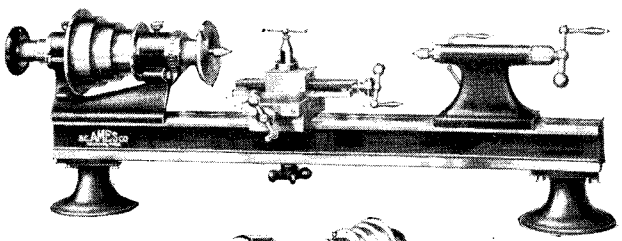
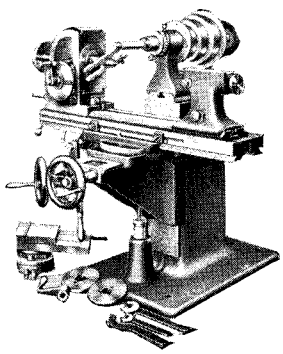
AMES
Bench Lathes
and Bench Millers

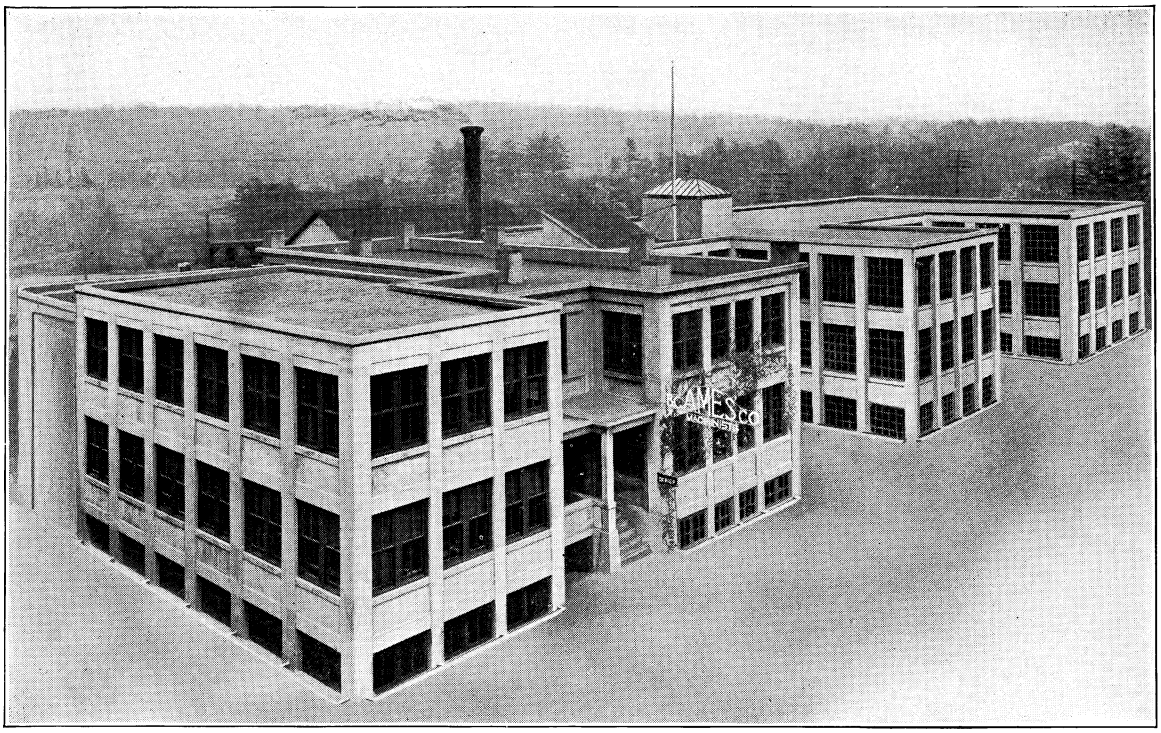




A Supplement to
Catalog No. 12

B. C. AMES CO.
WALTHAM, MASS., U.S.A.

The Home of Ames Precision Machinery



AMES Bench Machines are made by skilled mechanics, in a modern factory which is clean, well lighted and equipped with up-to-date machinery and appliances. For more than a quarter of a century they have been completely built and assembled in one plant to jigs, fixtures and gauges that guarantee accuracy of manufacture and interchangeability of parts.

GUARANTEE

The workmanship and materials entering into the manufacture of AMES Bench Machines are guaranteed to be free of defect. Any parts claimed to be defective will be replaced without charge, but must first be returned to our factory for inspection.

B. C. AMES CO.

The Work of the Bench Lathe *

THE variety of work that comes within the usual range of the Bench Lathe is exceptionally large, because this type of lathe is used widely both for the interchangeable manufacture of small parts and for fine precision tool and instrument work. This general application of Bench Lathes has resulted in the development of many tools and attachments for adapting such lathes to the varied requirements.

