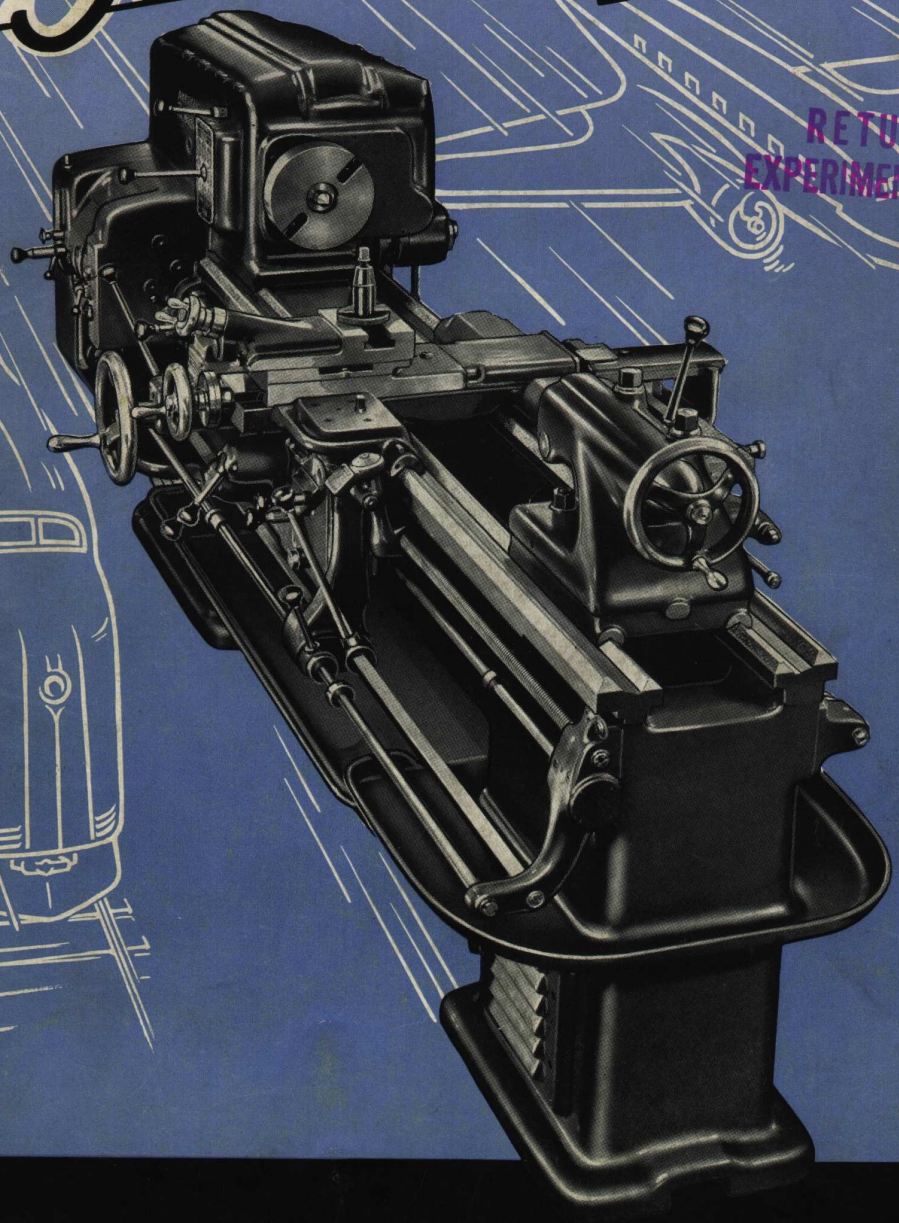
Guy Conner

BULLETIN 15

MOTCH AND MERRYWEATHER MACHINERY CO
CLEVELAND
DETROIT CINCINNATI
PITTSBURGH

"AMERICAN Pacemaker" LATHES

RETURN TO EXPERIMENTAL DEPT.

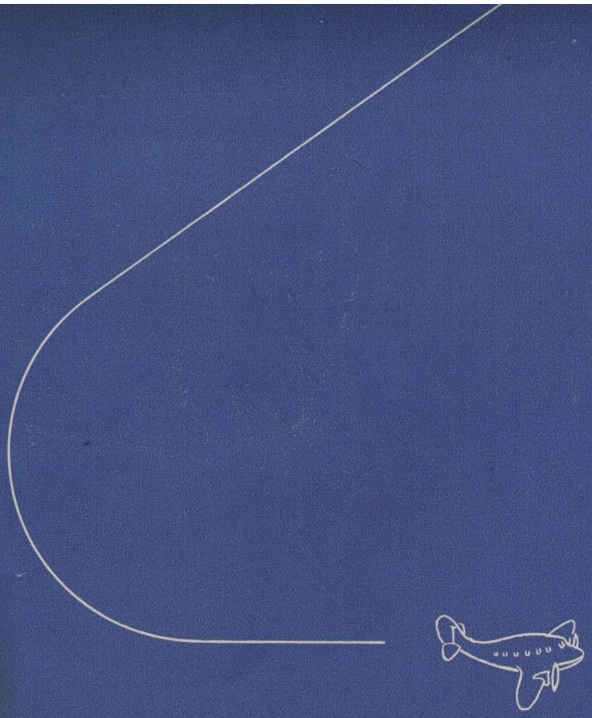


SETS THE PACE FOR INDUSTRIAL PROGRESS

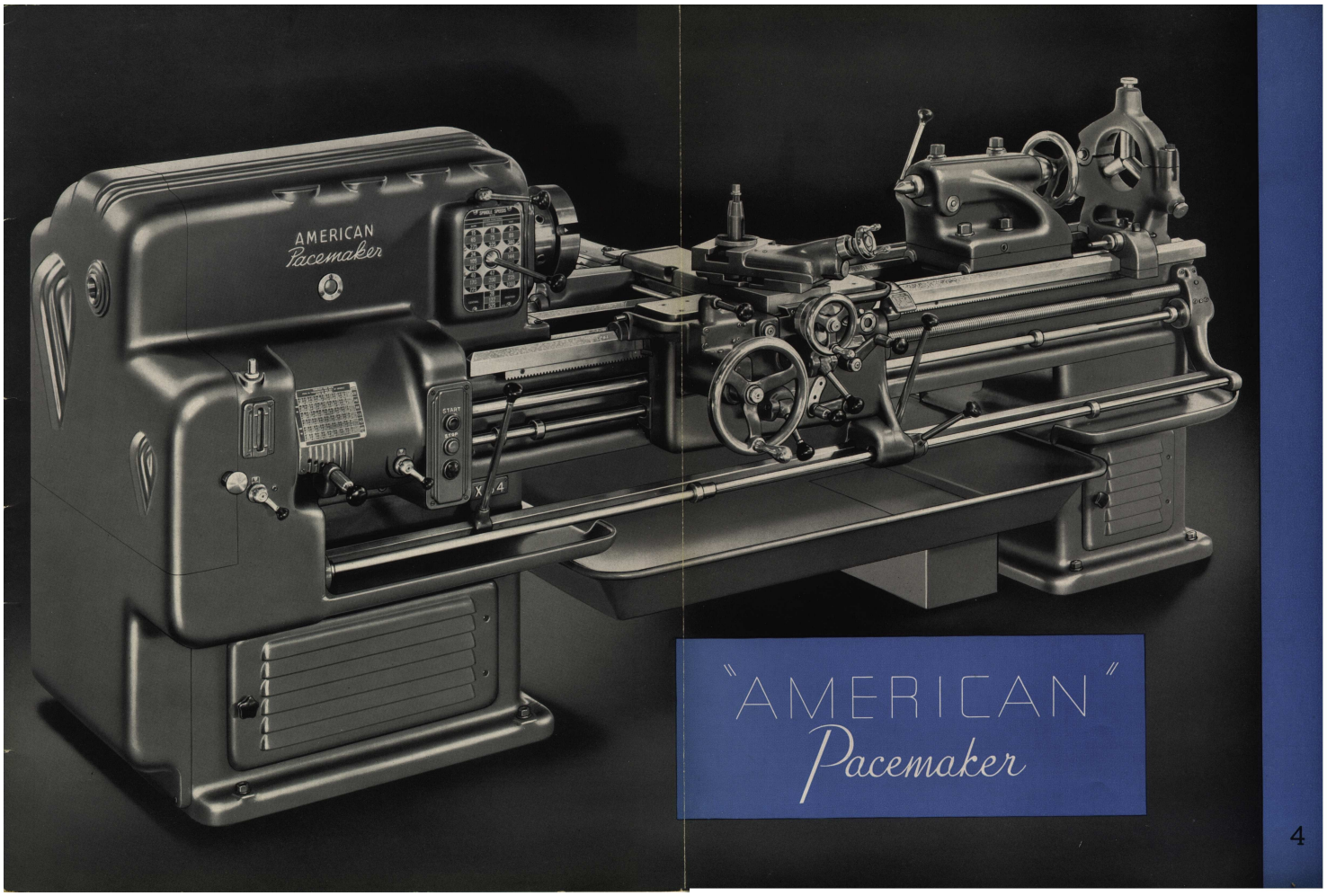
SIZES:
14 Inch, 16 Inch,
18 Inch, 20 Inch,
22 Inch

THE AMERICAN TOOL WORKS CO., Cincinnati, U.S.A.

LATHES • RADIALS • SHAPERS



"AMERICAN" Pacemaker Lathes are entirely new in design, from the drafting board to the finishing paint that is used to give them their beautiful and lasting luster. The function of every individual unit has been analyzed and studied and the unit then designed to accommodate every requirement of modern service. Nothing has been overlooked, either in design or construction, to make this the finest lathe that money, brains, experience and determination can produce. The new "AMERICAN" Pacemaker unquestionably represents the greatest lathe value that has ever been offered to lathe users.


AMERICAN
Pacemaker
START
STOP
"AMERICAN"
Pacemaker

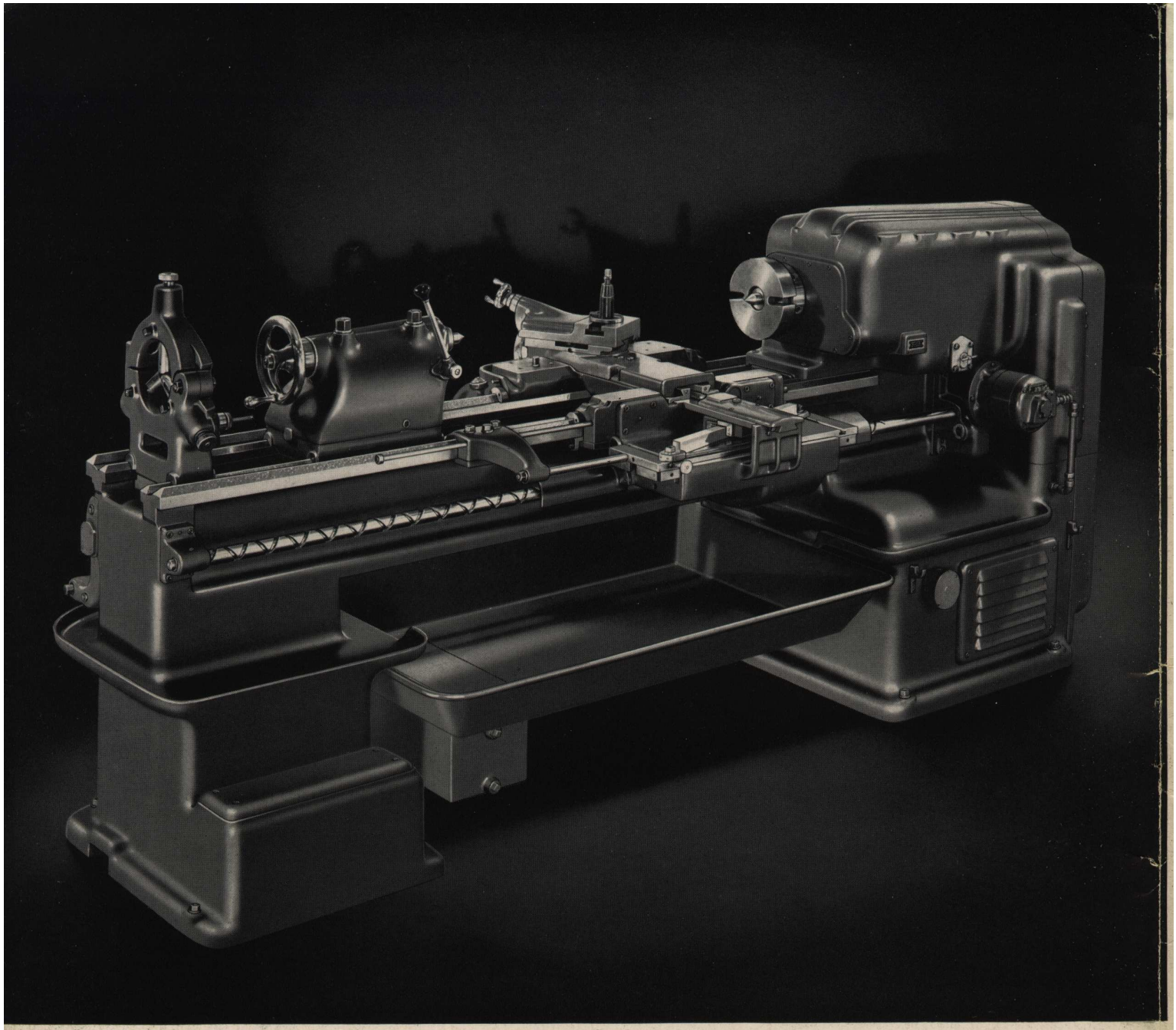


"AMERICAN"

Pacemaker



5

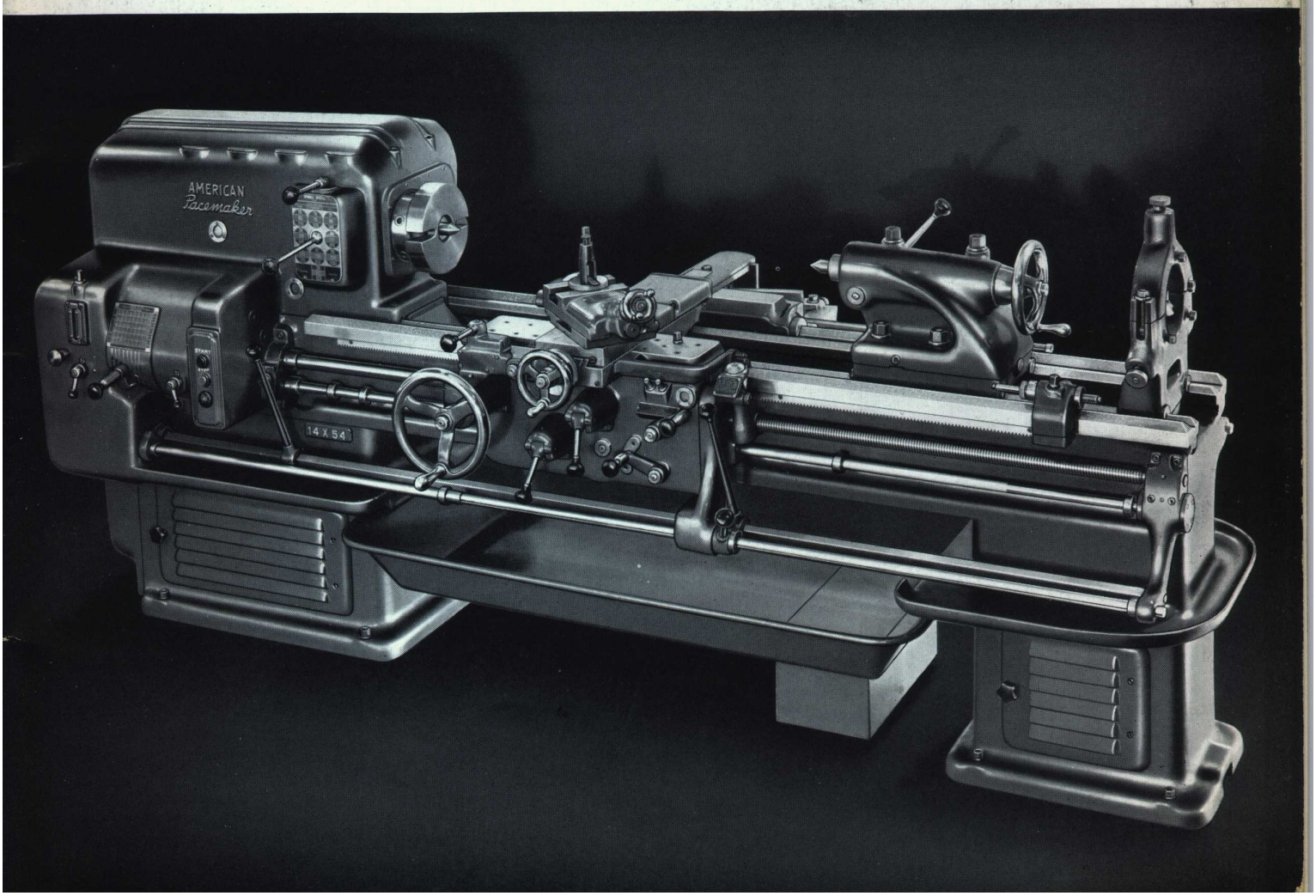


OUTSTANDING ADVANTAGES OF THE "AMERICAN" ...PACEMAKER LATHE

The description which follows will be devoted primarily to a portrayal of the remarkable adaptability of this new Pacemaker Lathe, to those inherent characteristics which insure a permanency of its original accuracy and to its sensitivity and responsiveness which, in themselves, are largely accountable for the universal popularity of this new lathe.

