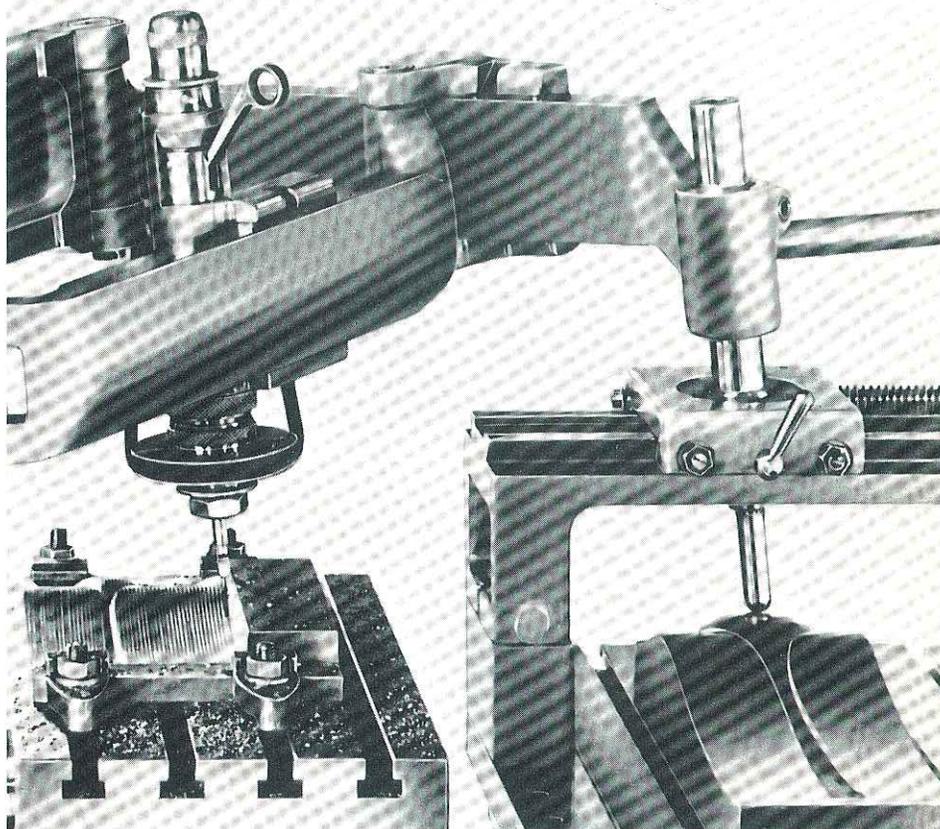


Fig 17

Machining of spoon die with rough milling attachment

The electromarking unit is particularly suitable for marking and identifying hard metal parts. The cutter spindle is replaced by a scribing head which, as in normal engraving, is controlled by the pantograph tracing a type template or following the desired contours on a drawing (GK 21 A). The trace of the electric arc on the work is adjustable between hairline width and approx 1 mm (0.04"). Suitable for AC power supply only.

Weight of complete unit:
approx 10 kg (22 lb).