Although the term "lathe" ordinarily implies turning operations, bench lathes with their attachments are commonly used for many other operations, such as grinding, milling, etc. Some of these attachments are intended primarily to permit handling a larger variety of operations, whereas others are designed more especially for the rapid production of duplicate parts, as for example, when the arrangement is such that a succession of tools may be applied rapidly for finishing duplicate parts on a quantity basis. Bench lathes are not only used throughout the machine-building and tool-making industries, but also for all kinds of model and instrument making, as well as for experimental work generally.

The work for which bench lathes are commonly used may be divided into several general classes. One of these includes precision work requiring a machine that may readily be set up, and that will have the features of accuracy and speed of manipulation that can only be obtained with the bench lathe. Then there is the modern application of bench lathes in interchangeable manufacture, as applied to both small and large quantities, with production rates often comparing favorably with less accurate methods.

A third group includes precision work on parts requiring such a variety of operations that bench lathes, with their provision for rapidly changing tools, and attachments, provide the only practical method. Finally, we have the use of the bench lathe for producing small parts that might be handled readily by either turret lathes or automatic screw machines were it not for the extreme degree of precision necessary.

* *From an article by Franklin D. Jones, Associate Editor, MACHINERY.*

Ames Bench Lathe No. 3

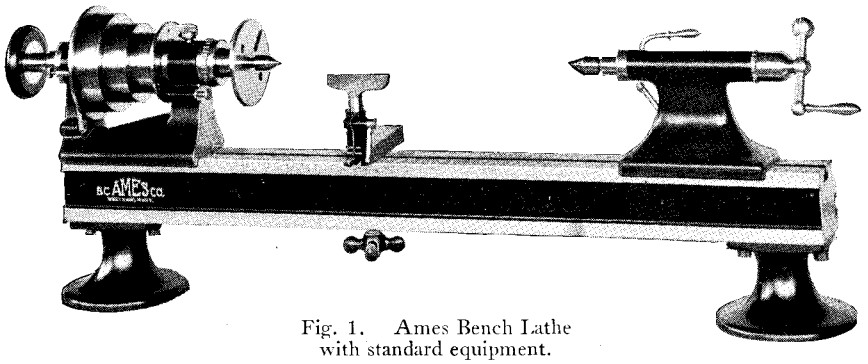


Fig. 1. Ames Bench Lathe with standard equipment.

OF simple design, liberal in size and capacity, complete in supporting attachments, and built to exacting limits of accuracy, the AMES No. 3 Bench Lathe represents all that is desirable in a machine for precision turning, milling, grinding, drilling, threading, and many other operations.

Thirty years of satisfactory service in tool rooms and production shops have earned an enviable reputation for this practical machine, it's general utility, it's high quality, and it's dependability.

No announcement of it's worth is necessary, but a description of those features which have made it the choice of so many will be found on the following pages.

The Headstock

HEADSTOCK is of heavy and rigid design. It is made in two sizes: one of 5/8", and the other of 1" capacity clear through chuck and draw-in spindle. Distance from bed to center of spindle is 4-3/16". Swing over bed is 8 3/8", and over compound slide rest, 3 5/8".

HOLLOW SPINDLE is machined from a solid bar of alloy steel, hardened, ground and lapped. It runs in straight cast iron bearings which are adjustable, and has ball-bearing end thrust. Outside front end is ground to a standard taper for taking face plates, jaw chucks, large step chucks and closers. Inside front end of spindle mouth is ground to 11° taper for seating and closing spring chucks. Side play of spindle can be entirely taken up without disturbing spindle end shake or alignment.

End shake of spindle is also adjustable independent of side play. A hardened steel thrust collar is securely fitted to front face of headstock around the spindle opening. Between this collar and the ground shoulder on hardened spindle, a steel retainer of balls absorbs pressures applied to spindle which otherwise would seriously affect bearing adjustment. A cone shaped steel cap threads onto headstock casting and bears on front side of spindle shoulder, adjusting end shake.

Back end of spindle is left free to expand or contract with changes of temperature, but that action does not disturb spindle end shake. The adjusting cap also serves as a dust guard for front bearing. A spanner wrench for end thrust adjusting cap is supplied with each lathe.

BEARINGS are made of close grain cast iron with straight, parallel holes inside, which are oil-grooved and tapered on outside to fit headstock casting. They have a square thread on small end and are split and channeled to permit compressing down taper in headstock casting by means of adjusting nut which screws onto and compresses each bearing as it is tightened. This eliminates side play and resulting wear. The practice of running steel spindles in straight cast iron bearings is old and thoroughly tried with practical mechanics. Bearings of this material and design will absorb and retain lubricating oil to prevent heating, and, unlike those of angular design, wear equally without cutting or heating and retain adjustments indefinitely.