CONVENIENCE and EASE OF OPERATION

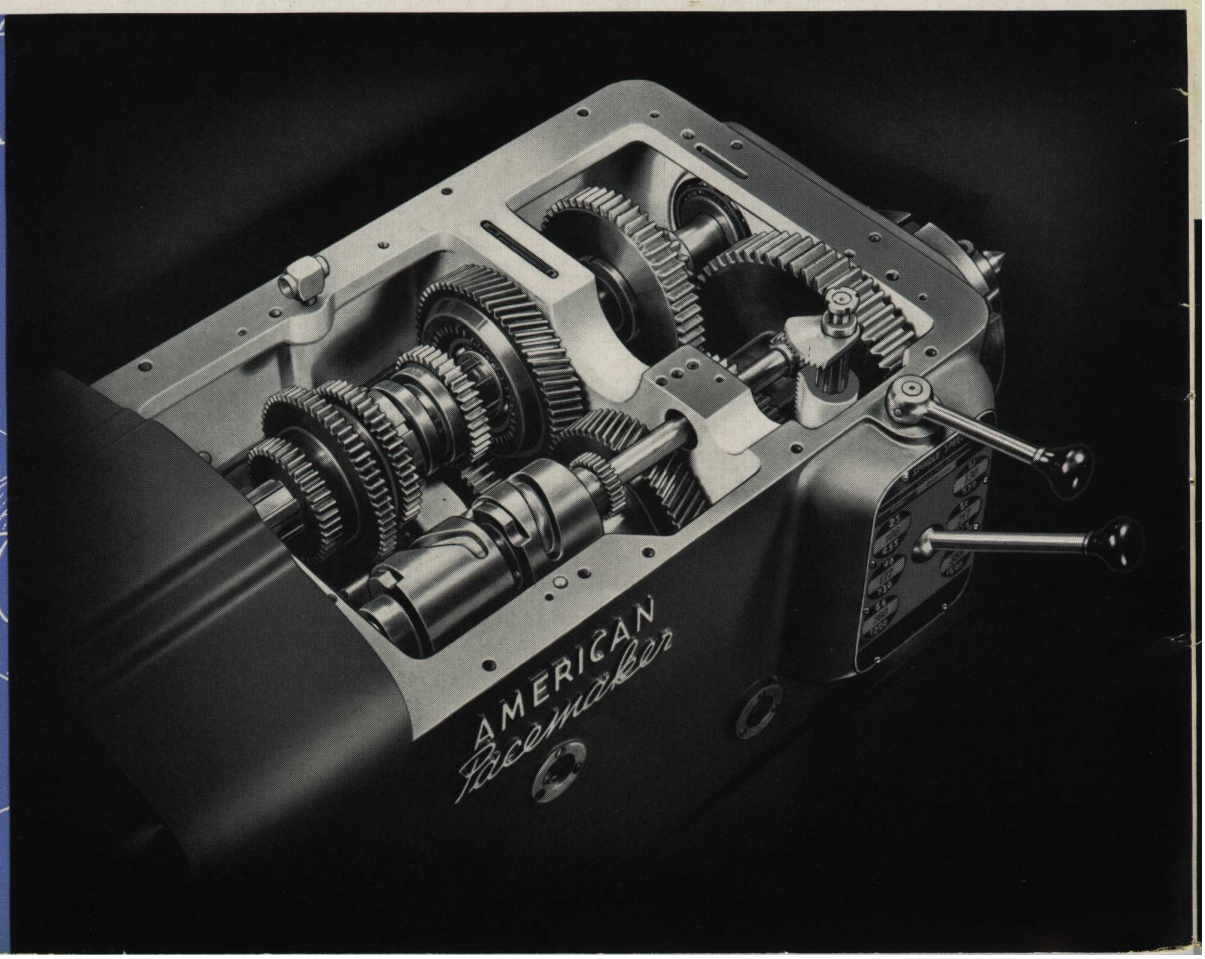
If we were asked what, in our opinion, is the oustanding requirement for a modern, high-productive lathe, our answer would unhesitantly be Convenience of Control and Ease and Smoothness of Operation. Realizing the absolute necessity for these characteristics in a modern lathe, we have concentrated upon and emphasized these features, perhaps above all others, in the new "AMERICAN" Pacemaker. It is next to impossible to adequately describe by words the degree of operative ease and convenience inherent in this machine—the lathe must be seen—handled and operated to fully appreciate how closely it approaches absolute perfection in this respect. To our prospective customers we can say without fear of contradiction that the new "AMERICAN" Pacemaker Lathe is unsurpassed in handling efficiency, while to ourselves, we can honestly say that in our own opinion, it is the most convenient to handle, the easiest to operate, the smoothest running and the fastest cutting lathe that has ever been designed.

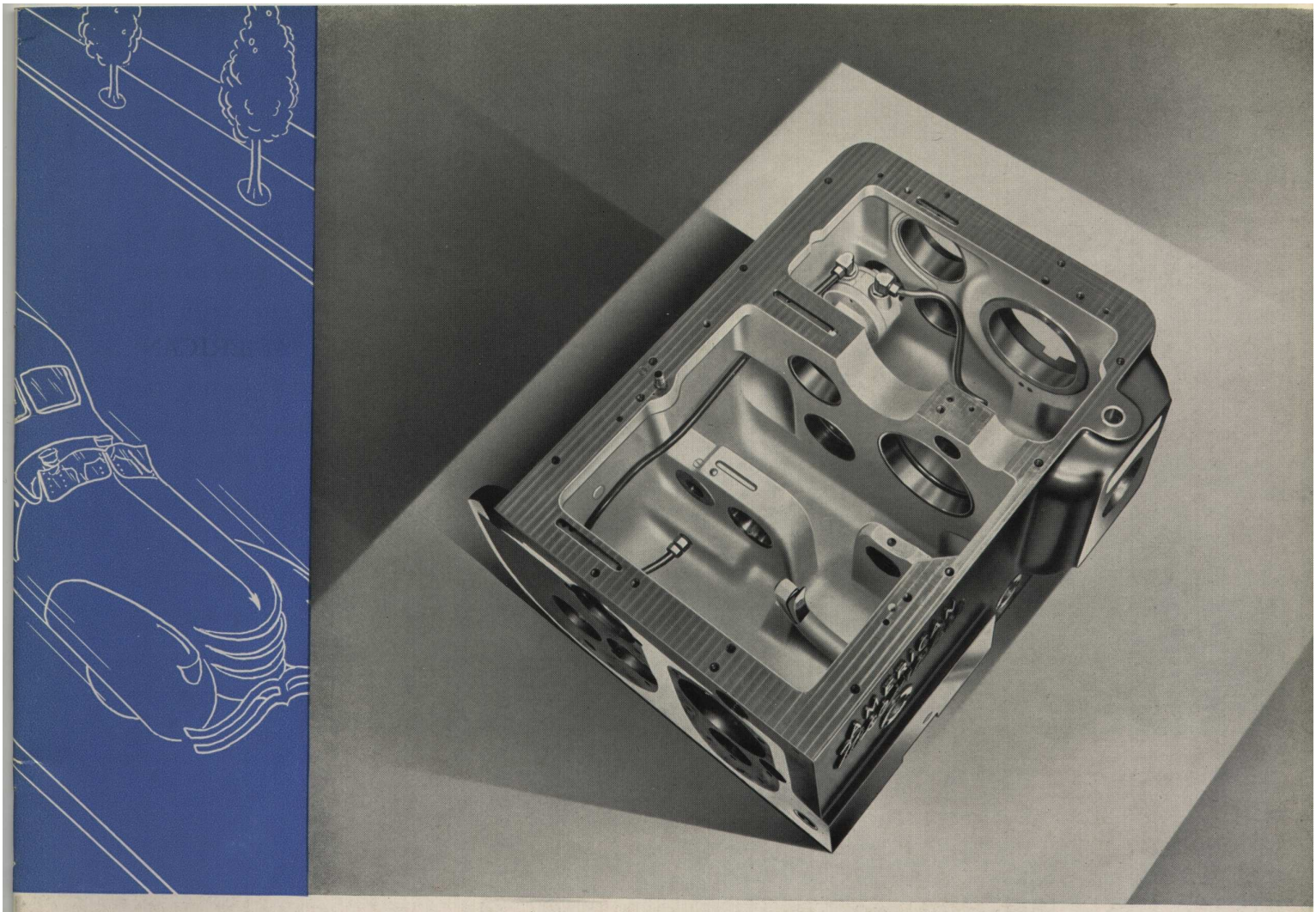


HEADSTOCK

The trend of progress in the art of metal cutting is definitely toward higher cutting speeds. What an inexcusable oversight it would be, therefore, if, in the development of a new lathe, the highest speeds of the present and probable higher speeds of the future were not adequately provided for. The headstock of the new "AMERICAN" Pacemaker provides not only for the high speeds made practicable by Cemented Carbide cutting tools, but supplies an ideal range of lower spindle speeds for the great variety of operations not included in the category of high-speed work. Twenty-seven (27) spindle speeds are provided, in geometric progression, which may properly be divided into three ranges—a low-speed range, an intermediate range and a high-speed range. The low and intermediate ranges are secured thru hardened spur gears, while the high-speed range is thru wide-faced, 20° helical gears. All gears are finish ground except the large slow speed spindle gear on 18″, 20″ and 22″ sizes which, owing to its size, is beyond the capacity of our Pratt & Whitney gear tooth grinders. On these three sizes this large gear is finished lapped on a "Michigan" Cross Axis gear lapping machine.

Headstock Assembly



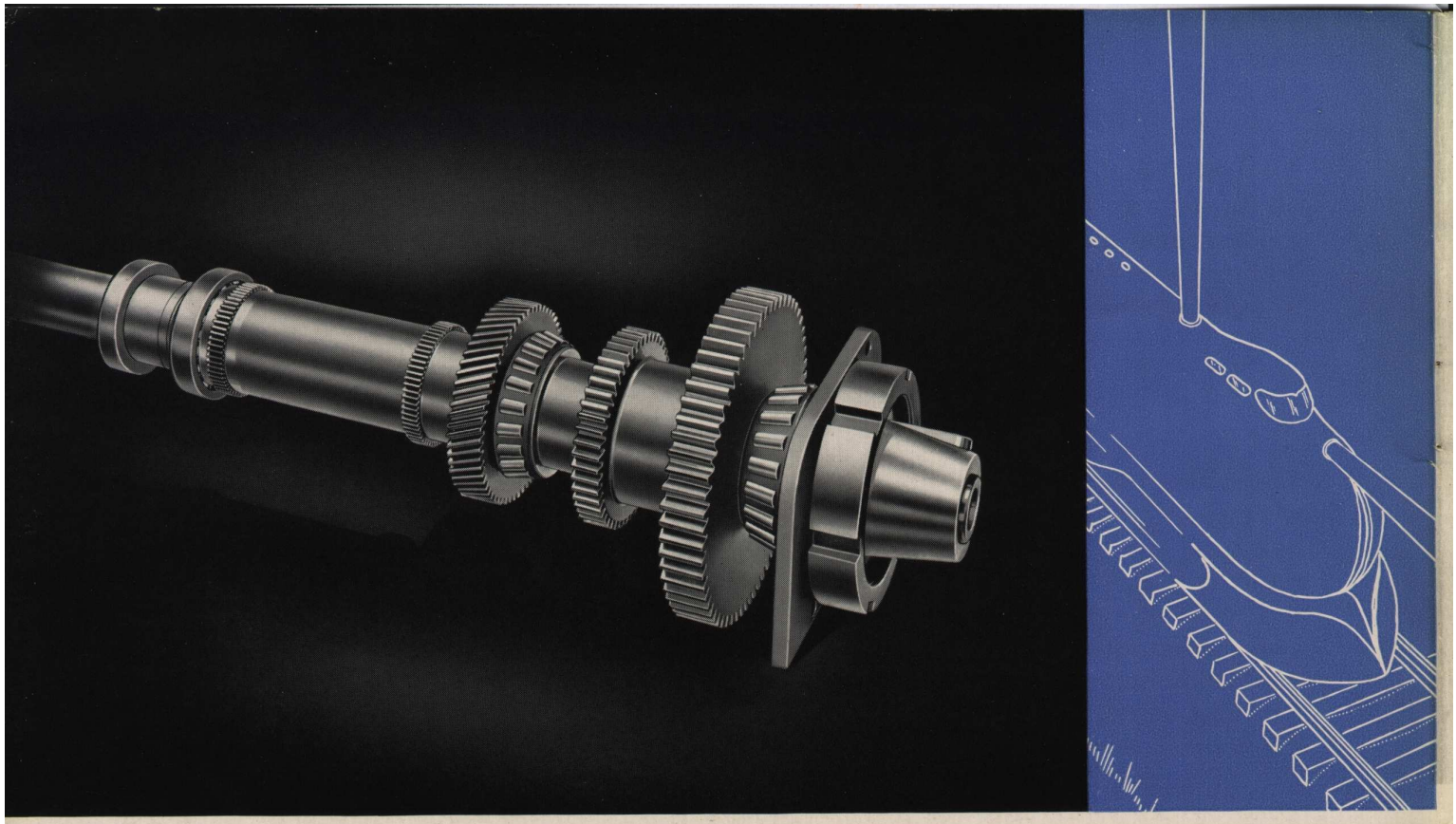


Headstock Drive showing Transverse Ribbing and Intermediate Supports for Spindle and Shafts

All speeds are selective, and in no way is it possible to simultaneously engage conflicting gear runs. Should the prospective customer feel that he does not require the close speed increments provided by the full range of 27 spindle speeds, the headstock mechanism may be simplified to produce either 9 or 18 speeds, with a corresponding reduction in price.

100% ANTI-FRICTION

There are no sleeve or plain bearings in the head mechanism. Only short, stub shafts are used and all are mounted on anti-friction bearings. This construction brings the shaft bearings close to the gears when in the driving position and minimizes the tendency to deflect under load. Shafts are made from heat-treated alloy steel, are multiple splined and finished ground on latest model spline grinders.



Spindle Assembly showing Selective Triple Drive

SPINDLE

The spindle, which is of unusually liberal proportions, is a hammered forging made from special, high tensile alloy spindle steel and is mounted in large Timken Zero Precision Taper Roller Bearings at the front and center and floats in a ball bearing at the rear. This type of spindle mounting has proven to possess unquestionable merit for the most advanced lathe service. The front and center bearings are opposed to provide for easy adjustment without removing the head cover and to absorb spindle thrusts in either direction, thus completely eliminating the necessity for the usual thrust washers at the rear bearing. The center bearing also supplies a rigid support for the spindle midway between the front and rear bearings and prevents deflection even under the heaviest loads.

A very convenient and novel means is provided for adjusting the front and intermediate spindle bearings. The removal of a small plate at the rear of the head exposes the adjusting shaft, the movement of which actuates a worm and worm wheel which in turn actuate the adjusting collar. This adjusting mechanism is self-locking, resulting in positive and lasting adjustment. One turn of the adjusting nut supplies .001″ adjustment to the bearings.

The spindle nose is exceptionally large and is regularly provided with the almost universally accepted standard key drive taper nose, although the cam lock type of nose will be furnished on all sizes when preferred and specified by the purchaser.

All gears employed throughout the entire head mechanism are made of alloy steel, oil hardened. In addition to being accurately machined on the very latest and most modern gear cutting equipment, they are finished ground for accurate tooth spacing and profile. The entire head transmission is located in the headstock bowl, all transmission mechanism being eliminated from the cover.

AUTOMATIC OILING

The entire mechanism of the new headstock is automatically oiled by a pump system which forces thoroughly filtered oil directly to all the bearings, including the spindle bearings, and sprays oil onto the transmission gears. The entire starting clutch and brake mechanism is also oiled directly by the pump system. The oil supply is carried in the bowl of the headstock below the gear line to prevent churning of the oil by the gears when revolving at high speeds. This is an important feature which is deserving of consideration, for, experience has shown that churning of the oil by immersed gears running at high speeds not only generates heat but rapidly destroys its lubricating efficiency. A reversing type, packless pump driven from the initial drive shaft forces the oil through a quick-cleansing metal oil filter to a flow indicator at the front of the head, which constantly assures the operator that the oiling system is functioning. An oil level gauge, also at the front of the headstock, shows at a glance the amount of oil in the reservoir.