Stock No., including foot switch and accessories: 4042 000000

Stock No. of mounting set (required for GK 21) 4043 000000

Spare tungsten electrodes, 2.5 mm (0.1") diameter

Stock No. (set of 10): 4071 000630

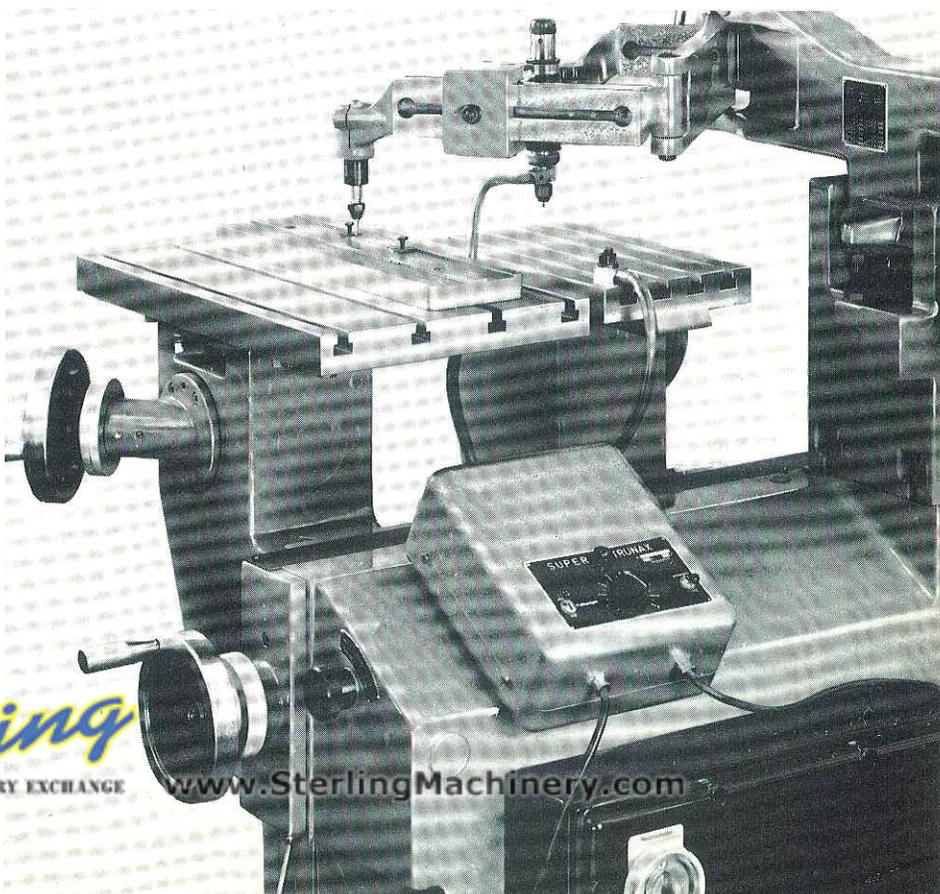


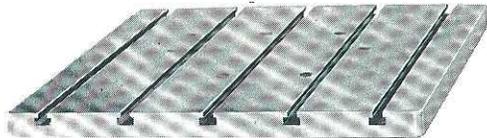
Fig 18

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Other special equipment

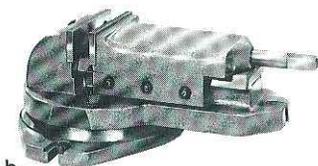
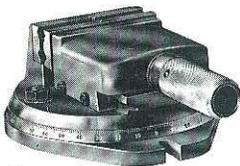
Auxiliary tables



Auxiliary tables are used for increasing the clamping area.

	For worktable	For worktable and copyholder table
Size	320 x 425 mm (12 ⁵ / ₈ " x 16 ³ / ₄ "	450 x 600 mm (17 ³ / ₄ " x 23 ⁵ / ₈ "
Stock No.	4010 000101	6010 000000

Machine vices



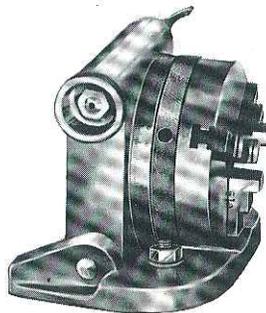
a

b

Vice 6013 (a) is fitted with grooved clamping jaws for holding different work shapes; vice 6012 (b) has plain jaws for clamping large components. Top section of both vices adjustable through 360°

Clamping capacity	55 mm (2 ¹ / ₈ "	80 mm (3 ¹ / ₈ "
Width of jaws	85 mm (3 ³ / ₈ "	110 mm (4 ³ / ₈ "
Overall height with base	85 mm (3 ³ / ₈ "	115 mm (4 ¹ / ₂ "
without base	65 mm (2 ⁵ / ₈ "	90 mm (3 ¹ / ₂ "
Stock No.	6013 000000	6012 000012

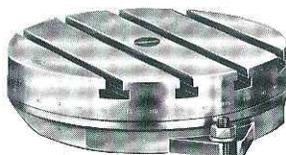
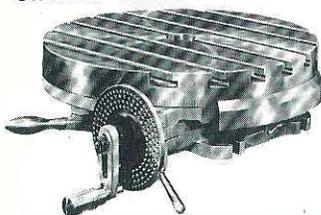
Index head



The three-jaw chuck of this clamping and indexing fixture is fitted with external and internal jaws, can be tilted 90°, rotated 360° and locked in any desired position. Indexing accuracy ± 2.5 min of arc. Rotation either by means of worm drive (fine adjustment to graduated scale) or by hand with the worm disengaged.

	Chuck axis horizontal	vertical
Overall height	138 mm (5 ¹ / ₂ "	
Max work diameter	95 mm (3 ³ / ₄ "	110 mm (4 ³ / ₈ "
Stock No.	6018 000000	

Circular tables



Coarse adjustments to 360° scale by means of zero mark or adjustable vernier; lockable in any position. Indirect indexing (up to 5220 divisions) by means of index plates and tabular values; direct indexing with 24-register index plate. Indexing accuracy ± 90 sec of arc.

Clamping surface dia	230 mm (9")	380 mm (15")
Overall height	60 mm (2 ³ / ₈ "	110 mm (4 ³ / ₈ "
Stock No.	6016 000000	6017 000000

Type template holders



Mounted by means of T-slot bolts.

Number of grooves	Height of letters	Dimensions	Stock No.
2	20 mm	120 x 440 mm	6015 000000
2	3/4"	4 ³ / ₄ " x 17 ³ / ₈ "	6015 200000
1	40 mm	100 x 500 mm	4015 000101
1	40 mm	100 x 800 mm	4015 000102

Universal copy dial



For simple composition and rapid exchange of type templates in fixed tracing positions. Base plate mounted on copyholder table by means of clamps. Rotatable top provided with holes and slots for prong-type templates. Top plate locked by means of pawl engaging peripheral teeth; diameter 200 mm (7⁷/₈").

Stock No. 4512 000000

Serial numbering holder



For frequently changing numbers or identifications. Capacity: seven adjustable copy strips (figures and/or characters) held in desired position by means of detent pins.

Size 115 x 200 mm (4¹/₂" x 7⁷/₈").
Stock No. 4017 000000

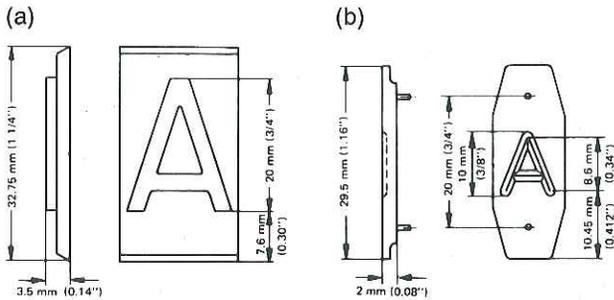
Numbering wheel engraving device



For engraving of numbering wheels, date wheels, and similar parts. Supplied with 12 mm (1/2") spring collet, 10-register index plate and work locating arbor. Other index plates and collets on request. Max clamping width 50 mm (2"). Stock No. (including template holder)¹: 4014 000000 (mm); 4014 200000 (in).