CONE PULLEY is finished all over. It has three ground diameters taking 1⅛" belt, and has two rows of index holes used with an index pin attached to headstock casting. Front face of cone has holes for use with push pin in headstock to lock spindle when chucks are being opened or closed.

DRAW-IN-SPINDLE is of hollow steel with machined fiber hand wheel attached. Front end is threaded inside to receive chucks and face plates. A key in headstock spindle prevents chucks from turning therein. Threading the draw-in spindle to chucks draws them back into seat of headstock spindle and closes them by means of taper in spindle mouth.

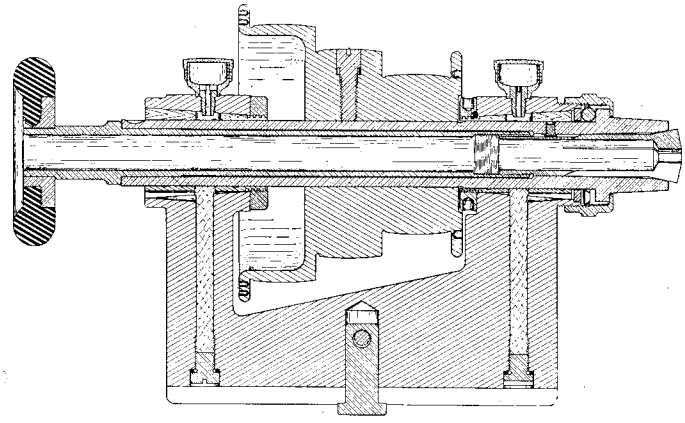


Fig 2. Cross section of Headstock showing details of construction

OIL CUPS are placed directly over bearings to insure proper lubrication. Wicks are inserted in the headstock casting beneath bearing journals, giving out constant lubrication and also accumulating any excess of oil.

DRIVER FACE PLATE has a solid chuck shank which is drawn securely into headstock by the draw-in spindle. A slot is milled into one side for driving lathe dog and pieces held on lathe centers. The center is of soft tool steel, driven into Morse No. 1 taper hole in face plate.

The Tailstock

THE TAILSTOCK is of spring-over type with bearing surface on bed 6¾" long.

SPINDLE is of steel, hardened and ground, made hollow, with Morse No. 1 taper in front end to receive hardened center, drill pads, etc. Forward

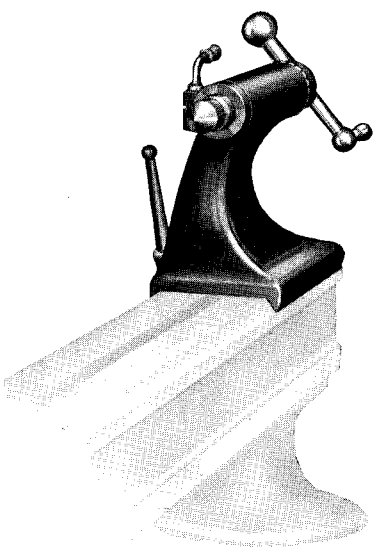


Fig. 3. Tailstock

travel 4¼" by means of large hand wheel and square threaded feed screw which runs in bronze nut. Steel cap on back end threads to casting and supports lead screw assembly. Lever on back side binds tailstock to bed in any desired position, and lever on top clamps tailstock spindle.

Hand Rest

HAND REST with shoe clamps in any position on bed by means of a binder bolt. Adjustable for height and angular position. Valuable for turning purposes where a hand graver is used. Also used to mount table rests, grinding fingers, etc.

The Bed

THE BED is 36″ long, machined all over to special form. It is extremely rigid, and has legs bolted securely to the frame. Top bearing surface is accurately planed and hand-scraped to standards, and has .430″ T-slot for clamping headstock, tailstock, slide rest and other attachments. Back surface is accurately ground and has T-slot in standard position to hold thread-cutting attachment. Name plate casting sets into milled recess in bed. Ends of bed polished and all corners rounded.

By machining the bed all over and thereby removing skin of the casting, all stresses and strains in the iron are removed. Castings are first rough-planed and allowed to season for a proper period of time; then later finish-planed and scraped to standards. The result is that no change in alignment of bed occurs after this process of machining has been followed.