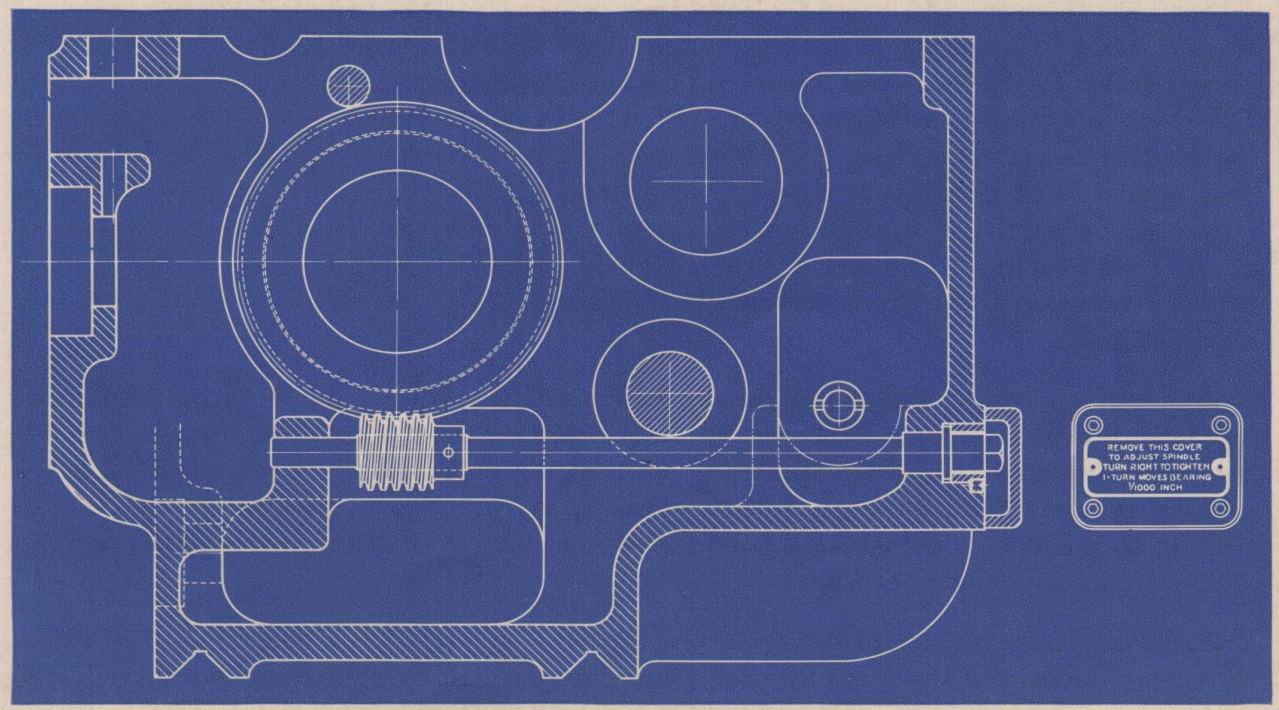
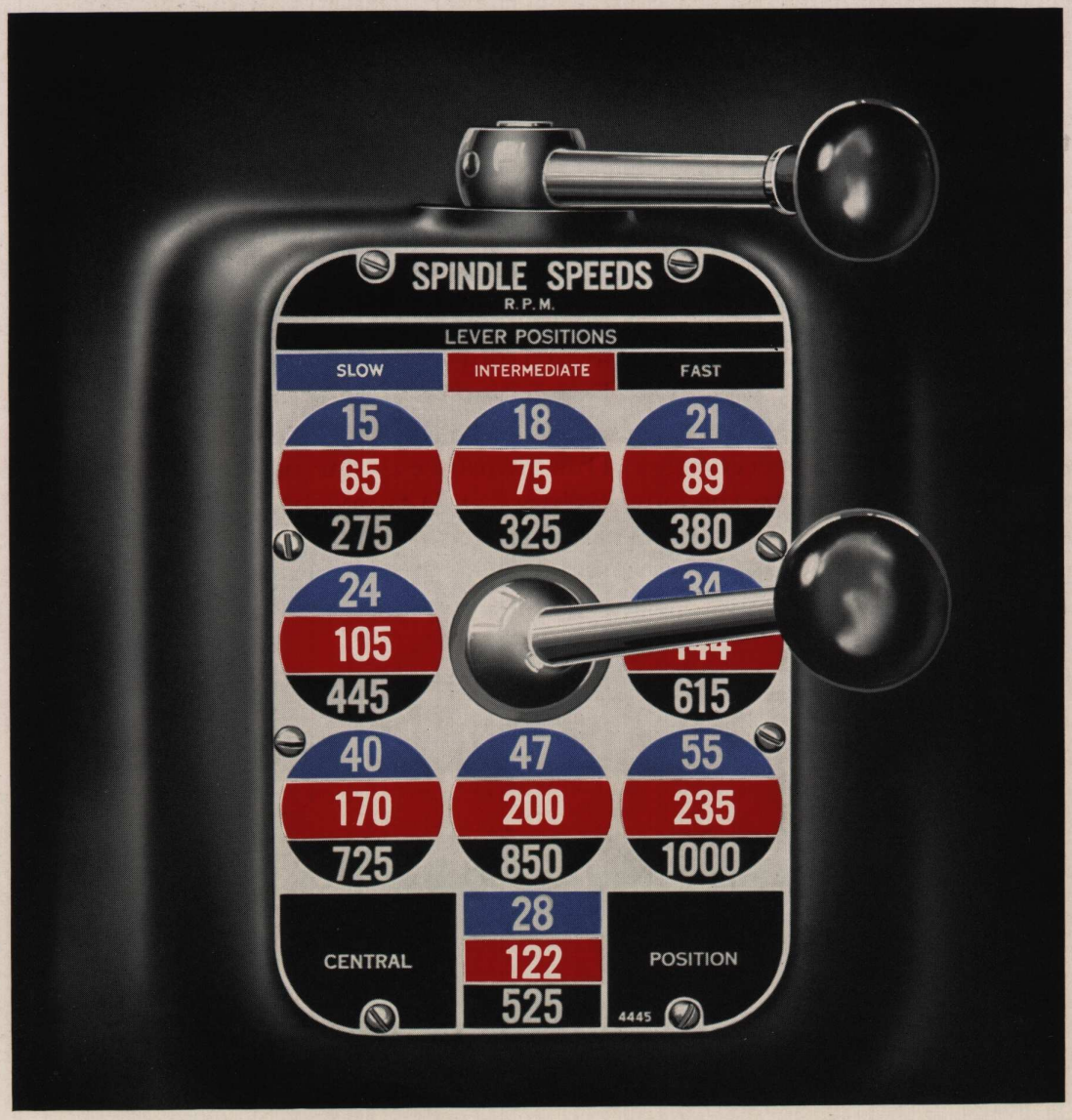


Diagram showing means for adjusting Spindle Bearings

INSTANTANEOUS DIRECT READING SPEED CONTROL



Perhaps the predominant contributing factor to the unprecedented convenience and ease of operation of this new lathe is the newly developed direct reading speed control. This is one of the outstanding features of this new design and is by far the simplest, fastest and most direct reading mechanical control ever furnished on a lathe.

On the 18-speed and 27-speed heads only two levers are used to secure the entire range of spindle speeds, while on the 9-speed head, the entire range is secured thru one lever. These levers are direct reading, thus eliminating the necessity of the operator referring to speed or index plates or to keep lever positions in his mind while changing speeds. With this new speed control, operators can make speed changes instantly and without confusion or error.

STARTING CLUTCH and BRAKE

This very important unit of the new Pacemaker Lathe is unquestionably an outstanding example of masterly machine tool design. It is a highly developed, complete and compact unit, mounted on anti-friction bearings. It is solidly bolted and doweled to the head, provides an outboard bearing for the initial driving shaft and carries a patented hard plate multiple disc driving clutch and brake, operated by either of two levers, one located at the head, the other attached to and traveling with the apron. This entire unit is automatically oiled by means of the pump system with pure, filtered oil. The outstanding characteristics of this mechanism are its tremendous pulling power, its dependability and its extreme ease of operation. The clutch, itself, is composed of a series of plates made from the best of saw blade steel, with each alternate plate die formed to cause it to spring away from the mating flat plate the instant the pressure of engagement is removed. This action completely frees the adjacent plates of contact when the clutch is released and overcomes any tendency for the plates to drag and cause spindle creepage. This clearance of the plates also permits the oil to flow in ample volume to thoroughly lubricate the mechanism and to carry away any heat that might develop under severe service. Adjustment for the driving clutch is very convenient. The adjusting mechanism is located outside the headstock at the end of the initial drive shaft. The multiple disc brake is self-adjusting for wear.

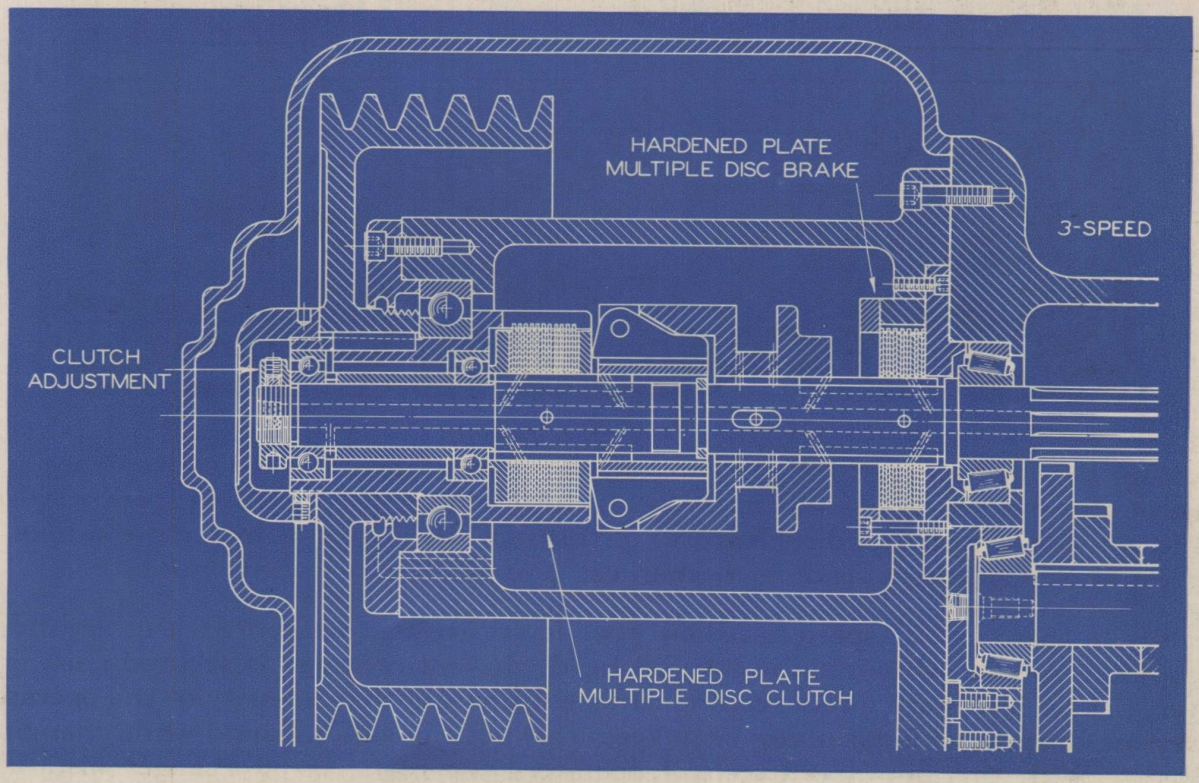


Diagram of Clutch and Brake Unit

TYPE OF SPINDLE NOSE OPTIONAL

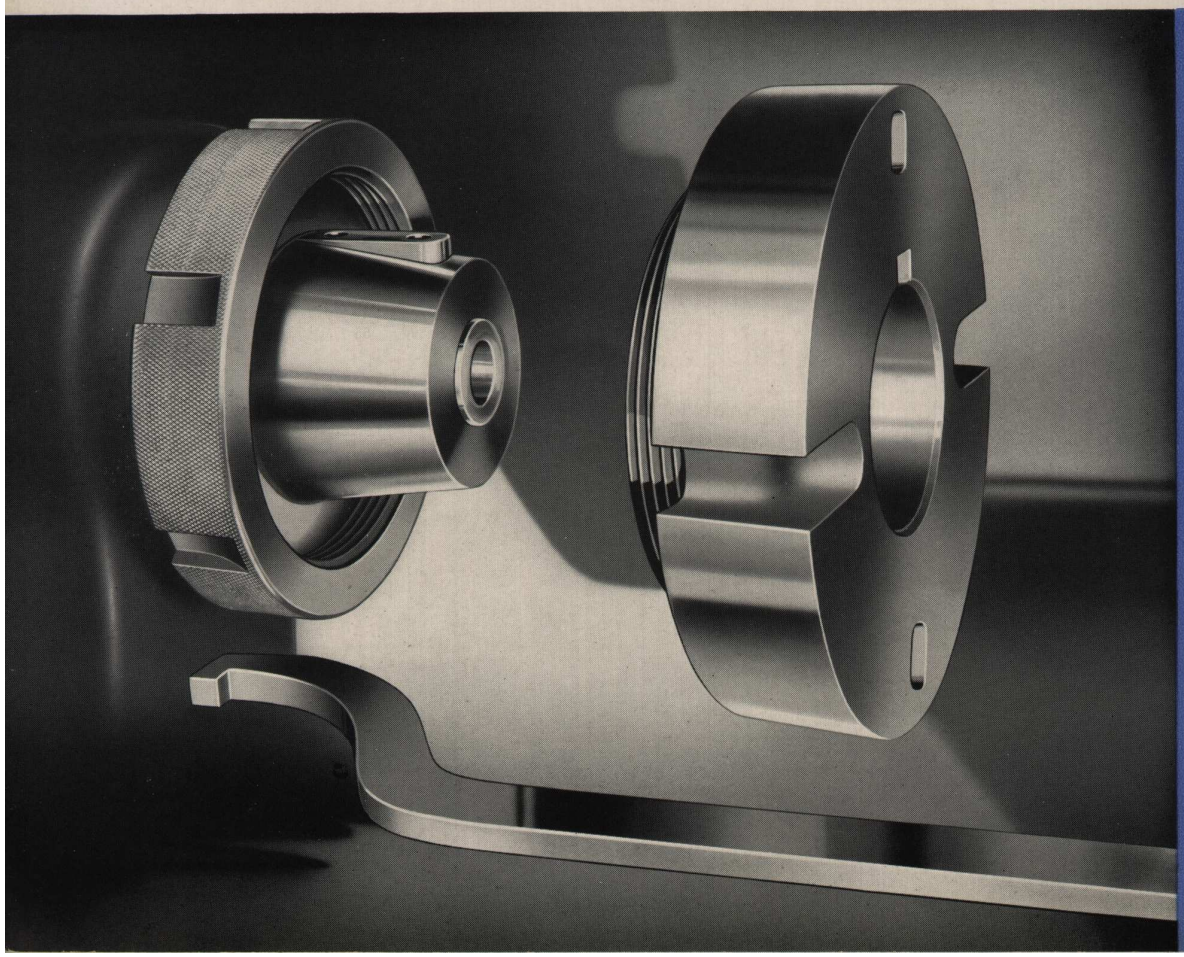
Two types of spindle noses are offered for the customer to choose from. The character of the work to be done by the lathe should be carefully considered, and the type of spindle nose selected that is best suited to the service.

