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The DRUMMOND 4in. Lathe.



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HIGH CLASS MACHINE TOOLS



THE DRUMMOND 4"

'A' Type, Cylindrical Bed Model Makers' Lathe.

Foreword.

THIS Lathe has been designed to meet the wants of Model Makers and others who require a tool capable of very varied and accurate work. In general design this Lathe follows somewhat on the lines of the watch and clockmaker's precision lathe type, but is of much heavier construction. Being designed primarily for small work, it is not back-gearred, but the speed cone is of unusual size, and with a good flat belt sufficient power can be obtained for all general model work; for this class of work the capacity for doing a very great variety of work is the principal necessity. We have, therefore, made the lathe self acting and screw-cutting, and fitted **both** the saddle and the cross slide of the slide rest with **1** slots for clamping bolts; a slotted angle plate fitting the cross slide is also included.

This design is quite novel and of immense use. It enables all plain milling work to be done, as well as making it easy to do a great number of boring jobs which would otherwise be very difficult, if not impossible. No other lathe of this class has this capacity, which is of great value when the lathe is the only tool in the workshop.

We give a few examples of operations on this lathe in later pages, but we may give here, as an instance of the remarkable scope of this lathe, some idea of the jobs that can be done on the lathe, **without any extra attachments**, in the making of a model Steam Engine. All turning can of course be done, and all screws cut. The cylinder can be properly bored, like its prototype, by bolting to the **1**-slotted saddle, if large, or to the **1**-slotted cross slide, if small. The steam and exhaust ports in the valve face can be **milled out**, as can be the slanting slots for the end steam ports, and the exhaust lead off. The steam clearance slots can also be milled with advantage. All keyways can be properly milled, this making the model very superior to the one with "filed flat" seatings. Half bearings, slipper guides, cross-head, connecting rod, big and small ends, etc., can all be **milled** instead of the usual laborious filing.