¹ Optional: master copy strip with raised reflected numerals, as shown. Special strips available on request.

Exchangeable type templates



Dovetail type templates, raised characters

Prong-type templates, sunk characters

Standard lettering on a workpiece is normally engraved with the aid of exchangeable type templates composed as required and mounted on the copyholder table. The templates are of a wear-resistant material; casehardened steel templates for special applications are available on request.

Fig. (a) shows normal dovetail templates, Fig. (b) prong-type templates for the universal copy dial.

Standard block letters (to DIN 1451 specification) are available in 6 widths: extra narrow, narrow, medium narrow, medium, medium wide, wide; and in 4 styles: sunk, direct reading; sunk, reflected; raised, direct reading; raised, reflected. All type templates can be supplied individually, in standard sets of 1 each (88 characters) and in extended sets (206 characters, frequent letters contained several times). For details on our comprehensive assortment of standard and special type templates, skeleton characters and special-purpose templates please consult our catalogue No. 2103 "Type Templates for Letter Engraving Machines".

Dust exhaust unit

For convenient removal of dust and dry chips. Stock No. 2068 001100 (110 V/50 Hz); 2068 002200 (220 V/50 Hz). Angular rubber tube (supplementary, see page 5, Fig 3). Stock No. 4601 000135.

Air supply line

Comprising blast pipe, holder, hose line, valve, etc. Stock No. 4601 000065.

Single-lip cutter (GK 12 up to 6 mm — 1/4" dia; GK 21 up to 10 mm — 3/8" dia)



Form	Material	Diameter mm in	Length mm in	mm	Stock No. in
Cylindrical	HSS 2	2.5 —	40 —	6071 002003	—
		— 1/8	— 2 3/8	—	6071 203003
	HSS 3	4 3/16	63 2 3/4	6071 003004	6071 203004
		6 1/4	80 3 1/8	6071 003006	6071 203006
		8 5/16	90 3 1/2	6071 003008	6071 203008
		8 —	125 —	6071 003080	—
	HSS 5	10 3/8	125 4 3/4	6071 003010	6071 203010
		— 1/8	— 2 3/8	—	6071 205003
		4 3/16	63 2 3/4	6071 005004	6071 205004
		6 1/4	80 3 1/8	6071 005006	6071 205006
	All carbide, grade P 40	8 5/16	90 3 1/2	6071 005008	6071 205008
		8 —	125 —	6071 005080	—
10 3/8		125 4 3/4	6071 005010	6071 205010	
4 —		63 —	6071 033104	—	
All carbide, grade K 10	6 1/4	80 3 1/8	6071 033106	6071 233106	
	8 5/16	90 3 1/2	6071 033108	6071 233108	
	8 —	125 —	6071 033180	—	
	10 3/8	125 4 3/4	6071 033110	6071 233110	
All carbide, grade P 40	— 1/8	— 2 3/8	—	6071 244103	
	4 3/16	63 2 3/4	6071 044104	6071 244104	
	6 1/4	80 3 1/8	6071 044106	6071 244106	
	8 5/16	90 3 1/2	6071 044108	6071 244108	
All carbide, grade K 10	8 —	125 —	6071 044180	—	
	10 3/8	125 4 3/4	6071 044110	6071 244110	
	4 3/16	63 2 3/4	6071 033604	6071 233604	
	6 1/4	80 3 1/8	6071 033606	6071 233606	
20° taper	8 —	90 —	6071 033608	—	
	4 3/16	63 2 3/4	6071 044604	6071 244604	
	6 1/4	80 3 1/8	6071 044606	6071 244606	
		8 —	90 —	6071 044608	—



Other special equipment

Single-lip cutters

a



b



c



High-speed steel (HSS) single-lip cutters with DECKEL "GA" taper shank.

Overall length 45 mm (1 3/4"); length of cut 22 mm (7/8").

(a) 90° cutter, tapered, 4 mm (5/32") cutting diameter.
Stock No. 4071 001314

(b) Half-round cutter, tapered, 4 mm (5/32") cutting diameter.
Stock No. 4071 001324

(c) Half-round cutter, cylindrical, 6 mm (1/4") cutting diameter.
Stock No. 4071 001336

End mills, HSS



spiral-fluted

Cutter dia		Shank dia		Length of cut		Overall length		Stock No.	
mm	in	mm	in	mm	in	mm	in	mm	in
8	5/16	8	5/16	25	1	70	2 3/4	6070 020008	6070 220008
10	3/8	10	3/8	30	1 1/16	85	3 3/8	6070 020010	6070 220010

End mills, ball-nosed, HSS



Cutter dia		Length of cut		Overall length		Stock No.	
mm	in	mm	in	mm	in	mm	in
6	1/4	25	1	75	3	6070 008003	6070 208003
8	5/16	35	1 3/8	90	3 5/8	6070 008004	6070 208004
10	3/8	45	1 3/4	100	4	6070 008005	6070 208005

Cutting tools with 8 mm (5/16") or 10 mm (3/8") shank diameter to be used on GK 21 machine only.