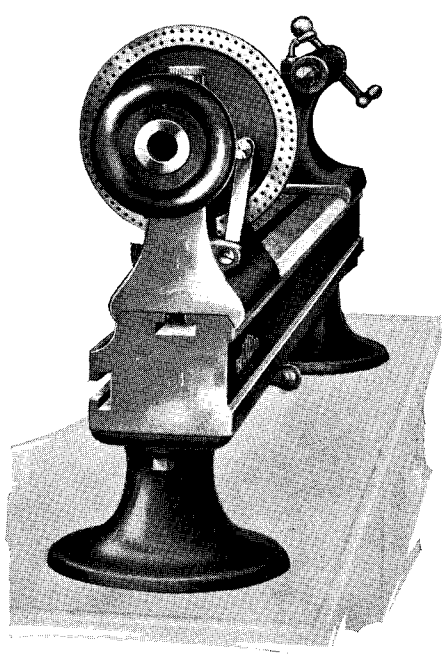


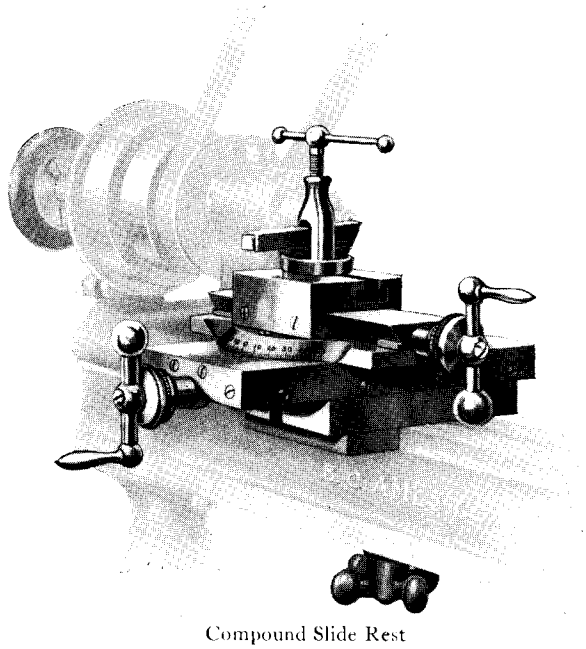
Fig. 4. End View of Lathe showing Bed, Headstock and Tailstock

Ames Bench Lathe No. 3

Specifications

		5/8" Capacity Lathe	1" Capacity Lathe
Bed	Length	36"	36"
	Maximum distance between centers	21"	21"
	Width T-slot top and back surface	.430"	.430"
	Weight Grey Iron Casting (machined all over)	65 lbs.	65 lbs.
Headstock	Hand scraped bottom surfaces.		
	Chuck capacity	5/8"	1"
	Swing over bed, diam.	8 3/8"	8 3/8"
	Swing over top slide of compound rest, diam.	3 5/8"	3 5/8"
Headstock Spindle	Ball-bearing end thrust type. Made of alloy steel, carbonized, ground and lapped.		
	Hole through spindle, diam.	3/4"	1 1/8"
	Taper for chuck seat	11°	11°
	Spindle nose ground to standard taper	3°	3°
Bearings for Headstock Spindle	Straight, cast iron, split, channeled, oil grooved, lapped and adjustable.		
	Length	2"	2 1/4"
	Parallel Hole	1 3/16"	1 3/4"
	Taper on outside surface fitting headstock	3°	3°
	Square threads on small end for adjusting nut, pitch (threads per inch)	10	10
Cone Pulley	Cast Iron, machined all over. Three steps diameters 4 3/16", 5" and 5 13/16". Driven onto spindle and locked in position with set screw. Spindle stop holes on front face, diameters .150" and .195" Index holes, two rows on rear face 60 and 72. Fast speed with countershaft should be 720 r.p.m. Slow speed with countershaft should be 160 r.p.m.		
Draw-in Spindle	Hollow steel, with fiber hand wheel. Outside diam. hand wheel	3 3/4"	3 3/4"
Driver Face Plate	Cast iron with solid steel chuck shank. Diam. of plate	4"	4 1/2"
	Hole from which soft center is removable, No. 1 Morse taper.		
Tailstock	Of sprung-over type. Hand scraped bearing surface. Lever for binding to lathe bed at rear. Spindle binding lever at top. Hand-scraped bearing surface.		
Tailstock Spindle	Alloy steel, carbonized, ground, and lapped. Lead screw operated by ball crank has square thread running in bronze nut. No. 1 Morse taper for hardened steel center, drill pads, drill chucks, etc.		
	Diameter	.826"	.826"
	Length	6 3/4"	6 3/4"
	Travel	4 1/4"	4 1/4"
	Length spindle bearing	6 1/2"	6 1/2"
Hand Rest	With binder bolt, adjustable in any position.		
	Width of top surface	3"	3"
	T-slot	.430"	.430"
	Bolted to bed.		
	Threaded hole in bottom surface for attaching lathe to bench	1/2"-13	1/2"-13
Standard Equipment	Bed, Headstock, Driver Face Plate, Tailstock, Two-Centers, Hand Rest, Hold-down Bolt, Spanner Wrench		
Weight	Complete, Net	110 lbs.	120 lbs.
	Gross	145 lbs.	155 lbs.