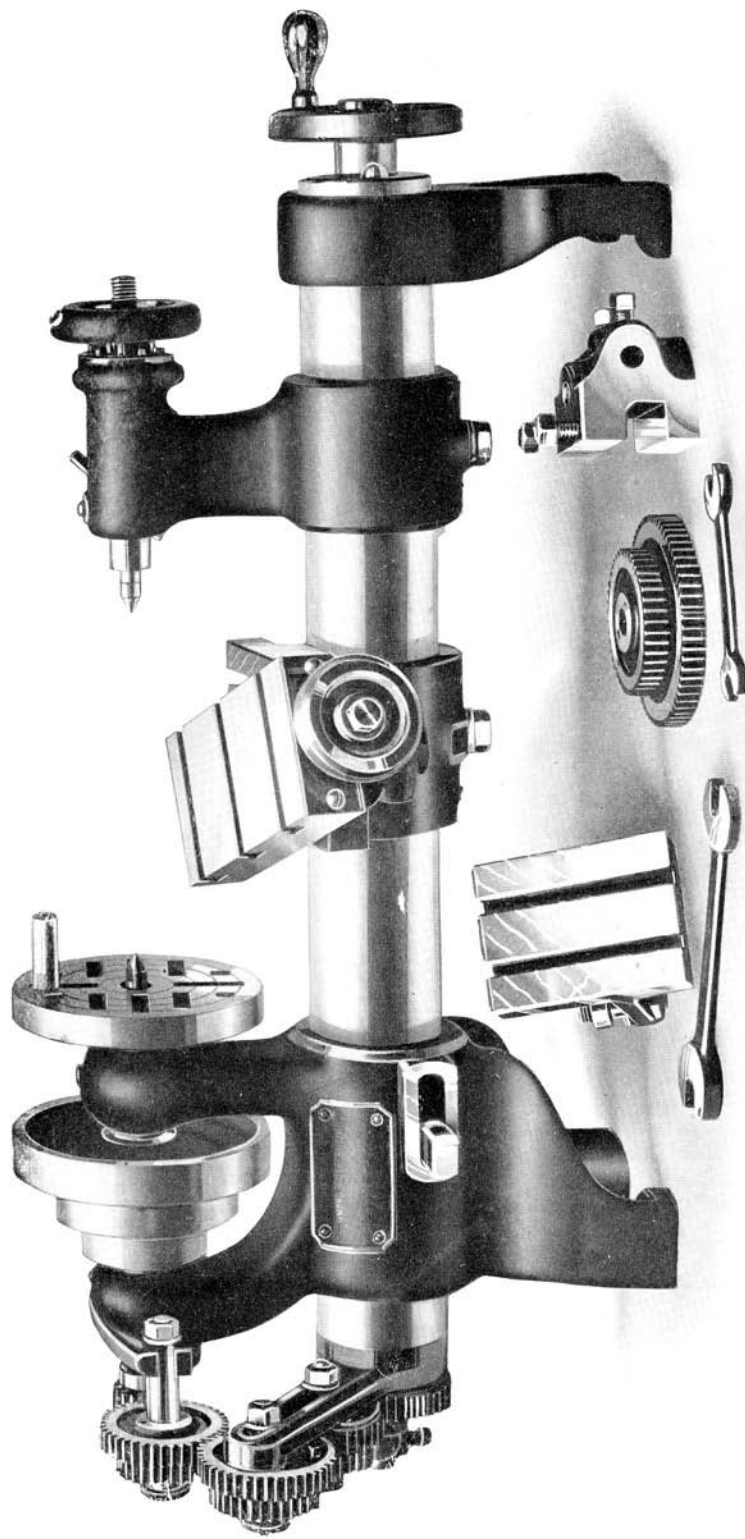


Fig. 1—'A' Type New Model Makers' Self-Acting, Sliding, Boring, Screw Cutting and Milling Lathe.

SPECIFICATION.

THE Lathe is of the very finest workmanship throughout, and of great weight for its size. The bed is of cast iron, very stiff, and of hollow circular form, and is ground on a "Norton" grinding machine to a limit of error of $\frac{1}{10000}$ —one ten-thousandth of an inch. The mandrel is steel, 1-inch diameter in bearings, **ground** dead true after turning, and runs in adjustable bearings. Speed cone is turned cast iron with three steps for flat belt. Ground centres of cast steel, one hardened and one soft supplied, to fit the No. 1 Morse tapers in head and tailstock. Poppet head has set-over adjustment for long slight taper work, and is fitted with steel barrel and polished handwheel. Poppet is retained in position by means of block sliding in slot in the bed. Locking this does **not** interfere with the sliding motion along the bed.

The saddle is formed as a machined and 1-slotted boring table for large boring work, and carries slide rest which also forms a 1-slotted boring table. The topslide may be set to any angle, and has a graduated base. It may be removed by merely slacking its locking screw and lifting clear, thus leaving the saddle clear for boring or milling. The toolholder is self-contained, and no tool-clamping strains are thrown on the central bolt. A hole is provided for holding boring tools in the holder.

Height Adjustment.

The cross slide, which is fitted with square slides, steel screw, and polished handwheel, has the particularly valuable feature of **height adjustment**. The saddle may be partially rotated around the bed, and locked at any angle **without disturbing the provision for sliding**. It will be seen that swinging the saddle round the bed has the effect of raising or lowering the slotted work tables in relation to the lathe centres. A glance at Figs. 4 and 5 will make this clear. This adjustment may be used for setting the centre height when boring, for putting on the cuts when milling, setting turning and boring tools to centre height, for positioning drilling and end-milling work, etc., and it will be found an immense advantage; it does away with numerous packing pieces under work and tools, and enables several operations to be performed on a piece at the one setting.

The leadscrew runs the full length of the bed, and being completely enclosed within it, is fully protected from dirt and chips. A lever operates a clutch which engages the leadscrew with the feed gear shaft for self-acting or screw-cutting.

Screw-cutting.