We recommend the use of a S0 Single-lip Cutter Grinder for proper grinding of cutting tools.

Etching needle



Shank diameter 6 mm (1/4"); overall length 51 mm (2"); with 2 spare inserts.

Stock No. 4071 000620 (mm); 4071 200620 (in).

Template tracer pin



For tracing standard sunk type templates; shank diameter 6 mm (1/4"); overall length 100 mm (4").

Stock No. 4001 000324 (mm); 4001 200324 (in).

Guide pins



For tracing templates with vertical edges; shank diameter 6 mm (1/4"); overall length 100 mm (4").

Stock No. (complete set): 4073 040101 (metric, 8 pins);
4073 240101 (inch, 9 pins).

End diameter		Stock No.		End diameter		Stock No.	
mm	in	mm	in	mm	in	mm	in
0.5 / 0.6	0.020 / 0.025	4073 000101	4073 200101	3.0 / 3.5	0.080 / 0.090	4073 000106	4073 200106
0.8 / 1.0	0.030 / 0.035	4073 000102	4073 200102	4.0 / 4.5	0.100 / 0.125	4073 000107	4073 200107
1.2 / 1.4	0.040 / 0.045	4073 000103	4073 200103	5.0 / 6.0	0.150 / 0.175	4073 000108	4073 200108
1.6 / 1.8	0.050 / 0.055	4073 000104	4073 200104		0.200 / 0.200	—	4073 200109
2.0 / 2.5	0.060 / 0.070	4073 000105	4073 200105				

Tracer pins

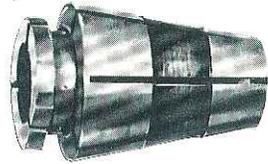


Tracer pins, 12 mm (1/2") shank diameter.

Stock No. (set of 9): 4073 042103 (mm); 4073 242103 (in).

Feeler dia		Feeler length		Overall length		Stock No.	
mm	in	mm	in	mm	in	mm	in
3	1/8	20	3/4	150	5 7/8	4073 002103	4073 202103
4	5/32	40	1 1/2	150	5 7/8	4073 002104	4073 202104
5	3/16	50	2	150	5 7/8	4073 002105	4073 202105
6	1/4	60	2 1/4	180	7 1/8	4073 002106	4073 202106
8	5/16	70	2 3/4	200	7 7/8	4073 002108	4073 202108
10	3/8	90	3 1/2	220	8 5/8	4073 002110	4073 202110

Spring collets



For GK 12; length 20 mm ($13/16$ "'). For GK 21; length 24 mm ($15/16$ "').

Inside dia		Stock No.		Inside dia		Stock No.	
mm	in	mm	in	mm	in	mm	in
2.5	$1/8$	6043 000125	6043 200132	2.5	$1/8$	6043 000225	6043 200232
4	$3/16$	6043 000140	6043 200148	4	$3/16$	6043 000240	6043 200248
6	$1/4$	6043 000160	6043 200164	6	$1/4$	6043 000260	6043 200264
				8	$5/16$	6043 000280	6043 200279
				10	$3/8$	6043 000210	6043 200295

Taper adapters



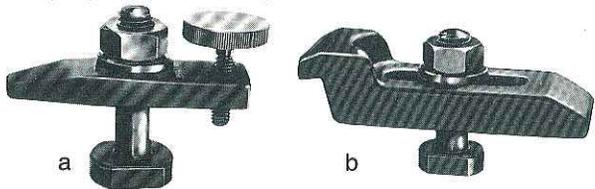
Taper adapters with DECKEL "GA" internal taper for GK 12, overall length 20 mm ($3/4$ "'); Stock No. 6043 000356; for GK 21, overall length 24 mm ($15/16$ "'); Stock No. 6043 000456.

Type clamps



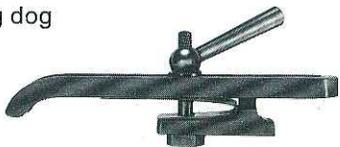
For lateral clamping of master copy types in type template holders.
20 mm ($3/4$ "') height of letters:
Stock No. (set of 2) 4047 010010 (mm); 4047 210010 (in).
40 mm ($1\ 1/2$ "') height of letters:
Stock No. (set of 2) 4047 010012

Clamping straps and dogs



(a) Clamping strap for small work; max clamping range 10 mm ($3/8$ "').
Stock No. (set of 2): 6047 010213
(b) Clamping dogs with clamping ranges 15...20, 15...30, 20...40, 35...60, 55...80, 80...105, 115...140 mm
($5/8$ "... $7/8$ "', $5/8$ "... $1\ 1/4$ "', $7/8$ "... $1\ 5/8$ "', $1\ 3/8$ "... $2\ 3/8$ "', $2\ 1/8$ "... $3\ 1/8$ "', $3\ 1/8$ "... $4\ 1/8$ "', $4\ 1/2$ "... $5\ 1/2$ "').
Stock No. (complete double set of 14): 6047 010001

Spring loaded clamping dog



For clamping large, thin parts; max clamping range 12 mm ($1/2$ "').
Stock No. (set of 2): 6047 010217.

Helix clamps



Clamping ranges 0...45, 15...45, 30...75, 60...135, 120...195, 180...255 mm (0... $1\ 3/4$ "', $5/8$ "... $1\ 3/4$ "', $1\ 1/4$ "...3", $2\ 3/8$ "... $5\ 1/4$ "', $4\ 3/4$ "... $7\ 5/8$ "', $7\ 1/8$ "...10").
Stock No. (complete double set of 12): 6048 010012

Articulated lamp



Three joints, with two fluorescent tubes 4 W, 24 V. To be mounted on swivelling control panel (GK 21) or on lamp holder (GK 21 A).
Stock No. 4650 000240.