Compound Slide Rest



Compound Slide Rest

MADE of two accurately scraped and fitted slides; one a bottom slide which is attached securely at right angles to lathe bed, and the other a top slide which carries the tool post. Between these two slides is a graduated swivel used to set the top slide and tool post in position to turn tapers or angles from 0° to 50° right or left.

The bottom slide bears directly on lathe bed, requiring no shoe, and has a plate which makes contact with front edge of bed to insure right angle setting.

Besides performing all kinds of turning operations, the slide rest supports grinding an

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4⅝″ in diamet..

FEED SCREWS have square threads which are accurately milled and travel through bronze nuts. Fitted with polished ball cranks of convenient size to insure sensitive touch on delicate turning operations.

FRICTION DIALS are 1⅛″ in diameter, graduated in thousandths of inches (or hundredths of millimeters) and beveled for convenient reading. They can be set at any desired graduation to maintain original tool setting. These accurate dials make the slide rest a micrometer tool throughout.

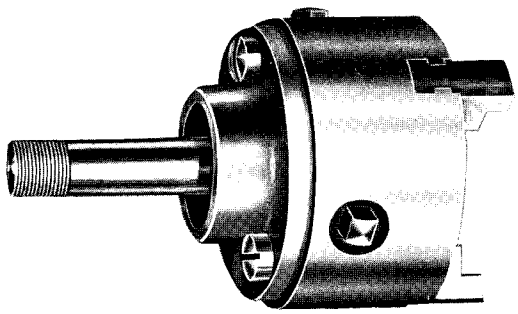
TOOL POST furnished with slide rest is hardened. Made for tool bits ⅜″ wide.

Specifications

Travel of Bottom Slide	4¾″	Angle of Slides, Top and Bottom	[illegible]
Travel of Top Slide	5½″	Diameter of Swivel Dial	4⅝
Length of Bottom Slide	5½″	Width of T-Slot in Top Slide	.430″
Width of Bottom Slide	3⅝″	Diameter of Feed Screws	.354″
Length of Top Slide	2¾″	Radii of Handles on Feed Screws	1″
Width of Top Slide	2⅝″	Diameter of Friction Micrometer Dials	1⅛″
Net Weight	16 lbs.		

Chucks for Ames Bench Lathes

Jaw Chucks



Jaw Chuck

UNIVERSAL Chucks, with three jaws which work in unison with key, or independent chucks with four jaws which are operated separately with key, are fitted to plates with draw-back chucks for use in lathe headstocks of both 5/8" and 1" capacity.

Whiton and Skinner Chucks are carried in stock, but other makes can be supplied promptly.

Spring Chucks

AMES spring chucks are straight, thin, and very long. They are made of tool steel, hardened from the face back to a point beyond the angle, and the remaining part, including thread, is tempered. This construction insures great springing and gripping qualities, the chucks being capable of securely holding material 1/64" undersize.

Spring Chuck

Openings in larger sizes are accurately ground. The smaller sizes are finished with diamond laps. Each size is plainly marked.

Threads are of V-shape, 24 to the inch, which enable great pulling power through the draw-in bar. Length of 5/8" capacity chuck is 3 3/16", diameter of body 3/4". Length of 1" capacity chuck is 3 15/16", diameter of body 1 1/8".

Sizes by 64ths, are carried in stock; also metric and decimal sizes. Chucks having B & S. and Morse tapers, and special shapes, can readily be furnished.

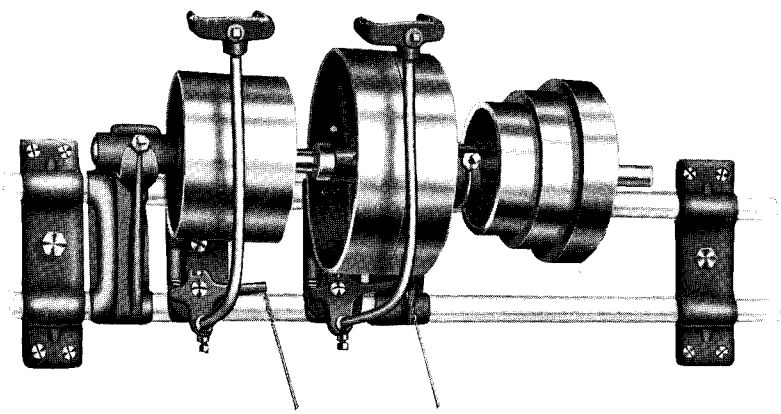
Capacity of spring chucks is governed by the size of the AMES Bench Lathe. With the 5/8" capacity lathe, stock 5/8" in diameter can be taken straight through the spring chuck and lathe headstock. With the 1" capacity lathe, stock 1" in diameter can be taken.

Countershafts for Ames Bench Lathes

AMES Two-speed and Three-speed Countershafts are of the wall rod type. The Grinding Countershaft can be attached to either.