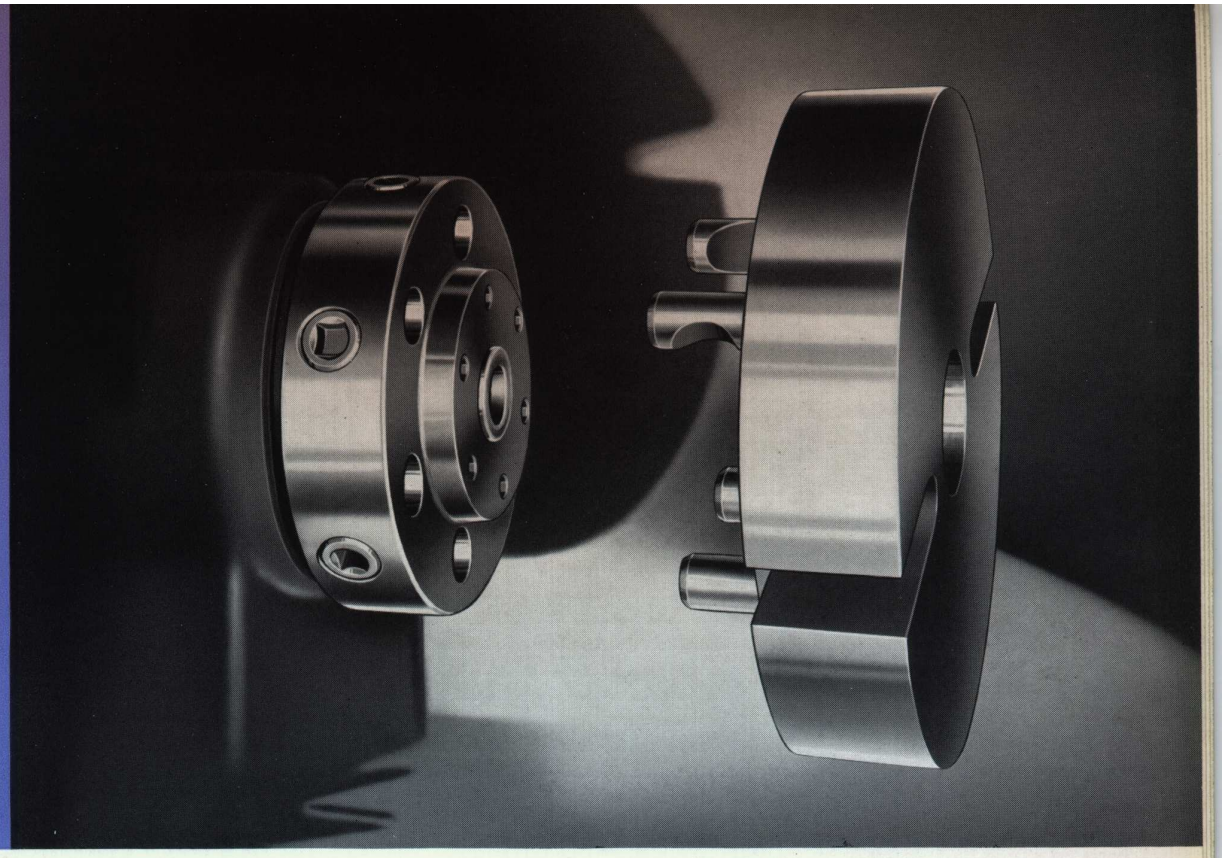
Type No. 1. Standard Key Drive Taper Nose

This type of nose is the most recent development in spindle noses and is offered for all sizes of "AMERICAN" Pacemaker Lathes. For the more severe classes of service it is preferable to the cam-lock type. It is very simple in design having but few component parts, is substantial and long lived. It consists primarily of a locating and seating taper for guiding and seating chucks, face plates and fixtures, has a substantial driving key and a large locking collar for securely holding the fixture in place. Application and removal of chucks, face plates and fixtures are accomplished quickly and with the greatest safety, as the taper prevents the fixture from falling when the locking collar is released.

This type of nose is offered in two sizes: No. 1 for 14″ and 16″ lathes; No. 2 for 18″, 20″ and 22″.

Standard Key Drive Taper Nose





Cam-Lock Spindle Nose

Type No. 2. "Cam-Lock" Spindle Nose

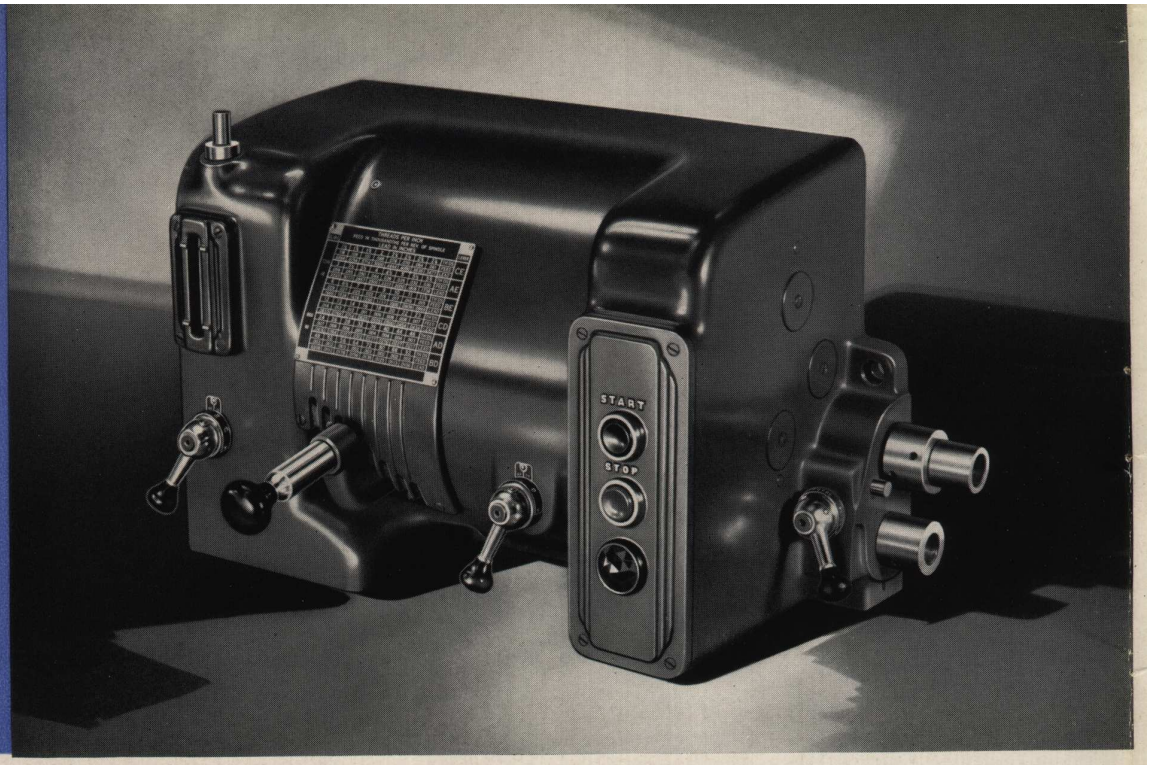
The cam-lock spindle nose is offered for all sizes of lathes up to and including the 22″ size. This type of nose offers quick and convenient means for applying and removing chucks and face plates with emphasis upon convenience of clamping such fixtures to the nose.

The 6″ diameter nose is used on 14″ and 16″ sizes. On 18″, 20″ and 22″ sizes the 8″ diameter nose is used. Chuck manufacturers supply steel body chucks to fit directly to Key Drive Taper and Cam-Lock noses without using adapter plates, but the type and size of spindle nose must be specified when ordering chucks.

OPTIONAL SPINDLE SPEED RANGES

14″ — 16″									18″—20″—22″								
27 Speeds			18 Speeds			9 Speeds			27 Speeds			18 Speeds			9 Speeds		
Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High	Low	Med.	High
15	23	30	17	25	34	21	31	42	12	18	24	13	20	26	17	25	34
18	26	36							14	21	28						
21	31	42	21	31	42				17	25	34	17	25	34			
24	37	48	27	40	54	34	51	68	20	30	40	21	32	42	27	41	54
28	43	56							23	35	46						
34	51	68	34	51	68				27	41	54	27	41	54			
40	60	80	43	66	86	55	83	110	32	48	64	34	51	68	44	65	88
47	70	94							37	56	74						
55	83	110	55	83	110				44	65	88	44	65	88			
65	97	130	70	106	140	89	133	178	51	77	102	55	82	110	71	106	142
75	113	150							60	91	120						
89	133	178	89	133	178				71	106	142	71	106	142			
105	157	210	114	172	228	144	217	288	84	126	168	90	135	180	115	174	230
122	183	244							98	148	196						
144	217	288	144	217	288				115	174	230	115	174	230			
170	256	340	185	280	370	235	355	470	135	203	270	145	217	290	186	279	372
200	300	400							159	238	318						
235	355	470	235	355	470				186	279	372	186	279	372			
275	415	550	300	455	600	380	570	760	220	330	440	235	353	470	304	455	608
325	480	650							258	388	516						
380	570	760	380	570	760				304	455	608	304	455	608			
445	670	890	485	730	970	615	925	1230	360	540	720	385	580	770	495	745	990
525	780	1050							420	630	840						
615	925	1230	615	925	1230				495	745	990	495	745	990			
725	1090	1450	790	1200	1580	1000	1500	2000	580	870	1160	620	930	1240	800	1200	1600
850	1270	1700							680	1020	1360						
1000	1500	2000	1000	1500	2000				800	1200	1600	800	1200	1600			

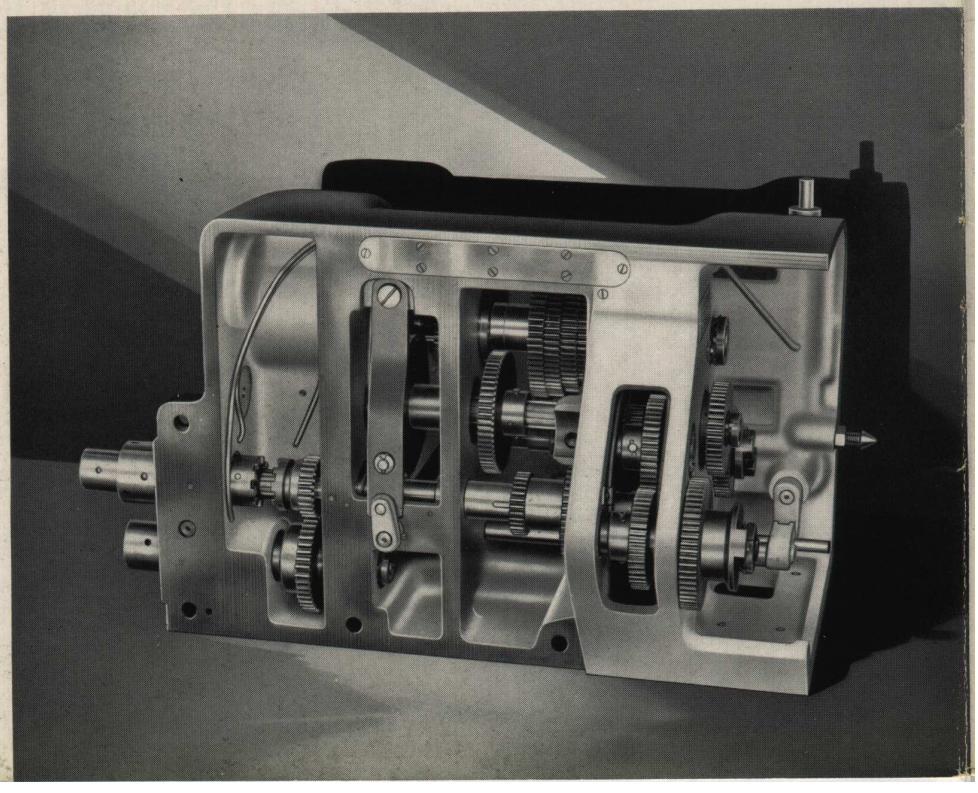
QUICK CHANGE GEAR MECHANISM



No. 1. Quick Change Gear Box—Exterior

The new quick change gear mechanism designed for "AMERICAN" Pacemaker Lathes is one of the most universal mechanisms of its kind ever developed. It cuts every standard thread ordinarily used without transposing or adding gears, and by the substitution of a very few gears can be quickly converted to metric, or vice versa. Means is also provided thru the addition of a few gears to the quadrant and first stud of the gear box to cut either a coarser or finer range than standard, also diametral and module pitches. To secure the full range of standard threads and feeds, however, no substitutions or additions are required as all changes are made in the gear box. On the 14″ and 16″ sizes a standard range of 48 threads 1½ to 92 and feeds from .002″ to .118″ is furnished, while on the 18″, 20″ and 22″ sizes, a range of 60 threads and feeds is provided from 1 to 60 per inch and feeds .003″ to .200″.

No. 2. Quick Change Gear Box—Interior

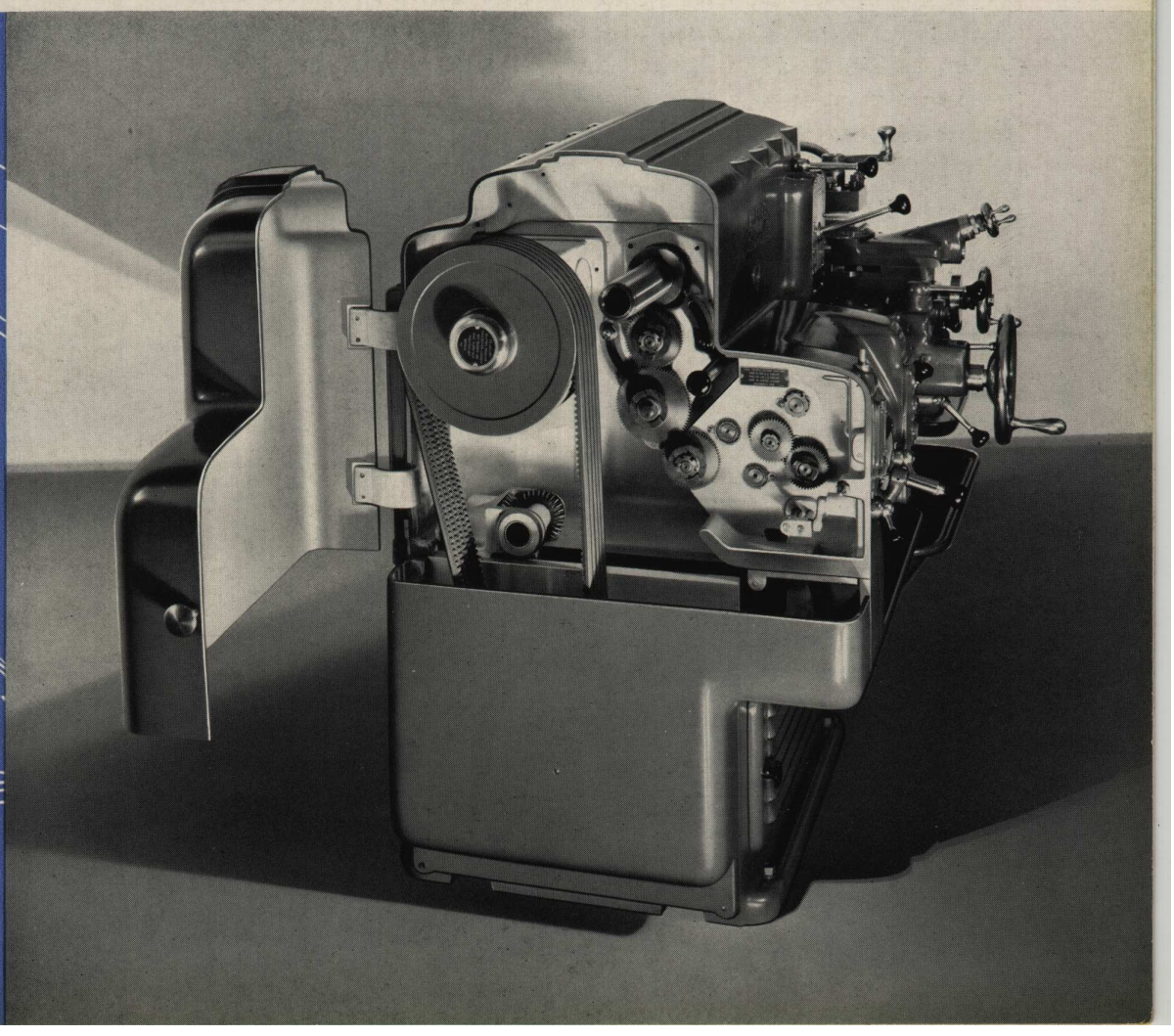


Means is provided for the addition of extra gears for cutting special threads and pitches.

This new quick change gear box is a complete unit of the tumbler gear type, securely attached to the outside of the bed where it is most easily accessible. It is 100% anti-friction in design and contains only heat-treated alloy steel gears and shafts. Likewise, the gears from the spindle to the quick change box are all anti-friction mounted. The tumbler itself is locked in its various positions by a spring locking pin which materially reduces vibration and wear between the cone and tumbler gears.

ONE-SHOT OILING for Quick Change Gear Box

An instantaneous "one-shot" plunger oiling system provides adequate lubrication to the entire gear box. Actuation of the plunger supplies sufficient oil to the distributing reservoir to thoroughly lubricate the entire mechanism for a whole day's work.



INDEPENDENT LEADSCREW and FEED ROD

There can be no conflict between the leadscrew and feed rod. These units are entirely independent of one another and can not function simultaneously. A small, easily operated lever at the right-hand side of the box selectively engages either the leadscrew or feed rod. When the leadscrew is in operation, the feed rod is at rest; consequently, there is no waste motion with its resultant wear and power consumption. The original accuracy of the leadscrew is thus preserved, resulting in accurate functioning over a long period of service.

Simplified Reverse for Leadscrew and Feed Rod.

In place of the old-fashioned swinging quadrant on the end of the bed to provide reverse for the leadscrew and feed rod, this new lathe employs a very simple pull rod which is instantaneous in operation and requires no manipulation of binder bolts. This one feature in itself has materially reduced handling time and effort.

The feed rod is regularly supplied with adjustable stop collars for automatically stopping the carriage travel in either direction.