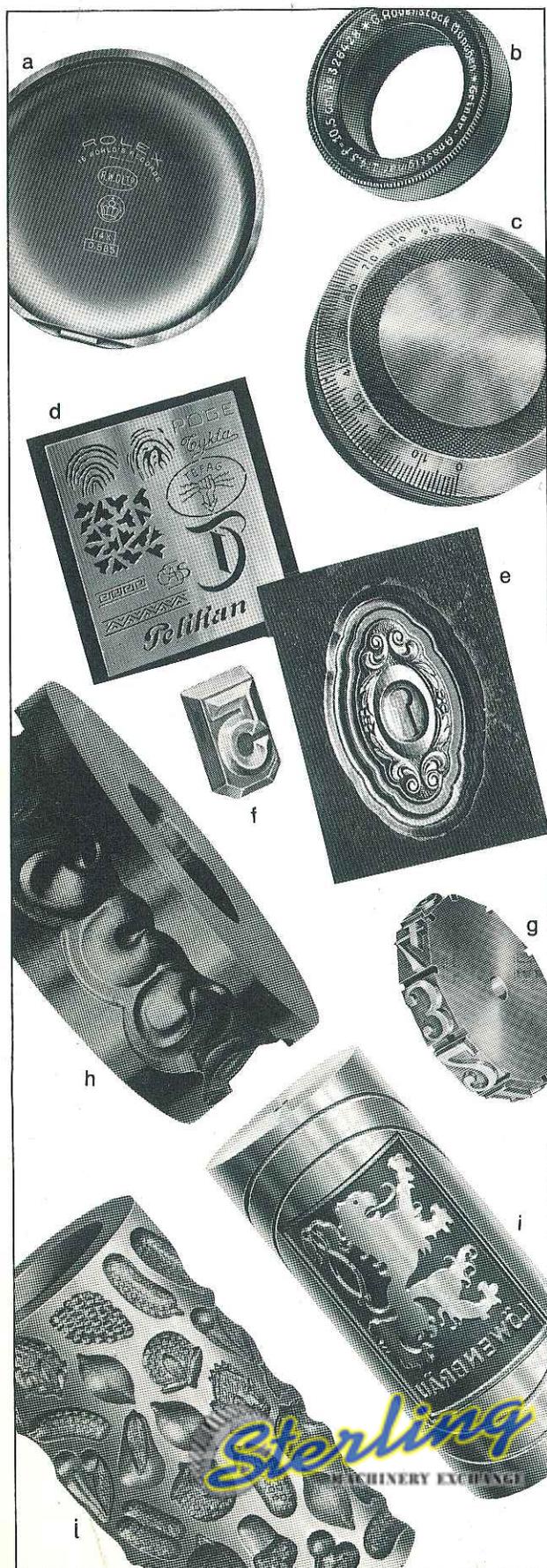
Lamp holder (GK 21 A only), Stock No. 4602 000380.



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Plastic machine cover: Stock No. 6580 0002.

Typical work – GK 12



(a) Watch cover with delicate, shallow engraving work produced by a spring-loaded, hardened and polished stylus.

(b) Lens mount engraved with special-purpose template and forming attachment.

(c) Graduation, $\frac{2}{3}$ actual size, engraved on index head.

(d) Spray painting stencils, brass, 1.2 mm (0.05") thick, $\frac{1}{2}$ actual size.

(e) Embossing die for keyhole plate, steel, $\frac{1}{3}$ actual size.

(f) Marking punch, steel, $\frac{1}{2}$ actual size, 4 mm (0.16") deep.

(g) Numbering wheel, steel, actual size.

(h) Picture frame forming roll, steel, 150 mm (6") diameter.

(i) Printing roll, brass, approx. $\frac{1}{2}$ actual size, engraved on almost entire surface, using roll engraving attachment.

(j) Candy forming roll, bronze, $\frac{1}{2}$ actual size, engraved on entire surface, using roll engraving attachment.

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(k)
Rubber sole mould, steel, $\frac{1}{3}$ actual size, rough cut by means of rough milling attachment, finishing work with the aid of a flat zinc template. Recesses and grooves by resetting the workpiece and using profiled cutters.