Two-speed Countershaft

THE Two-speed Countershaft is most commonly furnished, and gives a slow and high speed forward. The Three-speed Countershaft gives two speeds forward and one reverse. All these speeds are controlled by foot treadles on the floor which operate spring shipper brackets.



Two-speed Countershaft

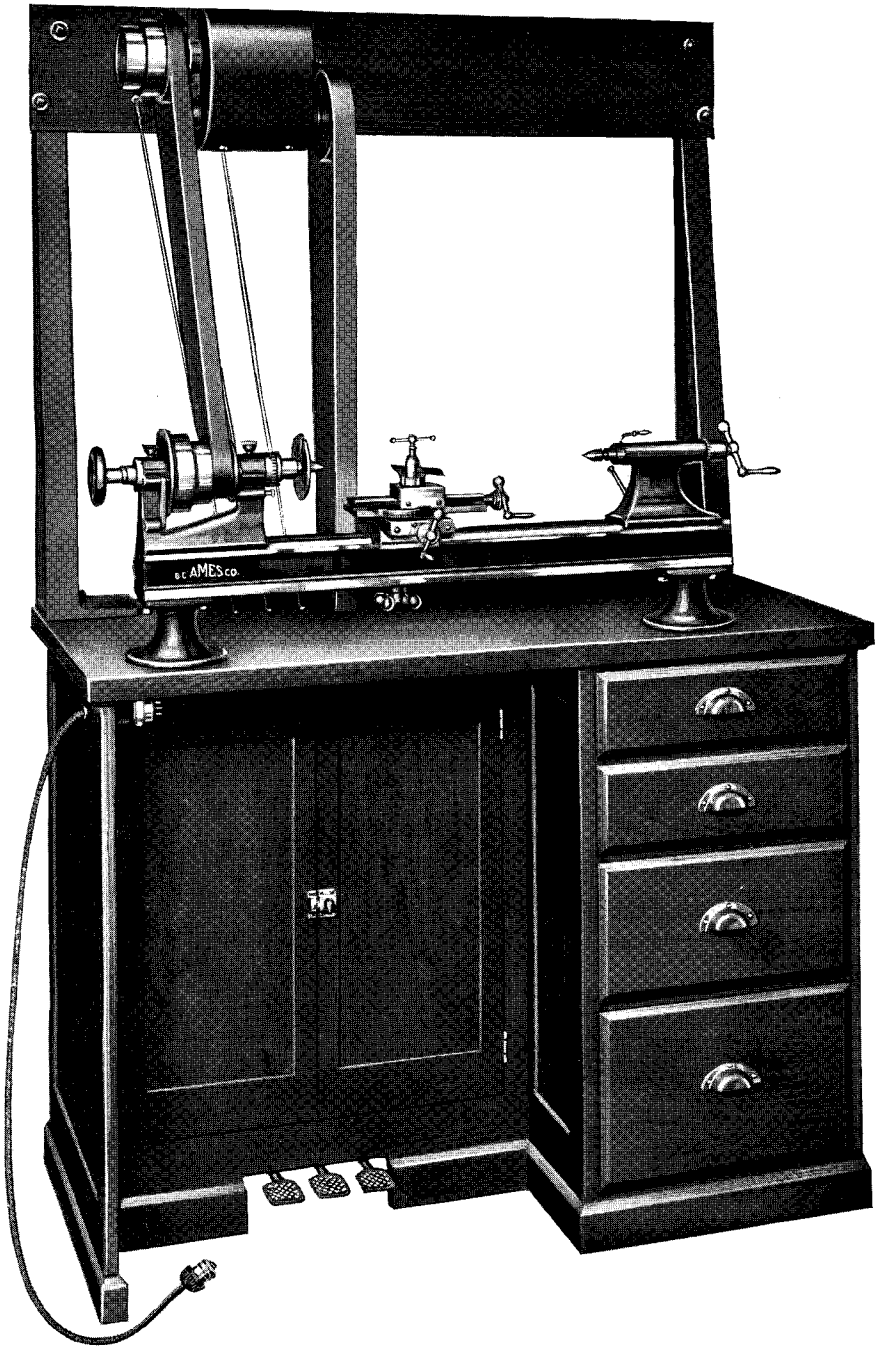
Equipment of Two-speed Countershaft consists of two brackets which are attached to the wall and take two 1″ diameter rods, 4″ apart on centers; one each 5″ and 7″ diameter tight pulley; one each 5″ and 7″ diameter loose pulley; one three-step cone pulley to match that on headstock of lathe; a ground shaft 18″ long and ¾″ in diameter; two brackets with bearing boxes, which are self-aligning, to support shaft; two spring shipper brackets complete, two collars, and two foot treadles complete. Speeds, high 720 R.P.M.; low 160 R.P.M. Net weight 40 lbs.