A mechanical feed reverse is regularly provided in the apron through a double bevel gear through which the direction of the carriage may be reversed without reversing the direction of the spindle or feed rod.

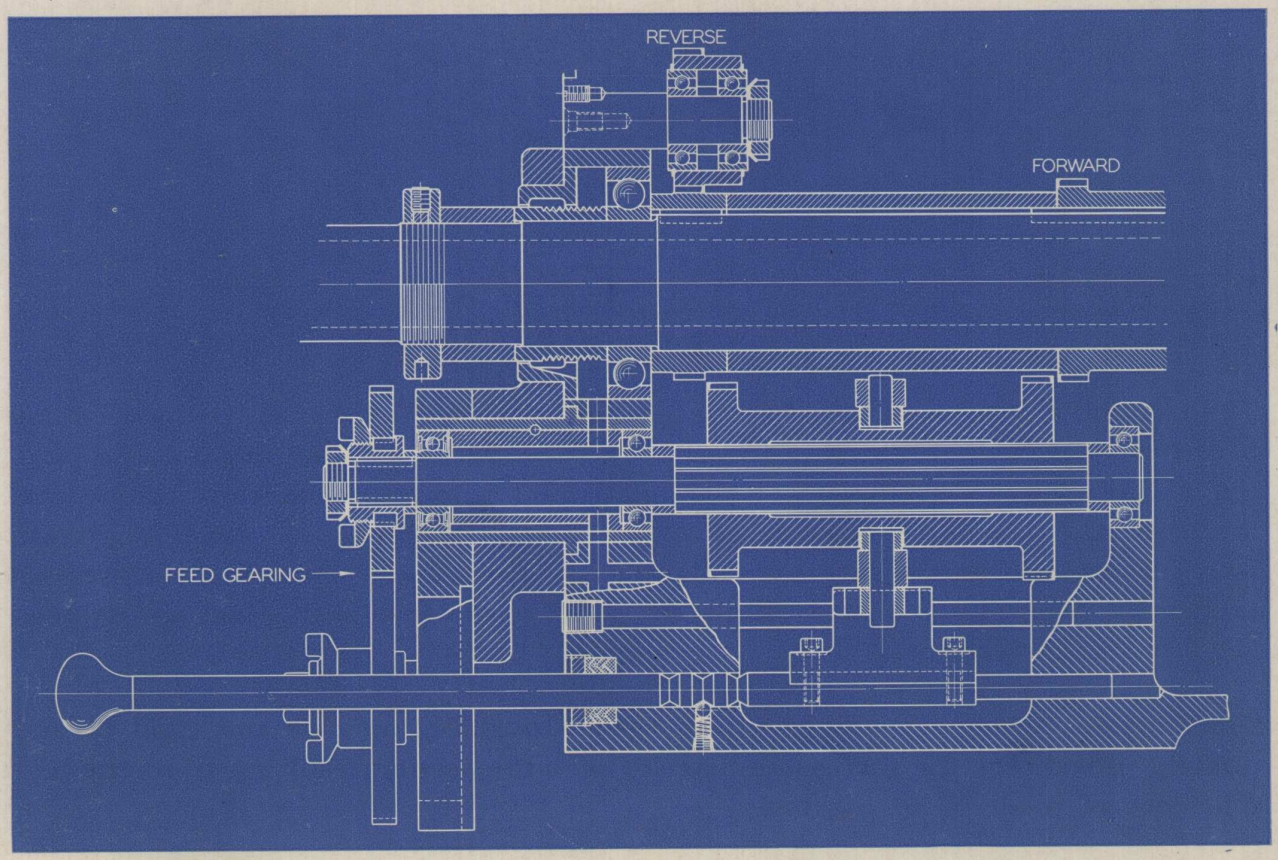
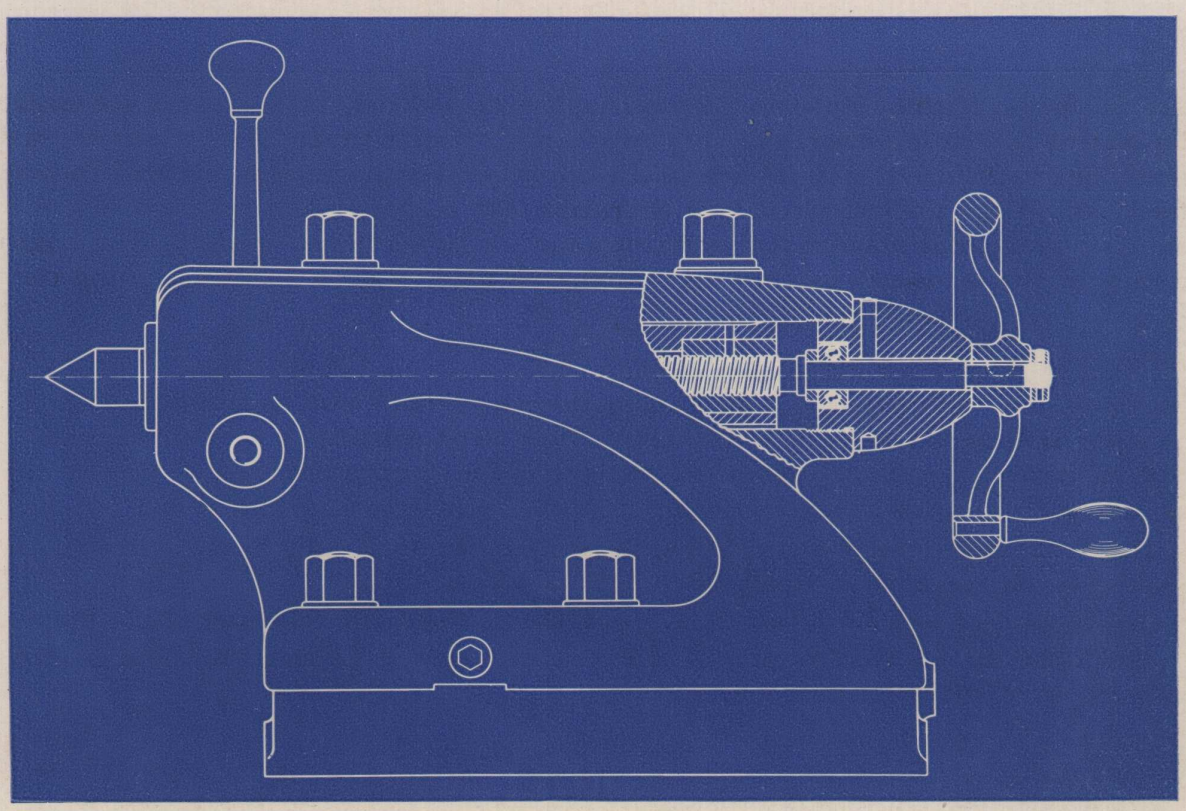


Diagram of Mechanism for Reversing the direction of the Leadscrew and Feed Rod.
(This is standard equipment and is not what is known as "Leadscrew Reverse from Apron")



STREAMLINED TAILSTOCK

The streamlined tailstock has a very large diameter extension barrel, giving clearance to the carriage bridge for short work. It is provided with four clamping bolts for binding it securely to bed, two rear bolts being carried to top of the barrel for convenience in clamping. The barrel is solid, the spindle being clamped by a double plug binder which clamps without affecting its alignment. The spindle itself is made over-size and carries a very large center. Tailstock screw is provided with a ball thrust bearing for absorbing thrusts.

The tailstock unit purposely has been made unusually massive and rigid to adequately provide for the increasing severity of lathe service resulting from the high efficiency of modern cutting tools.

The threads, leads and feeds shown in the following tables are those regularly secured through the standard quick change gear mechanism of 14″ and 16″ Pacemaker Lathes.

14″ and 16″ SIZES

Threads Per Inch	1½	1⅝	1¾	2	2¼	2½	2¾	2⅞
	3	3¼	3½	4	4½	5	5½	5¾
	6	6½	7	8	9	10	11	11½
	12	13	14	16	18	20	22	23
	24	26	28	32	36	40	44	46
	48	52	56	64	72	80	88	92

Equivalent Leads in Inches	.66666	.61538	.57142	.50000	.44444	.40000	.36363	.34782
	.33333	.30769	.28571	.25000	.22222	.20000	.18181	.17391
	.16666	.15384	.14285	.12500	.11111	.10000	.09090	.08695
	.08333	.07692	.07142	.06250	.05555	.05000	.04545	.04347
	.04166	.03846	.03571	.03125	.02777	.02500	.02272	.02173
	.02083	.01923	.01785	.01562	.01388	.01250	.01136	.01087

Feeds in Thousandths Per Revolution of Spindle	.1179	.1089	.1010	.0884	.0786	.0707	.0643	.0615
	.0589	.0544	.0505	.0442	.0393	.0353	.0321	.0307
	.0294	.0272	.0252	.0221	.0196	.0176	.0160	.0153
	.0147	.0136	.0126	.0110	.0098	.0088	.0080	.0076
	.0073	.0068	.0063	.0055	.0049	.0044	.0040	.0038
	.0036	.0034	.0031	.0027	.0024	.0022	.0020	.0019



The threads, leads and feeds shown in the following tables are those regularly secured through the standard quick change gear mechanism of 18″, 20″ and 22″ Pacemaker Lathes.

18″, 20″ and 22″ SIZES

Threads Per Inch	1	1 1/8	1 1/4	1 3/8	1 7/16	1 1/2	1 5/8	1 11/16	1 3/4	1 7/8
	2	2 1/4	2 1/2	2 3/4	2 7/8	3	3 1/4	3 3/8	3 1/2	3 3/4
	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	6 3/4	7	7 1/2
	8	9	10	11	11 1/2	12	13	13 1/2	14	15
	16	18	20	22	23	24	26	27	28	30
	32	36	40	44	46	48	52	54	56	60

Equivalent Leads in Inches	.10000	.88888	.80000	.72727	.69565	.66666	.61538	.59259	.57142	.53333
	.50000	.44444	.40000	.36363	.34782	.33333	.30769	.29629	.28571	.26666
	.25000	.22222	.20000	.18181	.17391	.16666	.15384	.14814	.14285	.13333
	.12500	.11111	.10000	.09090	.08695	.08333	.07692	.07407	.07142	.06666
	.06250	.05555	.05000	.04545	.04348	.04166	.03846	.03703	.03571	.03333
	.03125	.02777	.02500	.02272	.02174	.02083	.01923	.01851	.01785	.01666

Feeds in Thousandths Per Revolution of Spindle	.2000	.1777	.1600	.1454	.1390	.1333	.1230	.1185	.1143	.1066
	.1000	.0888	.0800	.0727	.0695	.0666	.0615	.0592	.0571	.0533
	.0500	.0444	.0400	.0363	.0347	.0333	.0307	.0296	.0285	.0266
	.0250	.0222	.0200	.0181	.0174	.0166	.0153	.0148	.0142	.0133
	.0125	.0111	.0100	.0091	.0087	.0083	.0076	.0074	.0071	.0066
	.0062	.0055	.0050	.0045	.0043	.0042	.0038	.0037	.0035	.0033



By the addition of a few special gears to the quadrant, a range of coarse threads, leads and feeds, in addition to the standard range is provided as shown by the following table.

14" and 16" SIZES

Threads Per Inch	3/8	13/32	7/16	1/2	9/16	5/8	11/16	23/32
	3/4	13/16	7/8	1	1 1/8	1 1/4	1 3/8	1 7/16
	1 1/2	1 5/8	1 3/4	2	2 1/4	2 1/2	2 3/4	2 7/8
	3	3 1/4	3 1/2	4	4 1/2	5	5 1/2	5 3/4
	6	6 1/2	7	8	9	10	11	11 1/2
	12	13	14	16	18	20	22	23

Equivalent Leads in Inches	2.6666	2.46154	2.28571	2.0000	1.77777	1.6000	1.45454	1.39130
	1.33333	1.23077	1.14285	1.0000	.88888	.8000	.72727	.69565
	.66666	.61538	.57143	.5000	.44444	.4000	.36363	.34782
	.33333	.30769	.28571	.2500	.22222	.2000	.18181	.17391
	.16666	.15385	.14285	.1250	.11111	.1000	.09090	.08695
	.08333	.07692	.07142	.0625	.05555	.05000	.04545	.04347

Feeds in Thousandths Per Revolution of Spindle	.4716	.4356	.4040	.3536	.3144	.2828	.2572	.2460
	.2358	.2178	.2020	.1768	.1572	.1414	.1286	.1230
	.1179	.1089	.1010	.0884	.0786	.0707	.0643	.0615
	.0589	.0544	.0505	.0442	.0393	.0353	.0321	.0307
	.0294	.0272	.0252	.0221	.0196	.0176	.0160	.0153
	.0147	.0136	.0126	.0110	.0098	.0088	.0080	.0076



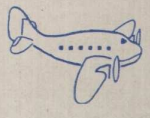
By the addition of a few special gears to the quadrant, a range of coarse threads, leads and feeds, in addition to the standard range is provided as shown by the following table.

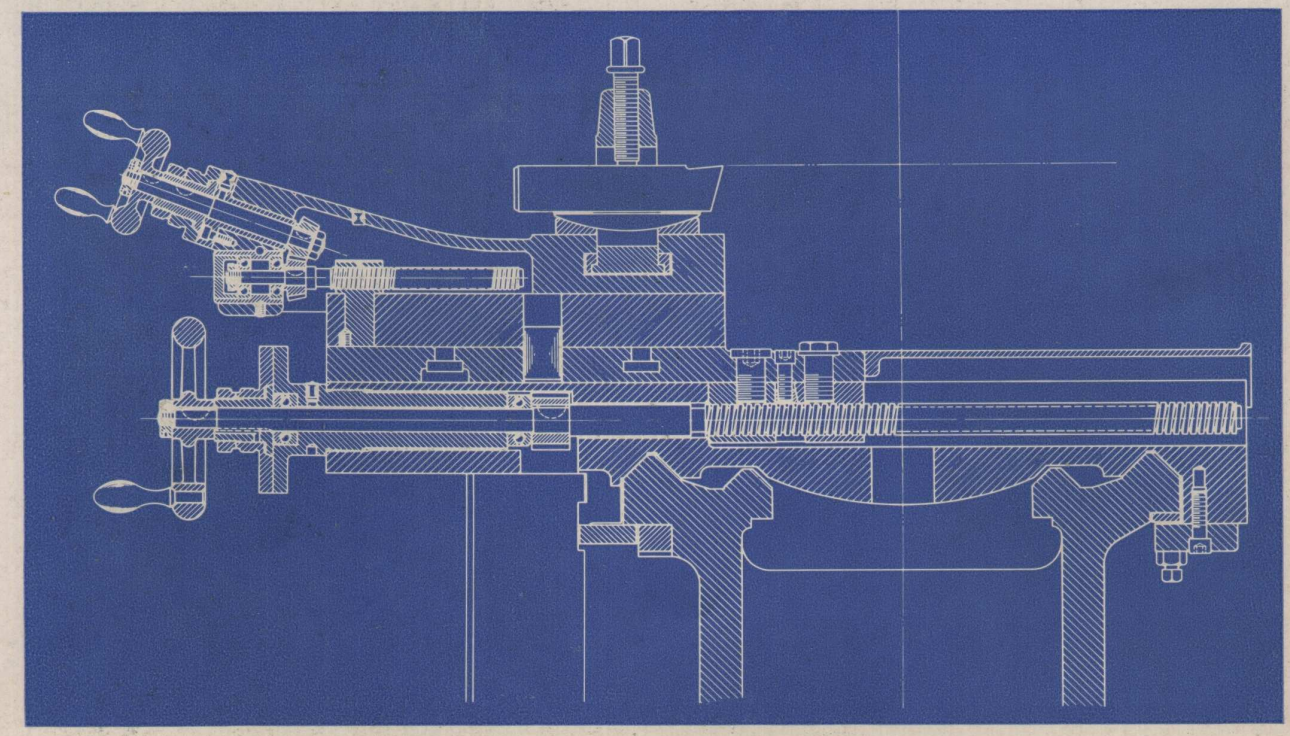
18", 20" and 22" SIZES

Threads Per Inch	1/4	9/32	5/16	11/32	23/64	3/8	13/32	27/64	7/16	15/32
	1/2	9/16	5/8	11/16	23/32	3/4	13/16	27/32	7/8	15/16
	1	1 1/8	1 1/4	1 3/8	1 7/16	1 1/2	1 5/8	1 11/16	1 3/4	1 7/8
	2	2 1/4	2 1/2	2 3/4	2 7/8	3	3 1/4	3 3/8	3 1/2	3 3/4
	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	6 3/4	7	7 1/2
	8	9	10	11	11 1/2	12	13	13 1/2	14	15

Equivalent Leads in Inches	4.0000	3.55555	3.2000	2.9090	2.78260	2.66666	2.46153	2.37036	2.28571	2.13333
	2.0000	1.77777	1.6000	1.45454	1.39130	1.33333	1.23076	1.18518	1.14285	1.06666
	1.0000	.88888	.8000	.72727	.69565	.66666	.61538	.59259	.57142	.53333
	.50000	.44444	.4000	.36363	.34782	.33333	.30769	.29629	.28571	.26666
	.2500	.22222	.2000	.18181	.17391	.16666	.15384	.14814	.14285	.13333
	.1250	.11111	.1000	.09090	.08695	.08333	.07692	.07407	.07142	.06666