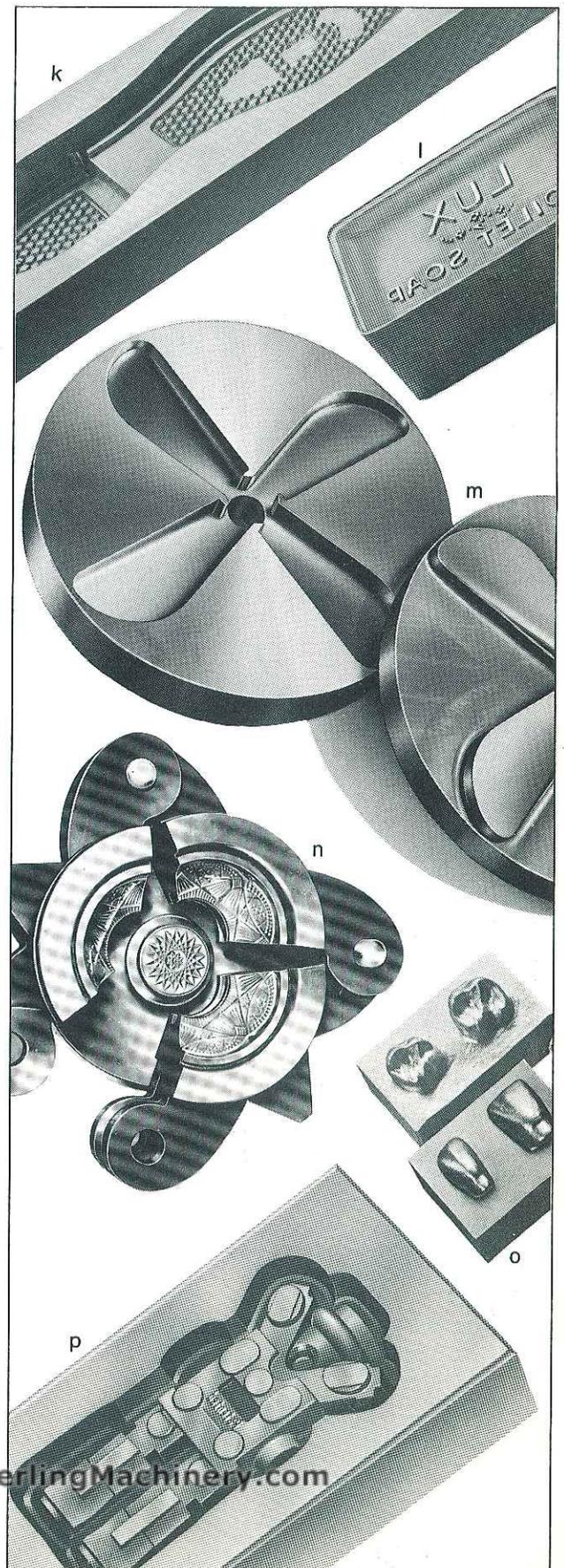
(l)
Soap cake mould with raised letters, stainless steel, approx. $\frac{1}{2}$ actual size, crowned surface transferred from master, lettering from flat template, using suitable forming guide in forming attachment.

(m)
Mould for fan rotor, steel, $\frac{1}{5}$ actual size, negative master cast from a larger pattern. Depth of cavities and, as a result, thickness of rotor blades controlled by using cutters of different diameters in the copy milling operation.

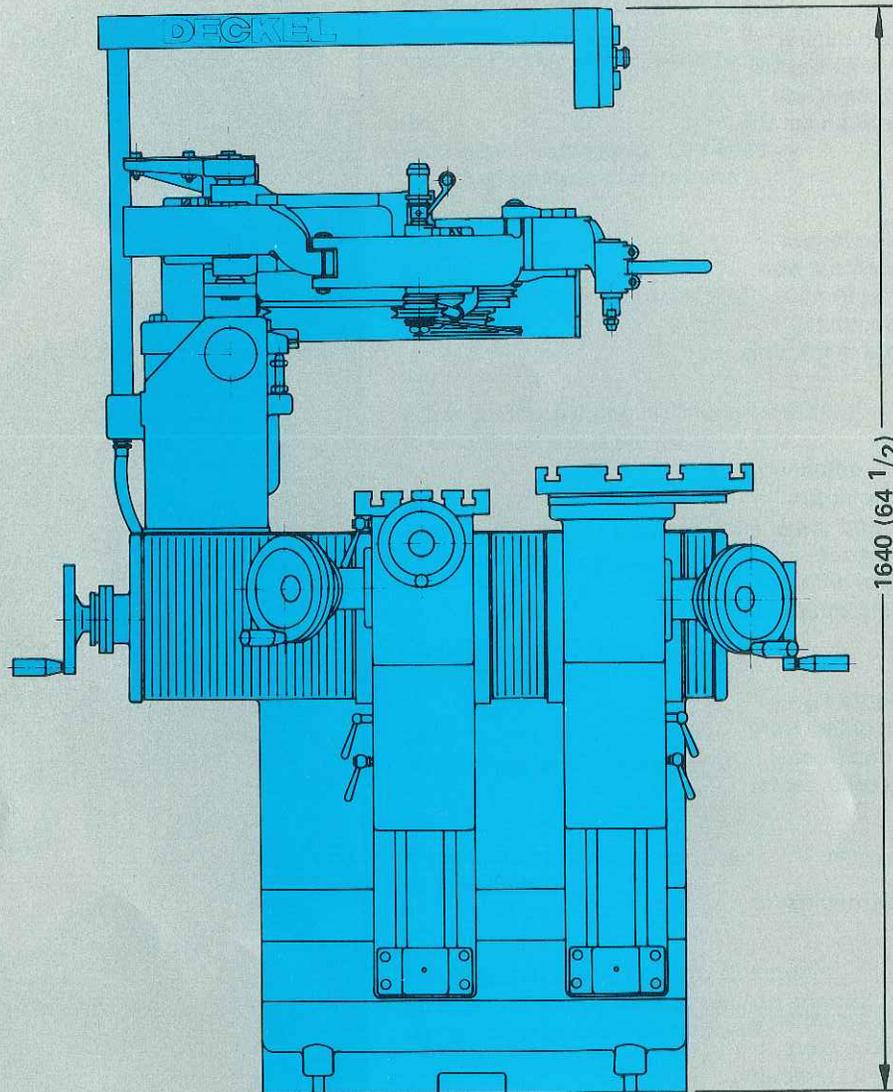
(n)
Split glass mould, special-grade grey cast iron, centre section copied from plastics pattern, wall sections from bronze master of repetitive ornamental pattern.