A set of eleven change wheels is included which will cut the following threads per inch: 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 24, 26, 28, 32, 36, 40, these being mainly commonly used Whitworth pitches. In addition, metric threads of from

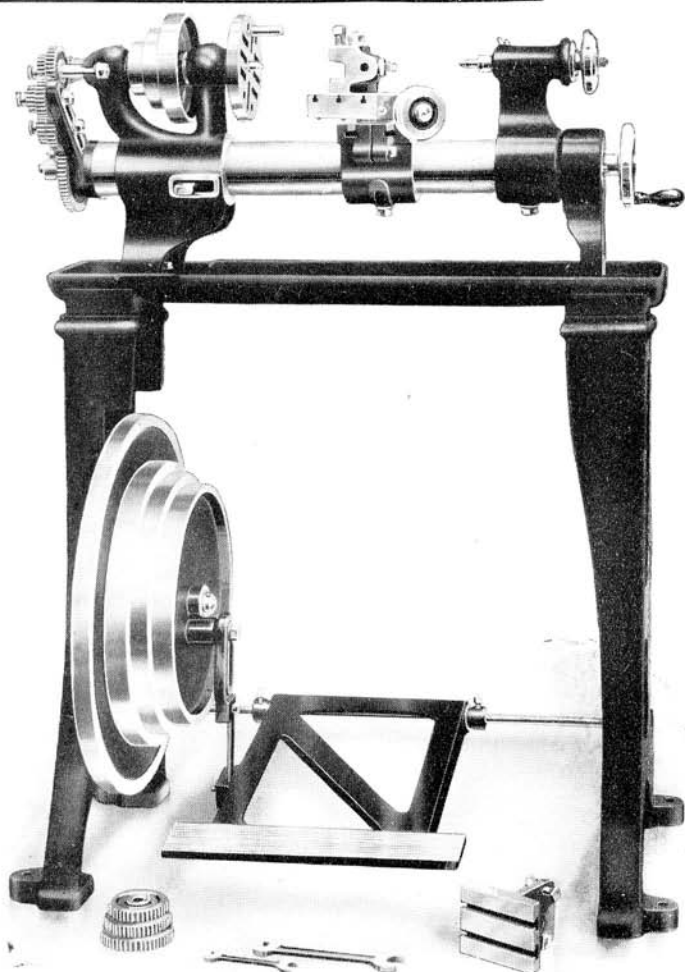


Fig. 2—4-in. Lathe, complete on Stand, with treadle drive.

0.5 to 2.5 millimetres pitch may be cut, in addition to a large number of odd and fine threads, and sliding speeds down to 200 per inch. A stud on which may be arranged a **reversing gear** is carried by a slotted bracket cast integral with the headstock, and thus all threads may be cut either **right** or **left-handed**. All gears are cut on the finest automatic machines from solid blanks.

Standard Equipment.

Each lathe has the following accessories : Face-plate and driver chuck combined, hard and soft 60° centres, angle plate with two bolts, change gears for English and Metric pitches, two spanners, and belt in the case of treadle drive machines

Extra Long Bed Lathes.

Long slender work sometimes calls for a lathe having a greater between-centre distance than the standard lathe gives. To meet these conditions the Drummond 4-in. lathe can be supplied with a bed one foot longer than that of the standard model. The long lathe bed is amply rigid under all conditions, and the extra capacity gained will be found extremely useful in many cases. The extra cost entailed is but slight. (See prices on page 9.)

Hollow Mandrels.

For the greater range of amateur work a hollow mandrel is not usually needed, and is not therefore fitted as standard; the lathe can be supplied with a hollow mandrel if ordered with same, at a very small extra cost (see page 9). The diameter of the hole in this mandrel is $\frac{3}{8}$ -in., and a collet chuck attachment can be supplied for use with the lathe. (Particulars on application.)

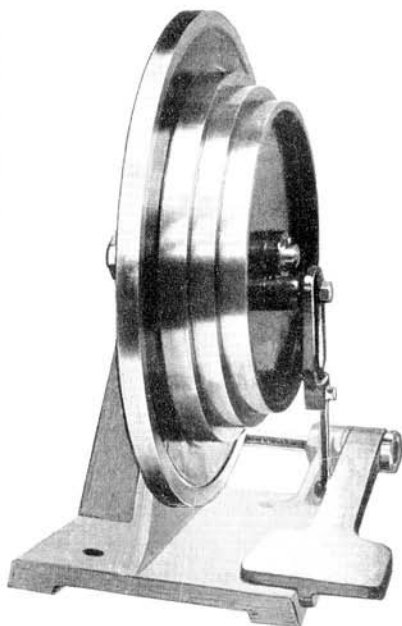


Fig. 3—Separate Footmotor.