Feeds in Thousandths Per Revolution of Spindle	.8000	.7111	.6400	.5818	.5564	.5333	.4943	.4740	.4572	.4266
	.4000	.3555	.3200	.2909	.2783	.2666	.2461	.2370	.2286	.2133
	.2000	.1777	.1600	.1454	.1390	.1333	.1230	.1185	.1143	.1066
	.1000	.0888	.0800	.0727	.0695	.0666	.0615	.0592	.0571	.0533
	.0500	.0444	.0400	.0363	.0347	.0333	.0307	.0296	.0285	.0266
	.0250	.0222	.0200	.0181	.0174	.0166	.0153	.0148	.0142	.0133

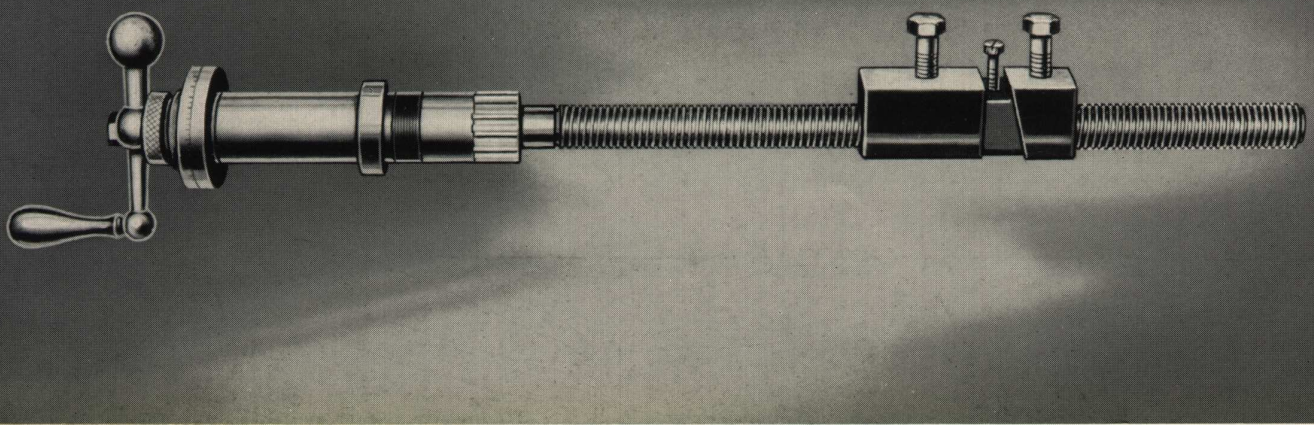


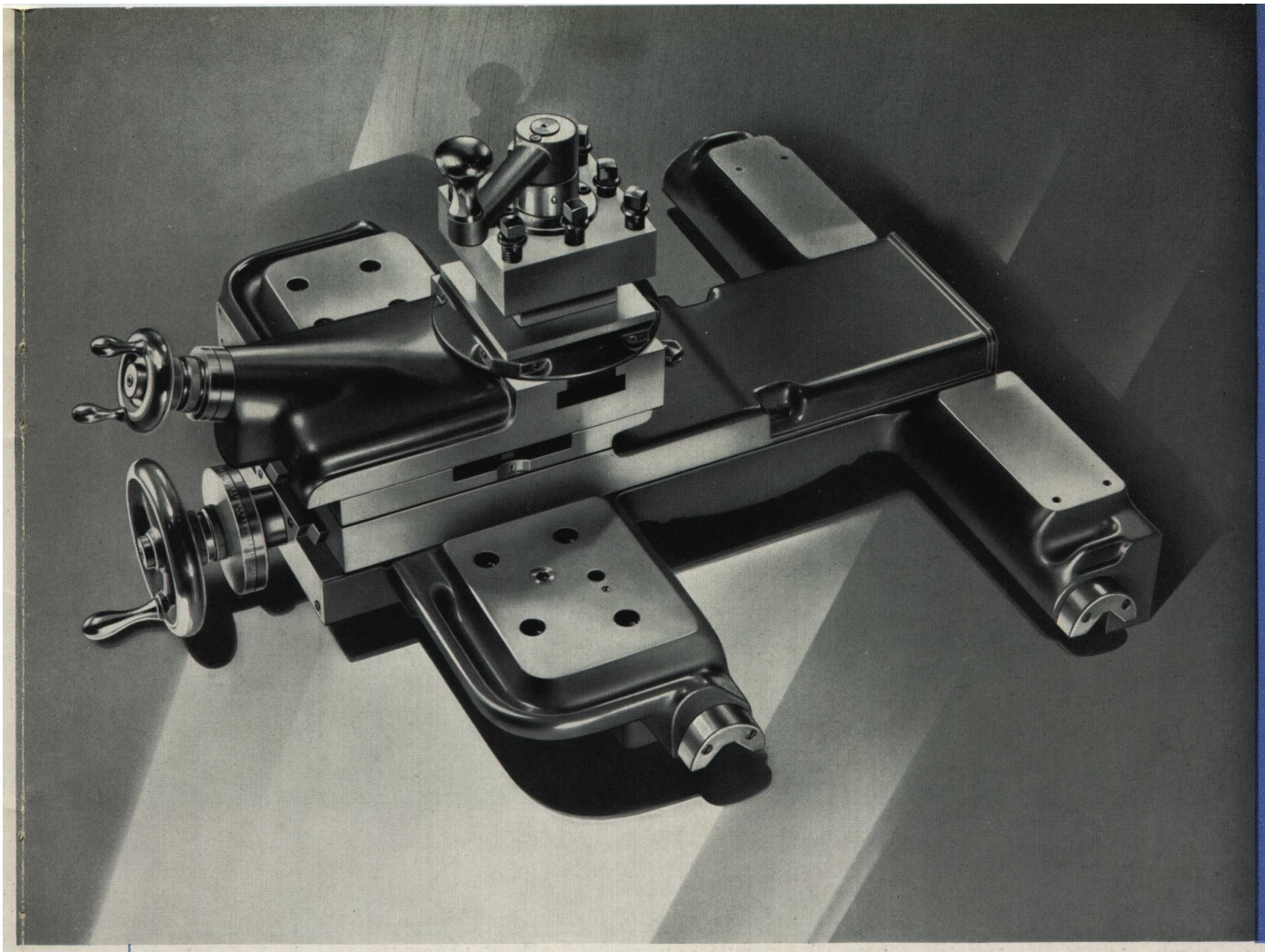


CARRIAGE

The carriage construction is one of the outstanding "PACEMAKER" features. It is unusually rigid, offering the greatest resistance to the cutting thrusts, yet is surprisingly easy in its movement along the bed. Hardened wipers honed to perfectly fit the bed "ways" exclude all chips and dirt and prevent scoring of the bed.

It has two vee bearings on the bed which insure long maintenance of original alignments and equal wear on the front and rear bearings. Due to the patented Drop Vee Bed, the carriage bridge can be made very deep which, coupled with its large area of contact on the wide angle bed vees, accounts, in a large measure, for its strength and



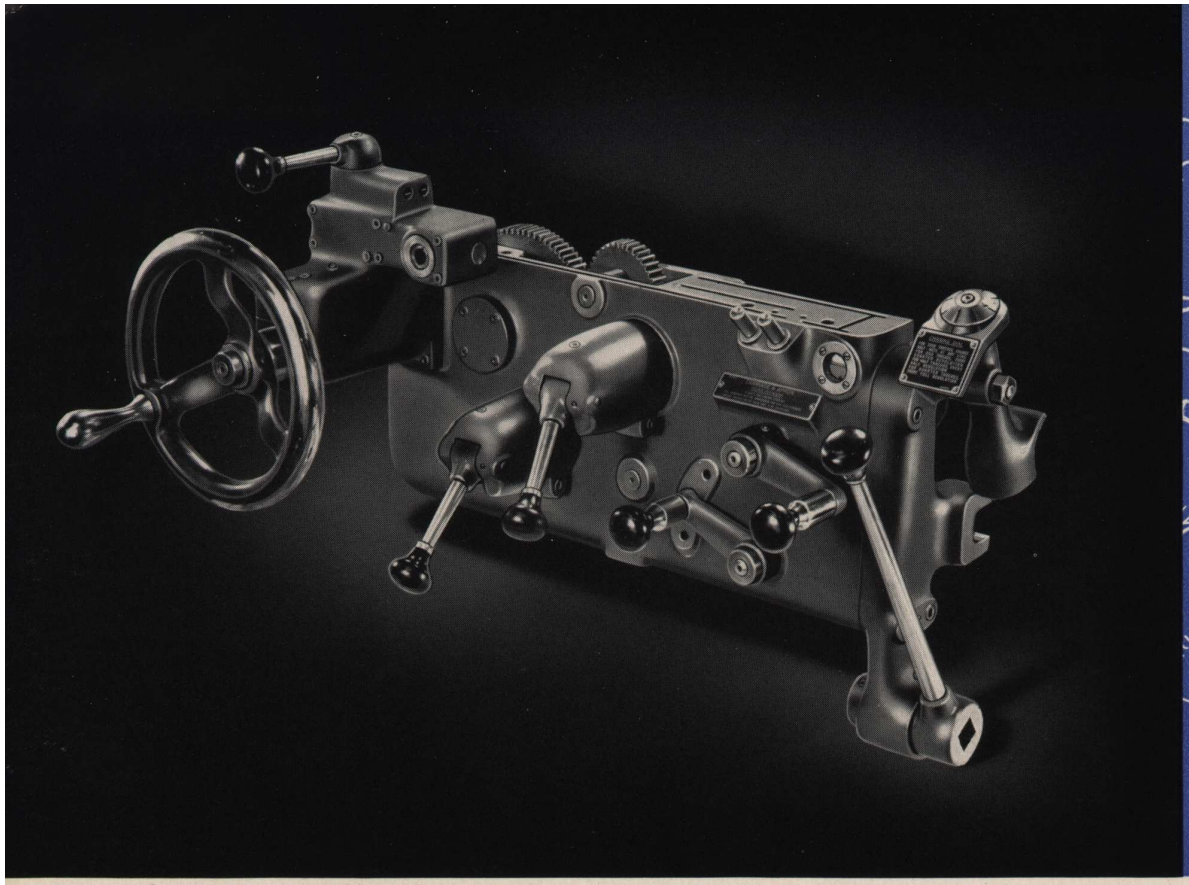


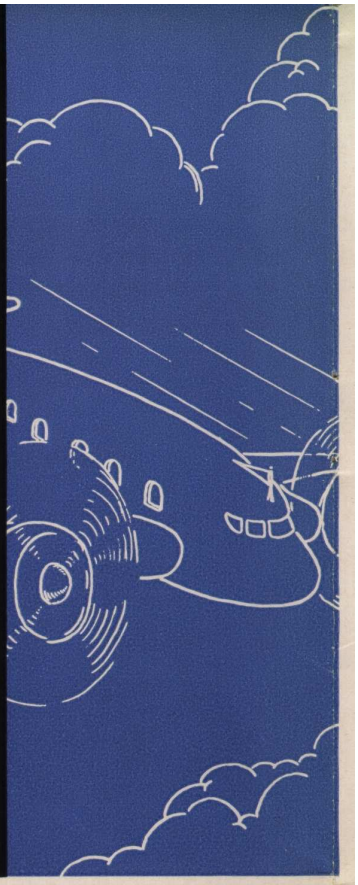
rigidity. The dovetail has been materially increased in width, giving the compound rest a most substantial mounting which, coupled with its very wide bearing on the widened bridge, provides a rigidity of mounting rarely encountered in other makes.

Both the carriage vees and the cross slide are adequately lubricated by means of approved "one-shot" oiling systems which function instantaneously and, at the same time, prevent the oil drip and waste encountered in many automatic systems.

For rigidly securing the carriage to the bed, clamps are provided at the front and rear with an adjustable gib at the rear for maintaining the proper contact with the bed vees. The compound rest and cross feed screws are very large in diameter, and have large, stainless steel, easily read, direct-reading micrometer dials.

The cross feed screw is surface hardened to about 70 scleroscope in such a manner that the original accuracy is retained. It is equipped with ball thrust bearings and a large automatically oiled, bronze compensating cross feed nut, which is conveniently and quickly adjustable for wear.





No. 1. Front View of Apron

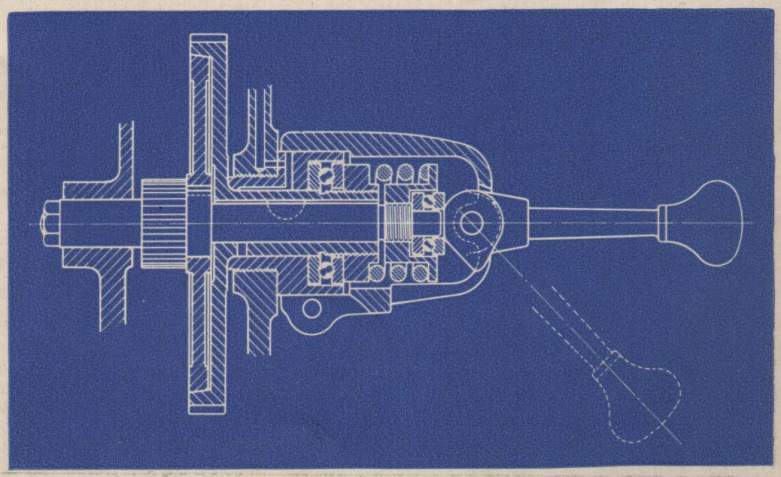
APRON

The "PACEMAKER" Lathe apron is a substantial, compact unit using all heat-treated, carefully processed gears and providing outer supports for all studs. The first stud and rack pinion are anti-friction mounted, which contributes materially to the extremely easy and smooth movement of the carriage along the bed, which in turn minimizes drag when chasing threads and eliminates the necessity of withdrawing the rack pinion.

The control for both the cross and longitudinal feeds is through convenient and easily operated drop levers which actuate clutches of the well-known "automobile" spring control type. The longitudinal friction is the cone type, while the cross feed is through a safety angular tooth type. Both units are held in engagement by heavy coil springs the same as the automobile clutch and consequently rarely, if ever, require adjustment.

Both are disengaged positively and instantly without effort, even under the heaviest cuts, by means of a cam, actuated by the drop type control levers.

Both the longitudinal and cross-feed units are provided with overload safety features. The longitudinal friction will slip when overloaded, and the cross feed clutch will automatically disengage itself.



No. 2. Diagram of Longitudinal Feed Clutch

The oiling of the entire apron is accomplished by means of an instantaneous "one-shot" oiling system. Actuation of the plunger supplies sufficient oil to distributing reservoir to thoroughly lubricate the entire mechanism for one day. The "one-shot" system delivers an adequate supply of oil, but does not supply it in the wasteful abundance of some other systems.

COMPOUND REST

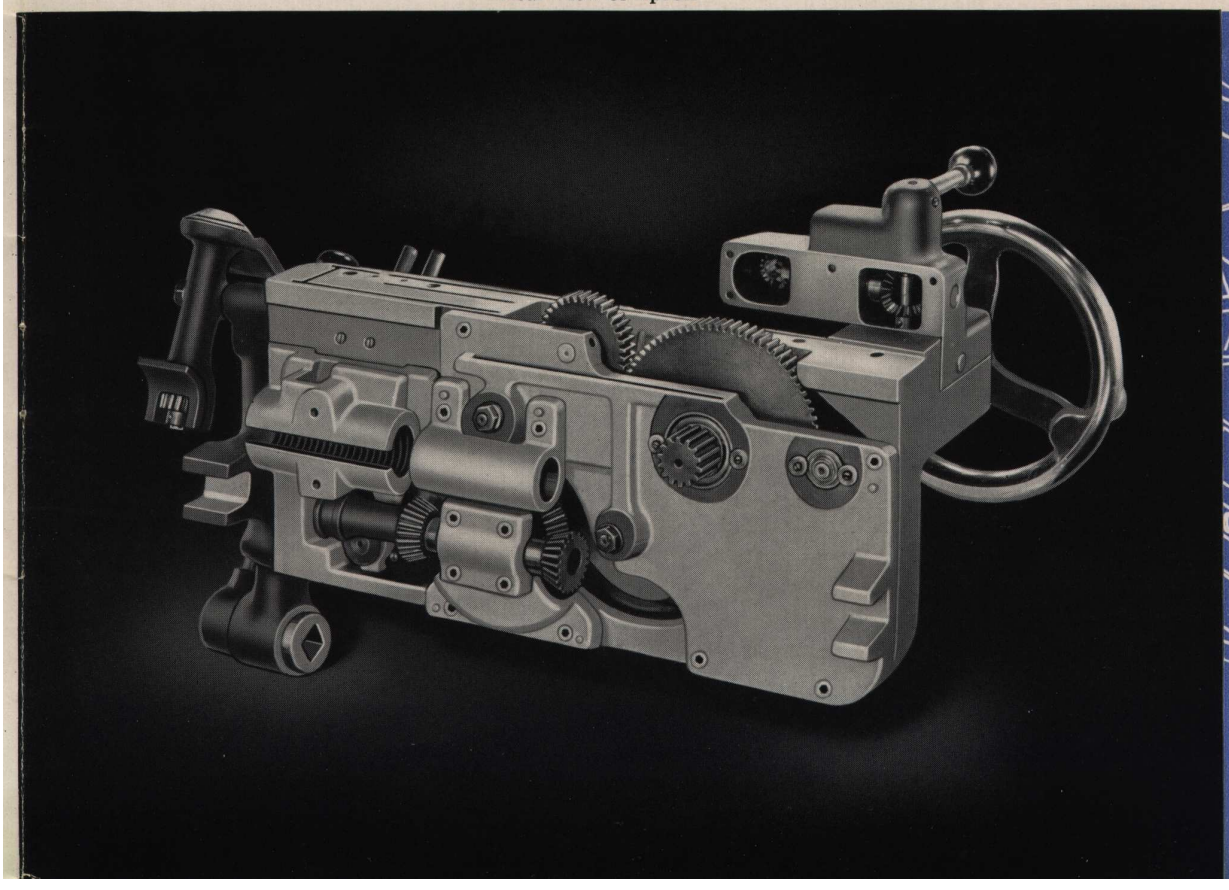
The compound rest, while very rigid, is exceptionally sensitive and amazingly easy to operate. The top slide hand wheel is set at an angle so as to provide additional clearance and to facilitate its operation.