(o)
Steel dies for producing the moulds for artificial teeth.

(p)
Mould for housing, steel, $\frac{3}{4}$ actual size, grooves obtained by profiled cutters, raised lettering copied from flat template.



Technical data



		GK 12	GK 21
Drive motor		GK 12	GK 21
Power		0.25 kW (0.35 hp)	0.37/0.55 kW (0.5/0.75 hp)
Speed (GK 21: pole-changing)		2800 rpm	1400/2800 rpm
Cutter spindle			
Collet capacity		6 mm (1/4")	10 mm (3/8")
Spindle vertical adjustment	fine	1 mm (0.04")	6 mm (1/4")
	coarse	3 mm (1/8")	6 mm (1/4")
Speed range	rpm	1600...20000	475...9500
(with finish milling spindle)			3150...20000

	GK 12	GK 21
Worktable		
Clamping area	200 x 360 mm (7 7/8" x 14 1/8")	
Max distance, spindle nose from table surface	375 mm (14 3/4")	390 mm (15 3/8")
Longitudinal adjustment	160 mm (6 1/4")	
Transverse adjustment	300 mm (11 3/4")	
Vertical clearance between spindle and top of column	275 mm (10 3/4")	290 mm (11 3/8")
Max weight of work, approx.	250 kg	(550 lb)

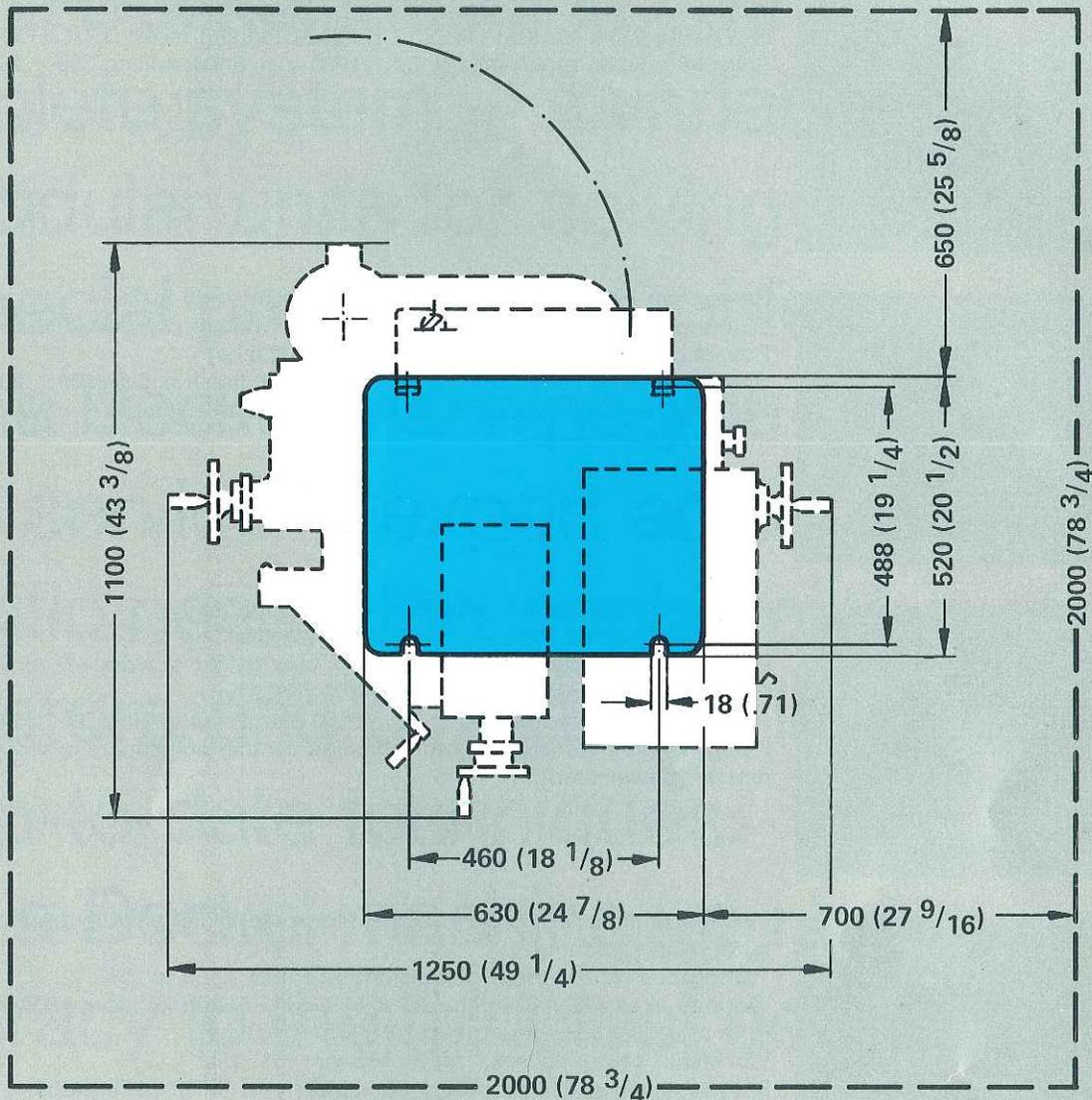
Pantograph		
Max ratio	1:1.5	1:1.5
Min ratio	1:10	1:10

Copyholder table	
Clamping area	320 x 520 mm (12 1/2" x 20 1/2")
Max distance, spindle nose from table surface	290 mm (11 3/8")
Swivel range	360°
Weight of machine,	524 kg 570 kg



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GK 21 A: additional space of 540 x 460 mm (22" x 18") required for console.