DIMENSIONS OF STANDARD LENGTH MODEL.

Length over all	...	...	2 ft. 11 ins.
Approximate weight	..	...	105 lb.
Length of bed	...	...	2 ft. 4 ins.
Diameter of bed	...	...	3 ins.
Height of centres	...	...	4 ins.
Diameter of work admitted over bed	...	...	8 ins.
Diameter of work over saddle	..	...	6 ins.
Length between centres	...	...	11 $\frac{1}{4}$ ins.
Pitch of Leadscrew	...	...	10 t.p. in.
Diameter of mandrel nose	...	...	$\frac{3}{4}$ in.
Thread on nose, standard Whitworth	...	...	10 per in.
Size of centre hole	...	...	No. 1 Morse Taper
Diameter of speed cone	...	...	6 ins., 4 $\frac{1}{2}$ ins., 3 ins.
Diameter of flywheel rim	...	...	21 ins.
Diameter of steps on flywheel	...	...	16 ins., 14 $\frac{1}{4}$ ins., 13 $\frac{1}{2}$ ins.
Weight of flywheel	...	...	100 lb.
Breadth of belt	...	...	1 in.
Dimensions of working surface of milling table	...	...	4 ins. by 6 ins.
Dimensions of sliding milling table	...	...	7 $\frac{1}{2}$ ins. by 3 $\frac{3}{8}$ ins.
Speed Countershaft should run	...	...	250 r.p.m.

Add 1 ft. to lengths for long bed models.

COUNTERSHAFTS.

The lathe can be equipped to order with either "roof" or "wall" type countershafts for power drive, or with countershaft for driving from electric motor, instead of and at the same price as treadle driving arrangements. These countershafts are as carefully designed and built as the lathe itself; lubricating arrangements are fully adequate, and the fact that the countershafts are frequently to some extent neglected owing to their inaccessibility has been borne in mind in their design. The question of convenience in erecting has also received due consideration, and the most amateur worker can install these countershafts without the slightest difficulty.

Roof and Wall Types—Specifications.

Two hangers of rigid girder section carrying long shaft bearings adjustable for alignment, and provided with lubricating arrangements. Polished steel shaft carrying three-step cone pulley and fast and loose pulleys for first drive. Striker bar, supported by arms extended from hangers, with belt forks of strong section, and fitted with adjustable stops to limit motion. All pulleys, forks, etc., can be locked in any position longitudinally as required. Diameter of fast and loose pulleys, 6 inches.

Type for Driving from Electric Motor—Specification.

Extended hangers to accommodate specially large pulley in place of fast and loose on shaft. Bearings, etc., as above, no striking arrangements are necessary and none are fitted. The specially large pulley fitted to this countershaft enables the necessary speed to be obtained from any usual motor, and does not necessitate the use of an abnormally small pulley on motor.

ATTACHMENTS AND ACCESSORIES.

The peculiar comprehensive adaptability of the Drummond 4-in. Lathe makes it an almost universal tool, but its scope can be still further enlarged by the addition of special attachments. It would be almost impossible to list all the special attachments built, but two are illustrated in the Special Attachments list. These are:—

Simple Indexing, Milling, and Gear-cutting
Attachment.

Circular Saw Table.

Chucks, Tools, and small accessories are shown in this list, which will be sent on request. An enquiry for any special arrangement can usually be answered by a definite quotation.

Electric Drive.

This lathe can be supplied with self-contained electric motor drive. The motor is carried on a special base under the tool tray, and drives the flywheel by gearing direct with a small pinion, the large gear being cut in the flywheel rim. Quotations on receipt of particulars of current supply, i.e., A.C. or D.C., voltage, phase, cycles, etc.