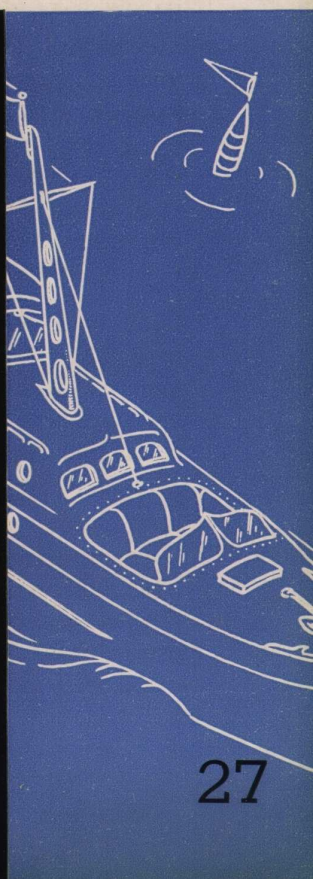
The swivel is rectangular in form and has greater bearing contact with the bottom slide than is possible with the circular swivel used on many designs. It is also graduated on both sides to facilitate setting. Full length taper gibs are used on both the compound rest top and bottom slides, and are located on the right-hand side, where they are free from the tool thrust under normal working conditions.

MECHANICAL APRON CONTROL

This unit provides means for instantly starting and stopping the lathe spindle from the apron. The control handle is located at the right-hand side of the apron and operates the multiple disc clutch in the initial driving unit, as well as a powerful brake. A secondary lever is located on the control rod close to the headstock for convenience when changing speeds and examining work close to the face plate or chuck. Both of these control levers are designed to operate with a minimum of effort.

Rear View of Apron





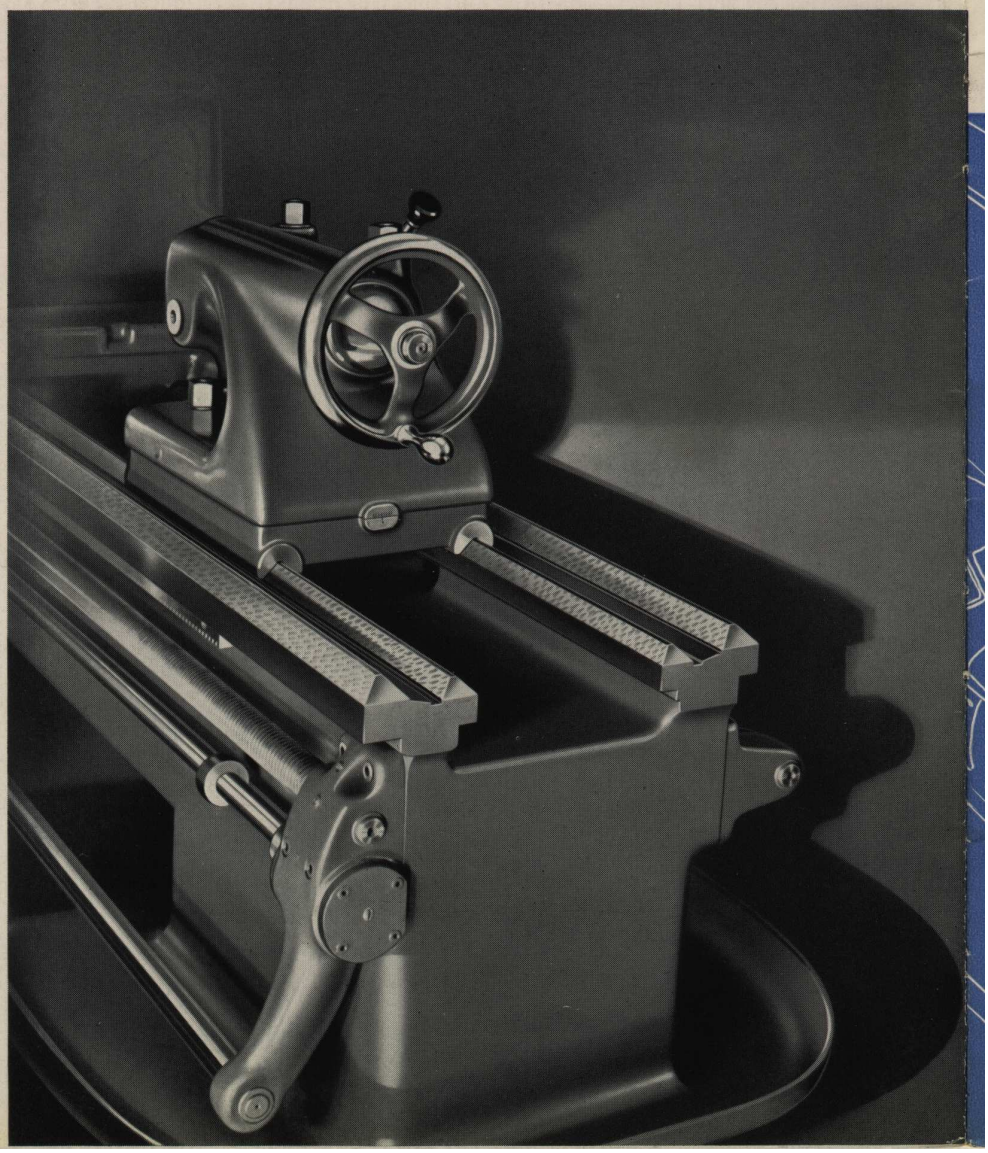
THREAD DIAL

A thread dial conveniently located at the right-hand side of the apron in full view of the operator is regularly furnished. This dial is marked plainly to indicate the correct point for engaging the half nuts for the thread being chased, and carries instructions to guide the inexperienced operator so as to avoid mistakes.

PATENTED 4-VEE BED

The bed has been made unusually rigid by increased depth, thicker walls and heavier ribbing. A special mixture is used, containing 40% steel scrap and other ingredients, which produces a semi-steel of approximately 40,000 pounds tensile strength and a scleroscopic hardness of 35 to 38 degrees. The outstanding characteristic of this special metal is the close-grained, wear-resisting surface it provides for the carriage bearings.

"AMERICAN" Pacemaker beds provide 4 large vees for the carriage and tailstock guides, the two inner Vees being dropped below the outer Vees to provide greater swing over the bed and additional carriage bridge thickness. In our opinion, the vee bearing is much easier to keep clean and consequently offers greater resistance to cutting and wear than a flat bearing. When wear does occur, the 4-vee bed wears more evenly than one using a vee and a flat bearing, for it is perfectly obvious that a vee bearing and a flat bearing will not wear equally. The 4-vee bed, in providing 2 vee guides for both the carriage and the tailstock, insures longer life for their alignments, resulting in the maintenance of accuracy over a longer period of service than is possible with any other type of bed.



The carriage vees are thoroughly lubricated by means of the "one-shot" oiling system in the apron.

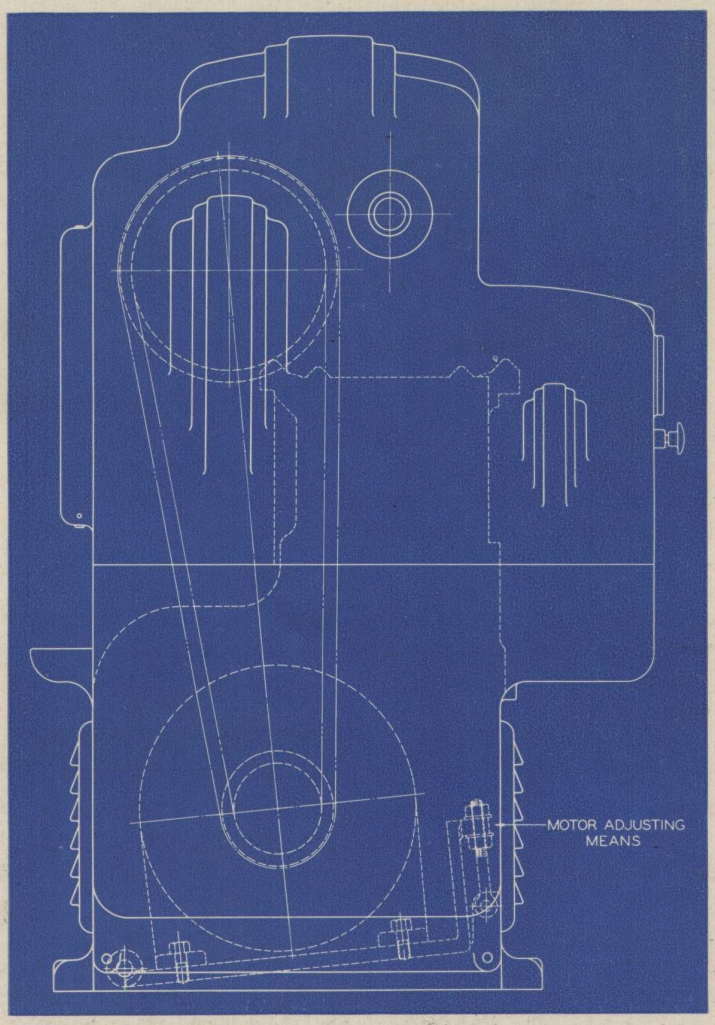


Diagram Showing Standard Motor Mounting

MOTOR DRIVE

"AMERICAN" Pacemaker Lathes are built only in the motor driven type. The motor drive consists of either A. C. or D. C. constant speed motor, mounted inside the cabinet leg under headstock, and connected to the initial driving unit of head, preferably by multiple vee belts, although a silent chain may be substituted if preferred.

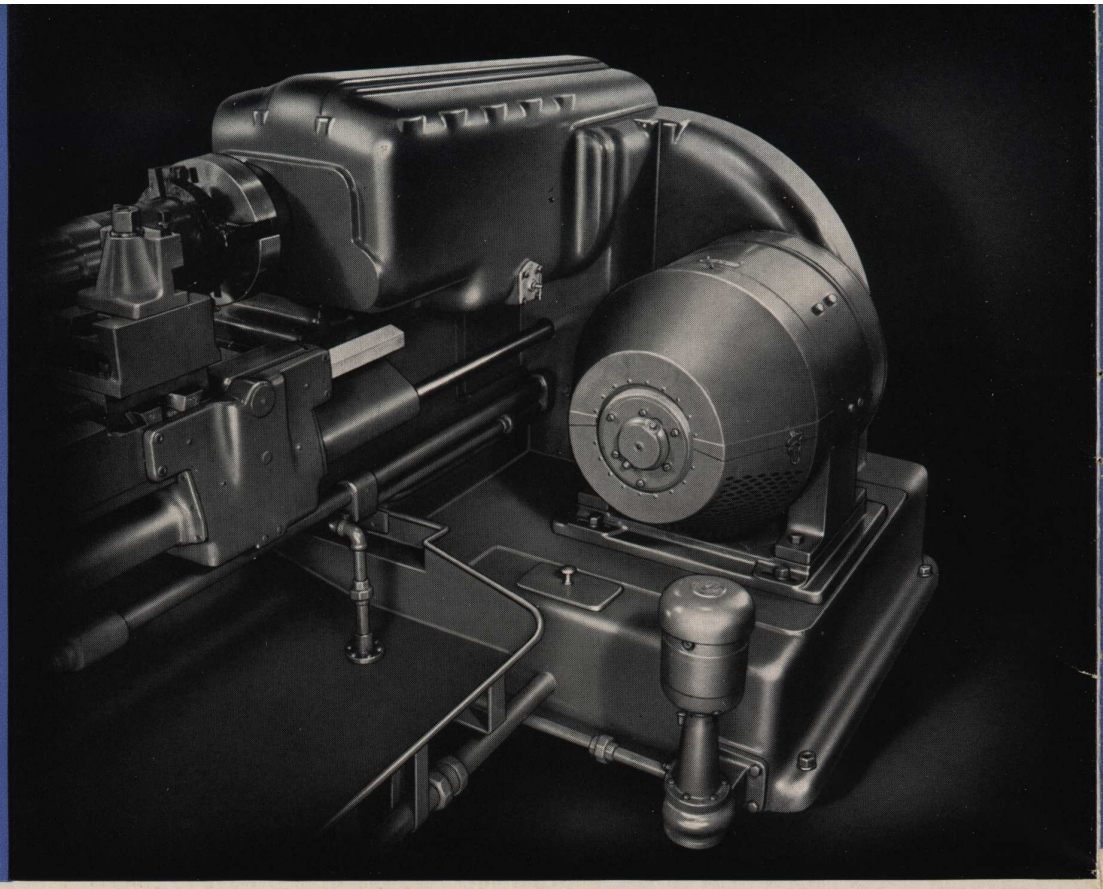
The motor mounting includes a hinged motor plate to permit motor adjustment to compensate for belt stretch. For the maximum horse-power motor recommended for each size lathe, see specifications, page 38.

For lathes driven by adjustable speed motors in frames too large for mounting inside of the cabinet leg a platform mounting is provided at the rear of the head end cabinet leg. Connection to the head driving sheave is made thru multiple Vee belts. Adjustment for the motor to compensate for belt stretch is supplied.

Motors of the following maximum round diameter are the largest that can be mounted inside the headstock cabinet leg.

Size of lathe.....	14″	16″	18″	20″	22″
Diameter of motor	15½″	15½″	17″	17″	17″

PLATFORM MOUNTED MOTOR DRIVE



Platform Mounting for Motors too large for Mounting Inside Cabinet Leg

STANDARD EQUIPMENT

Standard equipment upon which the base price is determined includes 18-speed geared head arranged for motor drive, but exclusive of the electrical equipment. Compound and steady rests, thread dial, either English or Metric quick change gear mechanisms, large face plate, small face plate, stainless steel compound rest and cross feed dials and necessary wrenches.

EXTRA EQUIPMENT

At extra cost we can, when ordered, equip these lathes with patented ball bearing taper attachment, chip and coolant pan, coolant pump and connections, leadscrew reverse with automatic chasing stops in both directions, Nose type collet chucks, either Key Operated, or Wheel Operated, collets for both types, power rapid traverse for carriage, follow rest, chromium plated wheels and handles and additional gears for quick change gear mechanism for chasing extra coarse threads, metric pitches, diametral or module pitches.

COLLET CHUCKS AND COLLETS

Two types of collet chucks may be furnished for either Cam-Lock or Standard Key Drive Taper Spindle Noses, the Key Operated nose type and the Wheel Operated nose type.

The Key Operated chuck takes a maximum size collet of $1\frac{3}{4}''$ on all sizes.