Three-speed Countershaft

THE Three-speed Countershaft consists of all the above, with another tight and loose pulley 7″ in diameter, spring shipper bracket and treadle complete. These extra attachments give a reverse speed to lathe headstock of 160 R.P.M. by means of a cross belt. Net weight 46 lbs.

The logical place to put a bench lathe countershaft is on the wall about three or four feet above the bench on which the machine sets.

Ames Bench Lathe—Cabinet Type



Cabinet Type Ames Bench Lathe with Gear Drive
and Electric Motor

Ames Bench Lathe—Cabinet Type

THE Cabinet Type AMES No. 3 Bench Lathe is mounted on a very substantial cabinet, greatly simplified through use of a gear drive in place of the conventional countershaft and jackshaft. Only one belt extends from motor to gear drive through top of cabinet, leaving maximum working surface and freedom from interference.

Cabinet

Sturdily built of oak, beautifully finished, and equipped with four large drawers in which lathe attachments are kept. Cabinet is 48″ long, 25″ wide and 36″ high. The total height including uprights and gear drive is 76″.

Compartment for motor is placed under lathe, cased with hinged doors, and sets back 10½″ from front side of cabinet to allow leg room for operator while sitting close to lathe.

Top surface is covered with thick linoleum, and the edges are protected by pieces of hardwood.

Two heavy cast iron uprights support a hardwood plank on which the gear drive is rigidly mounted.

Switch for motor is attached at left front top corner of cabinet. Six feet of wire, with plug for lamp socket, is furnished with cabinet.

Gear Drive

The gear drive is an adaptation of gears and friction clutches, designed to operate with foot treadles and give a simple, positive, quiet, motor-driven mechanism for operating the bench lathe. It can be attached to the wall, partition, cabinet, or bench, and used to drive bench lathes, bench milling machines, bench drills, etc.

The bronze housing is made in two sections, the front half being removable. Mounted within are three sets of gears and friction clutches. One 7″ diameter pulley is attached to driving shaft, to which the electric motor is directly belted. A cone pulley to match that of the AMES lathe headstock drives the lathe with one belt. The gear drive is supported by four large bolts and is oil tight.

Gears are helical in form, and run with constant mesh in a bath of oil. They are securely attached to ground shafts, accurately assembled to give maximum silence.

Clutches are cone shaped, made of steel, and very positive in action. Great pulling power is exerted by these clutches, and speeds can instantly be changed without causing injury to the mechanism. By depressing foot treadles, these clutches are caused to drive the cone pulley without the slightest hesitancy.

Shafts, with gear assemblies, run on double row, heavy duty ball bearings. Clutch thrust is of large ball-bearing type.

Speeds, two forward of 720 and 160 R. P. M., and one reverse of 150 R. P. M.

Gear drive can be furnished with grinding countershaft if desired.