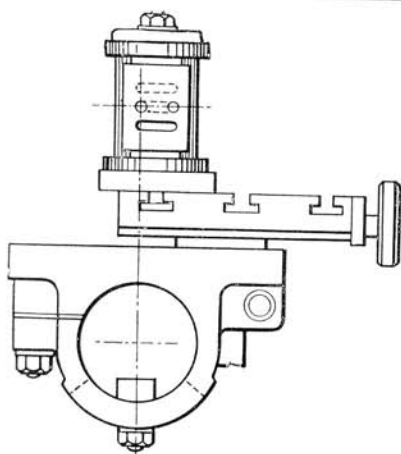


Fig. 4.

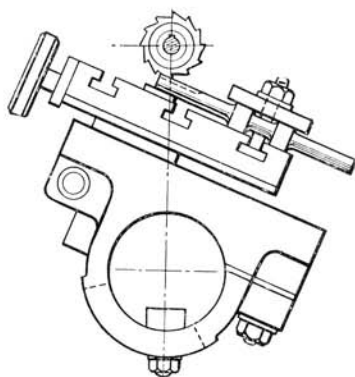


Fig. 5.

SOME METHODS OF USING THE SLIDE REST, Etc.

Showing the Use of the Height Adjustment Feature.

Fig. 4.—Milling Steam and Exhaust Ports in Steam Engine Cylinder casting, with end mill. Work bolted to topslide with bolt through centre. Heights of cuts obtained by swivelling saddle round bed, as in Fig. 5, or by use of packing of correct thickness.

Fig. 5.—Milling keyway in small Crank-shaft. Cutter on arbor between centres, and cut adjusted for depth by rotating saddle round bed.

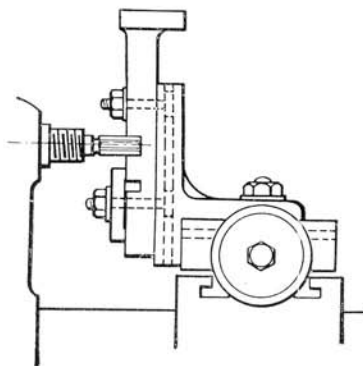


Fig. 6.

slide. Height of centres adjusted by rotating saddle. Diameter sized by setting tool in boring bar.

Fig. 6.—End-Milling slots in a casting. Work carried on angle-plate on topslide.

Fig. 7.—Boring the Cylinder of Model Steam Engine. Boring bar carried between centres, with cutter held by cotter. Work bolted on top-

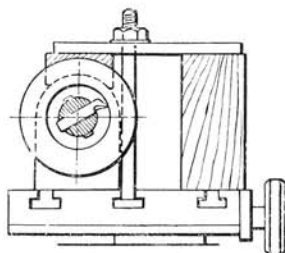
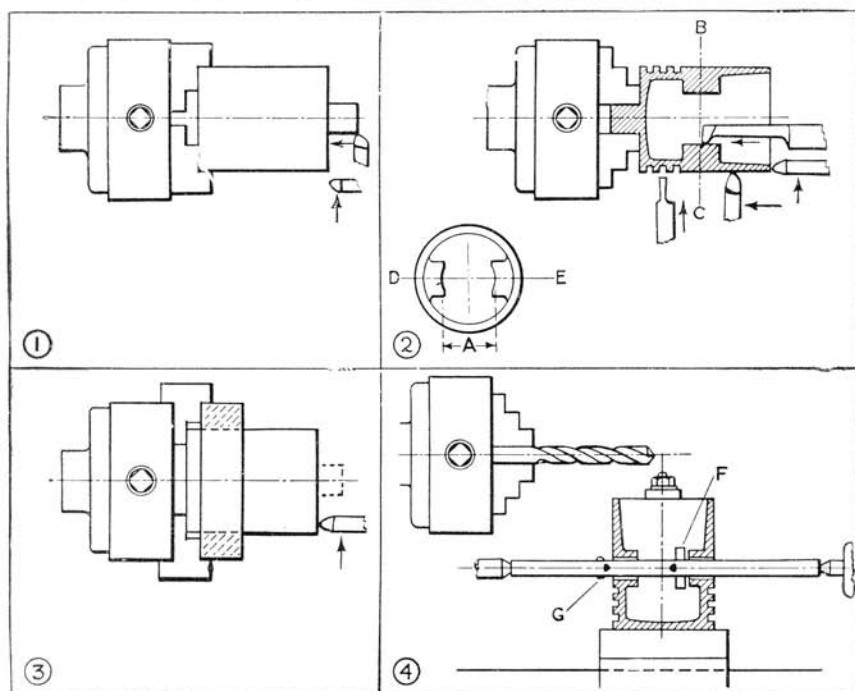


Fig. 7.