Areas covered by pantograph

Pantograph ratio	GK 12			
	Rectangle mm	Square mm	Ellipse mm	Circle mm
1: 1.5	145 x 320	153	155 x 400	155
1: 2.0	112 x 255	148	155 x 310	174
1: 3.0	75 x 150	98	106 x 210	126
1: 4.0	55 x 115	73	80 x 160	94
1: 6.0	36 x 75	48	52 x 105	61
1: 8.0	26 x 52	34	36 x 75	43
1: 10.0	18 x 44	22	23 x 55	23

GK 21				
1: 1.5	165 x 335	174	176 x 450	176
1: 2.0	122 x 255	162	160 x 320	200
1: 3.0	80 x 173	107	115 x 230	138
1: 4.0	62 x 125	81	92 x 155	104
1: 6.0	37 x 87	52	57 x 110	67
1: 8.0	26 x 63	37	42 x 76	47
1: 10.0	15 x 50	24	25 x 65	25

Supplementary data for GK 21 A

(technical data of basic machine same as GK 21):
Scanning area 594 x 420 mm (23 3/8" x 16 1/2"),
equivalent to DIN A2 paper format.

Width of drawing lines: contours 0.2 ... 0.7 mm
(0.08" ... 0.28"); connecting lines between
contours 0.4 ... 0.6 mm (0.016" ... 0.024").

Accuracy, referred to drawing, approx 0.1 mm
(0.004"). Repeat accuracy ± 0.02 mm (0.0008").

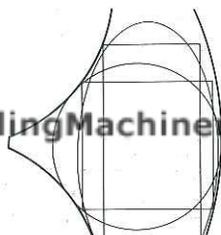
Scanning rate 0 ... 1 m/min (40 ipm).

Tool diameter compensation 0 ... 12 mm (1/2").
Depth feed per scanning cycle 0.005 ... 5 mm

(0.0002" ... 0.2").

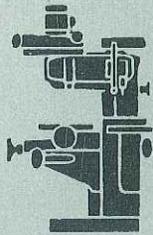
Max depth feed rate
50 mm/min (2 ipm).

Weight of machine,
complete with compound
table, optimal scanning unit
and control console
845 kg (1860 lb).



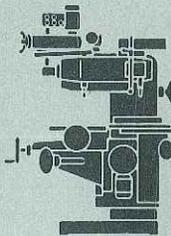
Universal copy milling machines

KF1



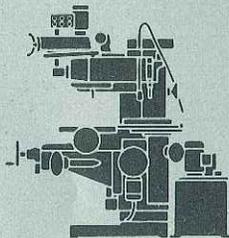
Pantograph ratios (three-dimensional): 1:1 or 1:1.5 to 1:4.
Working area 410 x 450 mm (16" x 18"). Max height of work 430 mm (17").
Worktable 450 x 450 mm (18" x 18"). Pole-changing motor 1.1/1.3 kW (1.5/1.75 hp).
Spindle speeds, rough milling 60...1000 rpm, finish milling 350...20000 rpm.

KF2



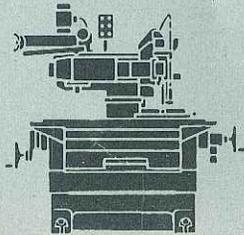
Pantograph ratios (three-dimensional): 1:1 or 1:1.5 to 1:4.
Working area 510 x 450 mm (20" x 18"). Max height of work 475 mm (19").
Pole-changing drive motor 1.3/1.8 kW (1.75/2.5 hp).
Spindle speeds, rough milling 80...1000 rpm, finish milling 500...20000 rpm.
Equipped with vertical slide for common vertical adjustment of work and master (power feed).

KF2S



Machine with hydraulic servo control for rough milling.
Pantograph ratios (three-dimensional): 1:1 or 1:1.5 to 1:4.
Working area 510 x 450 mm (20" x 18"). Max height of work 475 mm (19").
Pole-changing drive motor 1.3/1.8 kW (1.75/2.5 hp).
Spindle speeds, rough milling 80...3150 rpm, finish milling 500...20000 rpm.
Equipped with vertical slide for common vertical adjustment of work and master (power feed).

KF3S



Machine with hydraulic servo control for rough milling and hydraulic line feed in finish milling.
Pantograph ratios (three-dimensional) :1:1 or 1:1.5 to 1:4.
Working area 680 x 620 mm (26" x 24"). Max height of work 450 mm (18").
Pole-changing drive motor 1.3/1.8 kW (1.75/2.5 hp).
Worktable clamping area 1400 x 555 mm (56" x 22").
Spindle speeds, rough milling 80...3150 rpm, finish milling 500...20000 rpm.

Single-lip cutter grinders

**S0
S0E**



Drive motor 0.25 kW (0.35 hp) on S0; 0.55 kW (0.75 hp) on S0E.
Spindle speed 4500 rpm.
Grinding wheel diameter 100 mm (4").
Max clamping capacity with collet 17.5 mm (5/8");
with special index head slide 25 mm (1").
Max relief angle 45°.
S0E only: built-in dust exhaust unit; measuring projector.

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