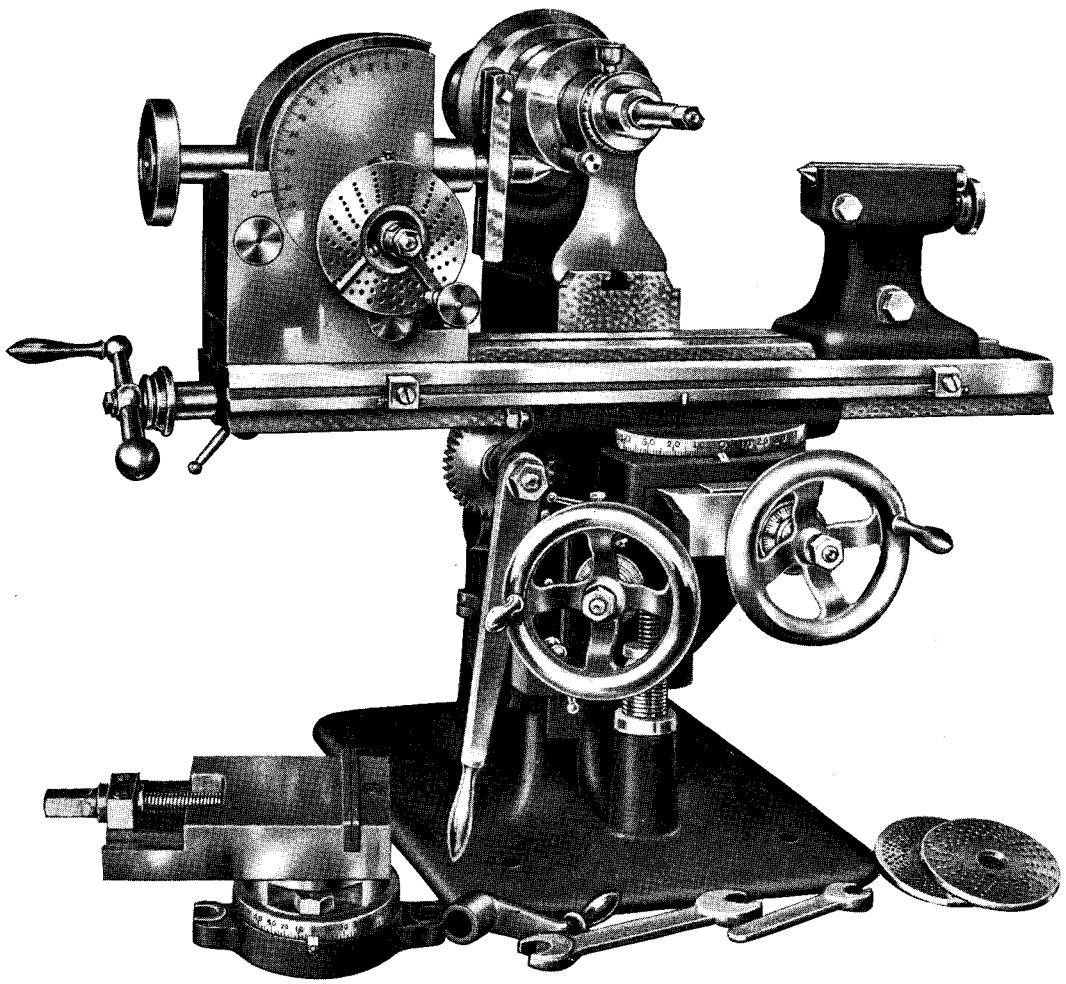
Motor

An electric motor of ¼ to ½ H. P., in any voltage desired is furnished with the Cabinet Lathe. *Current from an ordinary electric lamp socket is used to operate the motor.*

Weight

Weight of cabinet, complete with lathe, motor and gear drive approximately 200 lbs.

The Ames Bench Milling Machine with Standard Equipment



THE AMES Bench Milling Machine is designed for doing the finest and most exacting of precision milling, both in the tool room and in production. It is built solid and compact, has liberal capacity for work of medium size, and yet is sensitive and speedy in its operation.

Those same qualities which make the AMES Bench Lathe a precision machine of the highest order are incorporated in this practical, serviceable Milling Machine.

Standard equipment includes everything shown above, plus a two-speed countershaft, as described on page 11.

Ames Bench Milling Machine

SPECIFICATIONS

Cutter Head — Identical to that used on AMES Bench Lathes and described on page 5. Spring chucks are used to hold both straight and taper shank mills. A ½" diameter arbor is furnished for carrying milling cutters. Cutter head of ⅝" or 1" capacity can be used.

Feeds — All hand wheels operate screw feeds and have friction micrometer dials which are graduated in thousandths of inches, or hundredths of millimeters. Screws have Acme threads which are accurately milled, and run in long bronze nuts. Longitudinal feed of swivel table can be speedily operated by rack and pinion with hand lever.

Swivel Table — Rigidly supported by knee. Top surface is accurately hand-scraped and of same width and design as bed of AMES Bench Lathe. Bottom surface has hand-scraped bearing slides of 45° angles, provided with adjustment for wear. Extreme length, including oil pan and chamber, 21", and extreme width 4". Working surface 19" long by 2½" wide. Has graduated swivel dial, and can be set at angles up to 45° right or left of zero marking. Longitudinal travel of 12" may be operated by hand wheel or with lever operated rack and pinion feed. Traverse travel of table 3", and vertical travel 7½". Adjustable stops for longitudinal travel and binding levers for vertical slides are provided.

Index Head — A tilting dividing head of worm and gear construction, extremely well built and accurate. Swings 8⅜" diameter over working table, is graduated in degrees, and can be set at any angle to 10° below horizontal or 5° beyond perpendicular. Three index plates are furnished which will give divisions from 2 to 312.

Spindle is made of alloy steel, carbonized, ground, and takes the same ⅝" capacity spring chucks as used with cutter head. Securely attached to table by clamping bolt in T-Slot. Maximum distance between centers 10½".

Tailstock — Attached to table with binder bolt in T-Slot. Center is hardened and ground, being adjusted by knurled nut. Has permanent alignment.

Swivel Vise — Graduated base. Hardened jaws open 1½", are 3¼" wide and ¾" deep. Fastened securely to table by bolts in T-Slot.

Knee — Supports, raises, lowers, and gives traverse action to the table. Is of heavy web pattern, telescoping, and very rigid. Bearing surfaces are hand-scraped and provided with adjustments. Thrust on elevating screw is taken by ball bearings in a steel retainer.

Base — Sturdy design, with built-in compartment having two shelves and a hinged door on left side.

Countershaft — A Two-Speed Countershaft, as described on page 11 is furnished.