AN EXAMPLE OF MACHINING WORK ON THIS LATHE.

Piston Turning Operations.

The above diagrams show one method of machining a piston for an internal combustion engine to the best advantage. The operations described will serve as a typical example of the manner in which a piece of work should be tackled, following a logical sequence of settings.

Fig. 1.—Chuck open end of piston; rough turn the spigot; rough face the end. (Note:—This is necessary to allow a good grip for chuck jaws, and to prevent distortion of piston.)

Fig. 2.—Grip piston by spigot. Turn over the top, and face end. Turn grooves for rings. Bore through bosses to size at (A). (Note:—This ensures that the final facing operation will leave the bosses even in relation to the centre of the piston.) Before removing from chuck, scribe a line with a fine pointed tool round the piston at B—C, and another line at D—E. This will give the exact location of the gudgeon pin.

Remove from chuck and cut spigot off with hacksaw.

Fig. 3.—Clamp a block of wood in the chuck and bore out to a good fit for the piston. Insert the piston and face the end.

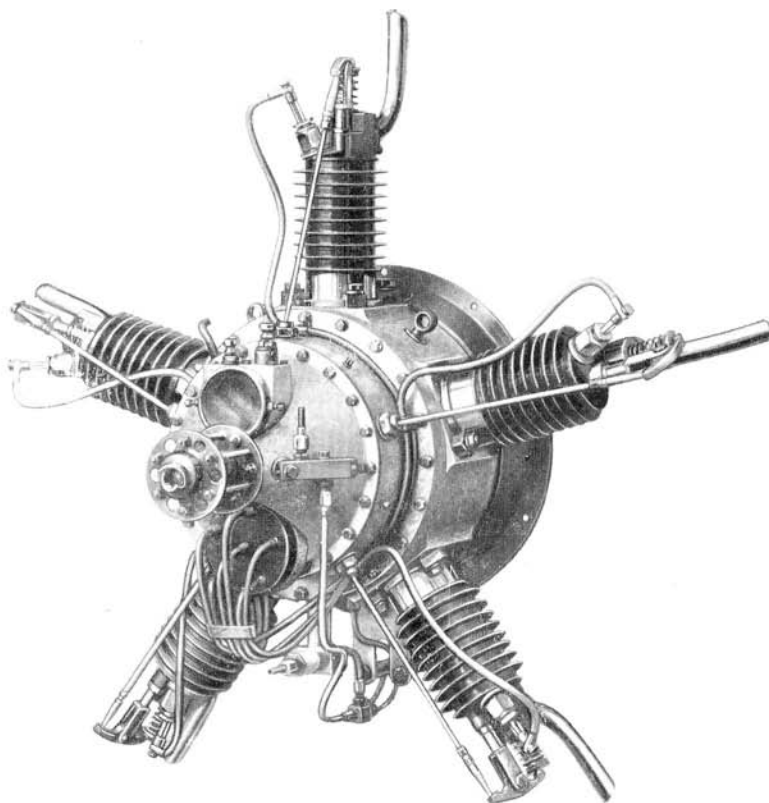
Fig. 4.—Line up piston to scribed lines, and clamp in position. Drill the pin holes, leaving enough metal to finish with a single pointed boring tool. Finish bore the pin holes with boring tool set in boring bar (G) running between centres. Face the bosses with facing cutter also set in boring bar as shown (F).

Note.—The above is also a good example of the work of the DRUMMOND Service Department. Every assistance will be rendered to enquirers on such points, machining methods, etc.

PRICE LIST.

STANDARD LENGTH MODELS.		Price.	Code.	Approximate Case Measurements.	Approximate Gross Weight.
		F.O.R. Guildford Carriage Forward.		Empty Cases to be returned Carriage Paid.	cwt. qrs. lb.
4-in. Bench Lathe	... ..	£9 : 0 : 0	Quab		1 : 2 : 20
4-in. Bench Lathe with separate footmotor	... ..	£13 : 0 : 0	Quam		3 : 0 : 15
4-in. Bench Lathe with countershaft	... ..	£12 : 0 : 0	Quabco		1 : 3 : 24
4-in. Bench Lathe with both countershaft and separate footmotor	... ..	£16 : 0 : 0	Quamco		3 : 1 : 19
4-in. Lathe complete on stand with treadle drive	... ..	£15 : 10 : 0	Quast		5 : 1 : 0
4-in. Lathe complete on stand with countershaft instead of treadle motion	... ..	£15 : 10 : 0	Quasco		4 : 3 : 0
4-in. Lathe complete on stand with countershaft and treadle motion	... ..	£18 : 10 : 0	Quascot		5 : 2 : 14
Countershaft only, roof type	... ..	£3 : 0 : 0	Add Co		
wall type	... ..	£3 : 0 : 0	Add Cow		
electric motor type	... ..	£3 : 0 : 0	Add Coe		
(If ordered separately prefix "A" to Countershaft Code Word.)					
Extra for 1ft. longer bed models,					
Bench Lathes	... ..	Add £1 : 15 : 0	Add LB		
Lathes on stand	... ..	Add £2 : 5 : 0	Add LB		
Extra for Hollow Mandrel	... ..	Add 5 : 0	Add I		

Example of Code Word: 4in. Lathe with treadle drive, long bed, and hollow mandrel Quastilb;



SPLENDID WORK SHOWS CAPABILITIES OF THE LATHE.

Five Cylinder Radial Aero Engine.

The whole of the machining in the above model was done on a DRUMMOND 4-in. Lathe. Every part, including such small details as bolts and nuts, were made by the constructor, in preference to buying ready-made. The patterns for the castings were made on the same lathe. The cylinders are of cast iron, turned from the solid bar, while the crank-case is of aluminium. Where the parts were too large to swing in the lathe, they were machined by various rigs, bolting to the boring table, etc. The extremely fine finish on the whole engine is a testimony to the skill of the maker, and also to the qualities of the lathe.

The weight of the complete engine is $11\frac{1}{2}$ lb. when fitted with propeller, and it delivered on test 4.6 B.H.P. at 5,800 revs. per min., a truly wonderful performance. The bore of the cylinders is $1\frac{1}{4}$ inch, and the stroke is $1\frac{1}{2}$ inch. As one instance of the extremely fine machining in this model, we may mention the master ring, into which the connecting rods are assembled. This was machined from a piece of steel weighing at the commencement $3\frac{1}{2}$ lb., but when finished weighed only 2½ oz. It is a very fine example of turning. The maker remarks that even in turning the larger parts the lathe was quite free from chatter.

This model was shown at the Model Engineering Exhibition in 1924, where it obtained the Sir Francis Spring prize.

EXPERIMENTAL & SCIENTIFIC WORK.

Mr. Percy W. Harris, author of numerous books on wireless subjects, makes good use of a Drummond 4-in. Lathe in his workshop. Mr. Harris's articles on the construction of wireless sets and parts are known all the world over for their sound practical methods.

There often comes a time in experimental work when a standard part will not exactly fill requirements, or some special idea needs working up, or a new design needs trying out. The lathe will then be found of great assistance. Coil-winding, and similar operations, are carried out with facility, while it is a simple matter to run a small circular saw for cutting panels, etc. The owner of the Drummond Lathe can not only make his own parts, but make parts for sale at a profit, and thus help to pay for his outlay.

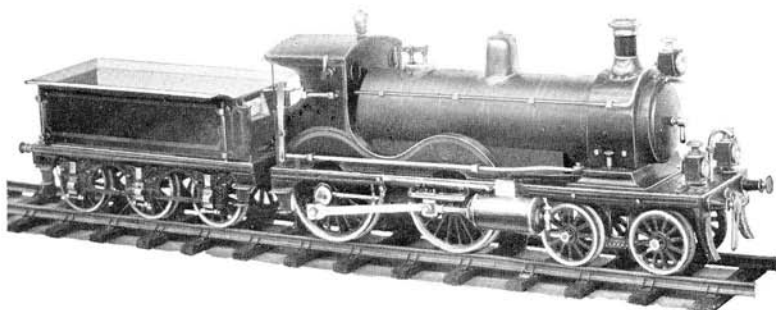
(Our photograph shows Mr. P. Harris at work on the lathe.)

For scientific and engineering laboratories the small lathe is a great convenience, and greatly extends the available facilities for the production of new apparatus.

Inventors will also find it invaluable in working up patents.



MODEL LOCOMOTIVE BUILDING.



There is a fascination about model railway engineering which is subtle and unique. The hobby is not confined to youngsters by any means, and the older one grows the keener one becomes, and the more accurate and realistic is the work produced. Many splendid models have been made on the Drummond 4-in. Lathe, with "a few odd tools," and these are eloquent testimonies to the value of the machine.

GUARANTEE AND CONDITIONS OF SALE.

DRUMMOND BROTHERS, LIMITED, guarantee that they will replace any portions of any machines made by them which can (within 12 months from date of delivery) be shewn to have failed through defective material, workmanship or design, provided such parts are returned to their works, carriage paid. In no case will they pay, or be responsible for, repairs made without their knowledge or sanction, or for indirect damage, or any consequential loss or expense incurred by purchasers.

This guarantee is to take the place of, and exclude any implied by law or arising at the common law, and no further liability is accepted by DRUMMOND BROTHERS, LIMITED.

In the case of the occurrence of any strike or lock-out of workmen, fire, breakdown of machinery, defective casting or any unforeseen cause of delay, the time fixed for the completion of the order or contract shall be extended accordingly.

The terms of payment agreed upon shall be strictly adhered to. No minor defect which may be discovered after the plant is set to work is to interfere with the payments by the purchasers at the proper time, full provision being made for dealing with possible defects under the makers' guarantee.

The weights, sizes, etc., given, are approximate, and not binding in detail, although the illustrations and specifications may as a rule be taken as a correct representation of the machines. It will, however, be understood that alterations in patterns are necessary to keep the machines up to date, and all alterations are made with a view of effecting the more perfect efficiency of the machine.

Prices in this catalogue are subject to alteration without notice.

Prices in lists are for goods delivered free on rail, Guildford Station carriage forward. Cases are not charged for if returned in good condition within 14 days, carriage paid.

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Is used in the complimentary sense only, and those firms whom we style our agents are not authorised to advertise, incur any debts, or transact any business whatsoever on our account, other than the sale of goods which they may purchase from us; nor are they authorised to give any warranty or make any representation on our behalf other than those contained in the above guarantee.

DRUMMOND LATHES have been supplied to

HIS LATE MAJESTY KING EDWARD VII. H.M. THE KING OF GREECE.

The British Admiralty
The British War Office
The Royal Air Force
The Sultan of Johore
The Rt. Hon. the Earl of Carnarvon
The Rt. Hon. the Earl of Lonsdale
The Rt. Hon. the Earl of Lovelace
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The Bradford National Munition Works
The National Projectile Factory, Lancaster
The National Physical Laboratory, Teddington
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&c., &c.

The various products of the firm of

DRUMMOND BROS. L^{TD.}

are listed separately, and detailed catalogues of any of these will be sent on request. They include the following :—

The DRUMMOND 4-in. Circular Bed Lathe

The DRUMMOND 3½-in. Centre Lathe

The DRUMMOND 5-in., 6-in., and 7-in. Centre Lathes

The DRUMMOND 7-in. Toolroom Lathe

The DRUMMOND Sensitive-Radial Drilling Machine

The DRUMMOND Hand Bench Drilling Machine

The DRUMMOND Hand Lever Shaping Machine

A full range of Attachments, Accessories, etc., for the above.