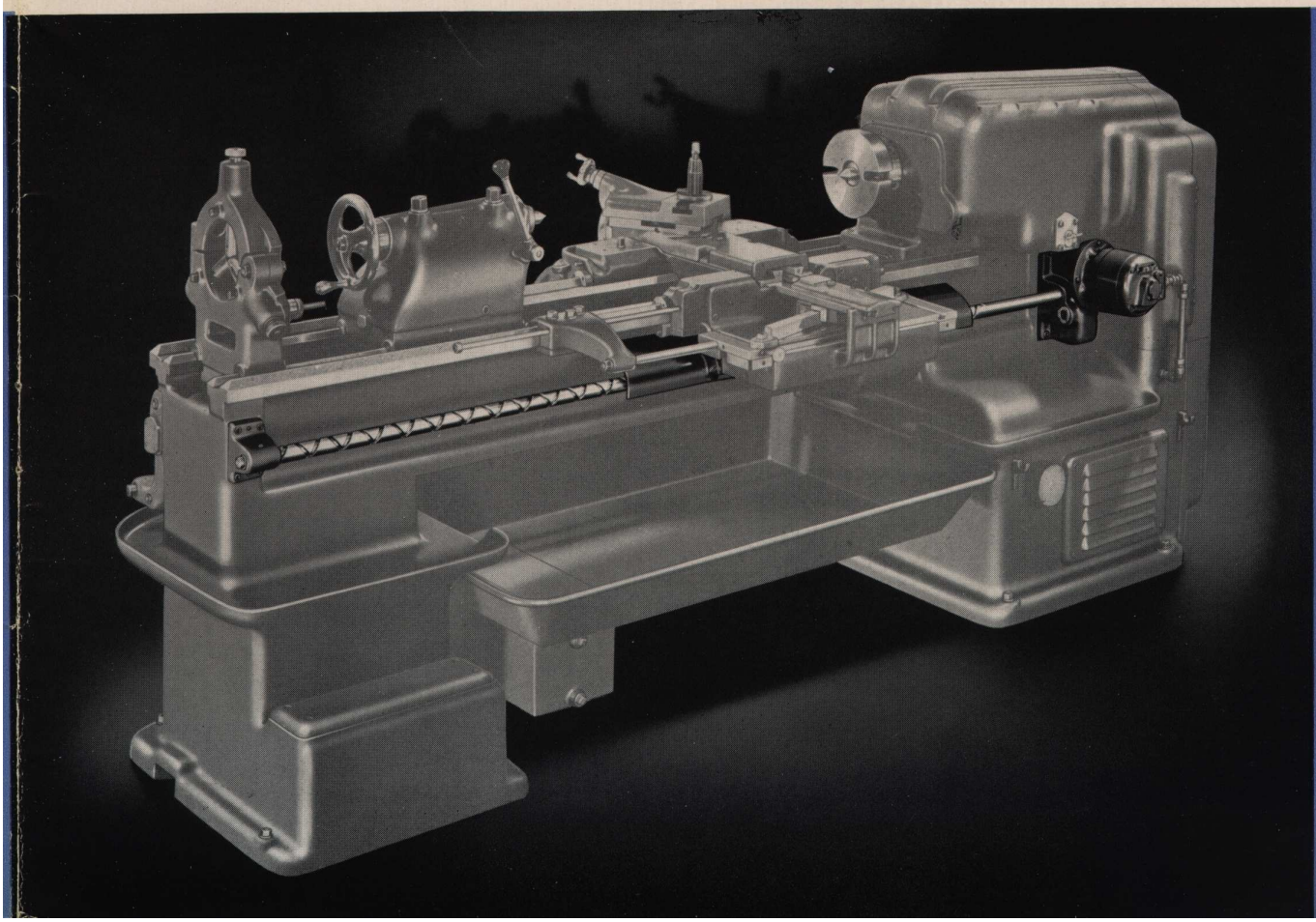
The Wheel Operated chuck accommodates a maximum size collet of $1\frac{3}{8}''$ capacity on the 14″ and 16″ sizes and $1\frac{3}{4}''$ capacity on the 18″, 20″, and 22″ sizes.

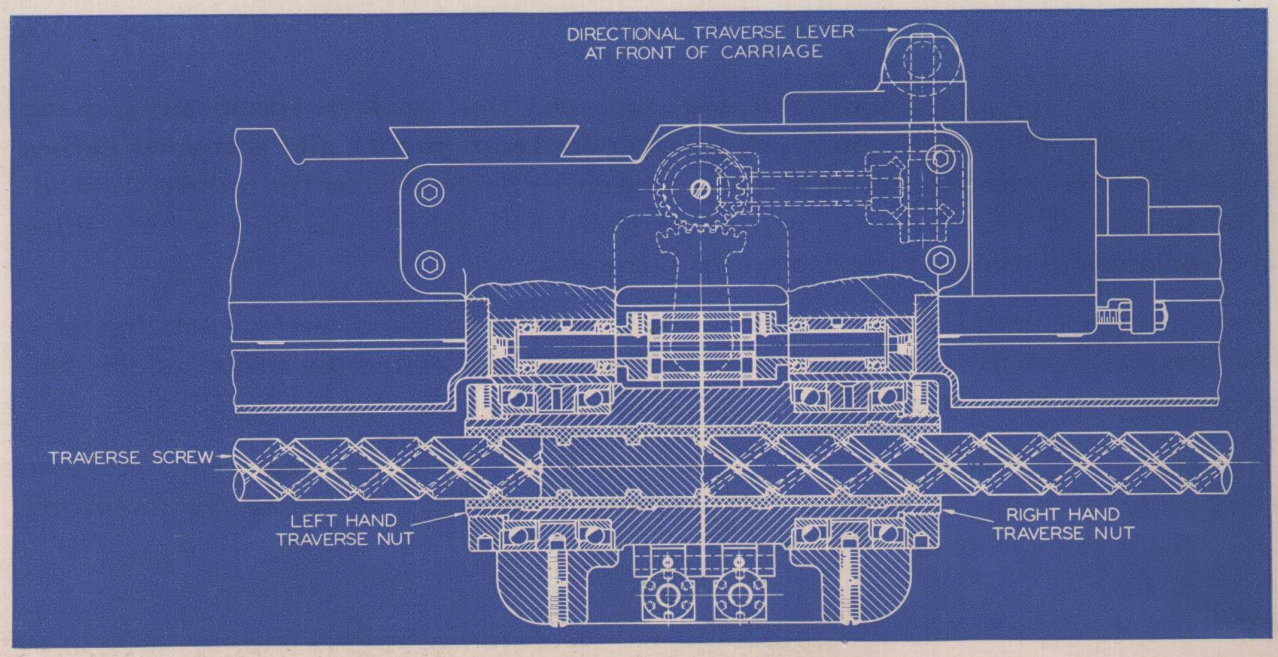
POWER RAPID TRAVERSE for CARRIAGE . . . PATENTED . . . FOOL PROOF

The power rapid traverse for carriage in its highly efficient and simplified form has become a very desirable feature for any size lathe regardless of bed length. It has proven conclusively to be such a time and work saver that its additional cost is saved many times over during the life of the machine.

The new motor driven Power Rapid Traverse now applicable to all sizes of "AMERICAN" Pacemake Lathes is an outstanding development which in design and operation is far in advance of other mechanisms of this character. It is so sensitive that it may be operated with one finger and is absolutely fool proof in its functioning.

This mechanism consists essentially of a full length traverse screw with right and left-hand threads and a pair of opposed babbitt-lined nuts with large diameter hubs over which raybestos contacting bands are fitted. It is embodied in a compact self-contained unit attached to the rear of the carriage where it will not interfere with any of the other operating members of the lathe, the only member brought to the front being the directional control lever which is conveniently located on the left-front carriage wing.

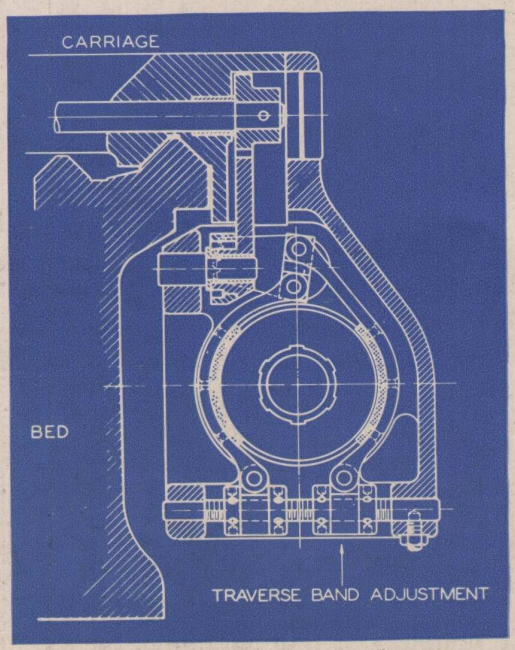




No. 1—Diagram of Power Rapid Traverse Mechanism

This control lever actuates either of the two contacting bands, which causes it to grip the hub of its traverse nut, which in turn imparts the traverse to the carriage. The operation of this mechanism is absolutely fool proof. It is so constructed that in event of the carriage being accidentally run into the headstock, the tailstock or any other interference, the engaged contacting band will simply slip and no damage will result.

A further safety feature is provided by the control lever, which must be held in engagement by the operator. The moment he releases this lever, it automatically snaps back to the neutral position, which disengages the contact band and stops the carriage traverse.



No. 2—Power Rapid Traverse, End View

SAFETY FEATURE

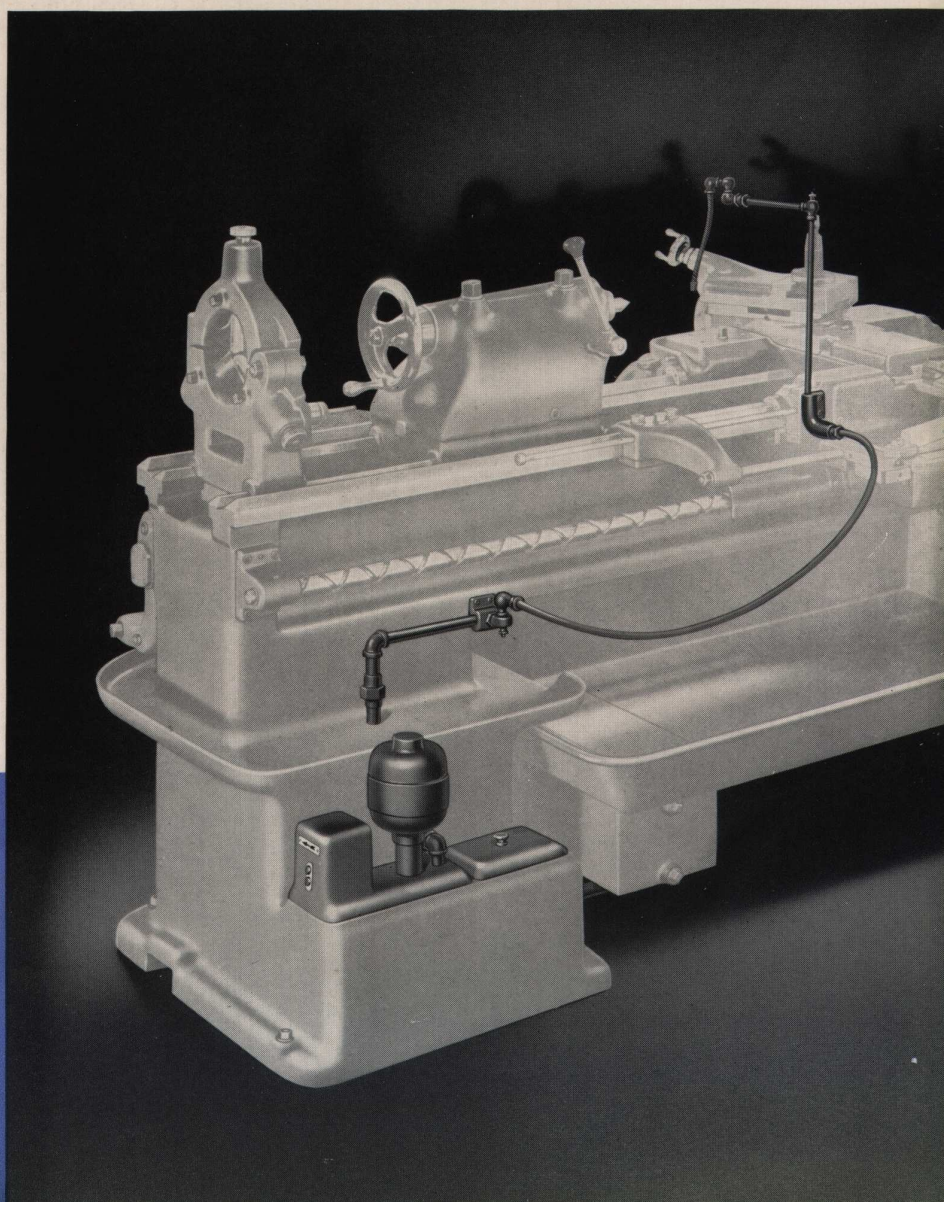
An outstanding safety feature is the automatic declutching of the traverse handwheel when the power traverse is engaged. This important feature protects the operator against the danger of a rapidly revolving handwheel when using the power traverse.

PAN (Integral Chip and Coolant Pan with Reservoir)

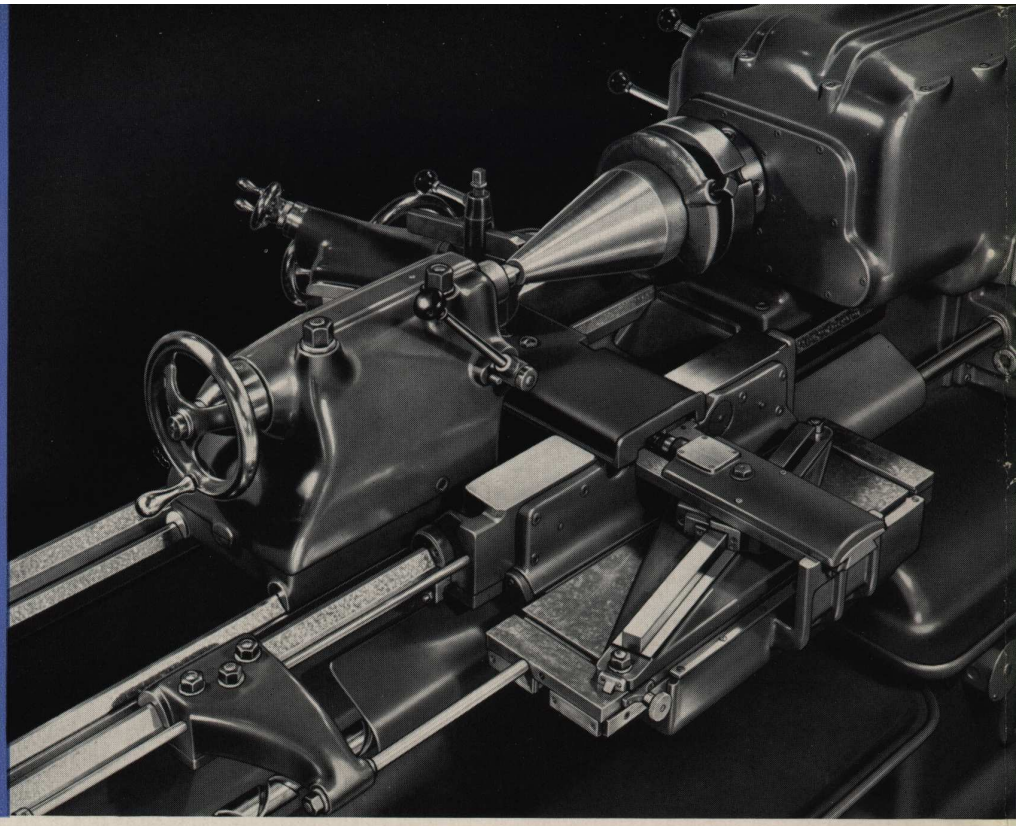
Although the chip and coolant pan is an accessory that must be specifically ordered (except on tool room lathes on which it is standard equipment), all Pacemaker Lathes are regularly arranged to receive it at any time either before or after the lathe is shipped. The standard cabinet legs are regularly provided with oil troughs for catching chips and coolant and draining the coolant into the pan.

The pan itself is made of heavy sheet iron with rolled edges and carries a settling tank and strainer in order to provide for the use of a coolant system by simply adding the coolant pump and connections.

The pan is removable and may be quickly removed, cleaned and replaced. The rear cabinet leg is regularly provided with a coolant sump and provisions for mounting the coolant pump.



"AMERICAN" BALL BEARING TAPER ATTACHMENT



A new and greatly improved ball bearing taper attachment, providing a maximum capacity of 6″ taper per foot, is now available for all "AMERICAN" Pacemaker Lathes. This new attachment is the very last word in accuracy, ease of control and frictionless operation.

Twenty-four (24) permanently sealed anti-friction bearings reduce frictional loads, especially on the steepest tapers, to a fraction of those encountered on the standard type of plain bearing attachment, resulting in faster work, with better finish and of greater accuracy.

The anti-friction bearings employed in this mechanism are concealed in such a manner that they are never exposed to dust, dirt or chips, which in itself is a decided advantage, as such an application eliminates the necessity of cumbersome guards, exposing the entire mechanism to the view of the operator at all times. A very simple wedge adjusting means is provided to compensate for any wear that might occur in the anti-friction bearings.

To insure permanent accuracy and minimize wear, hardened and ground steel contacting surfaces or "ways" are supplied for the anti-friction bearings, both in the sliding shoe and the bottom slide. These surfaces are extremely hard and are kept scrupulously clean by improved Duprene wipers.

This new taper attachment is of the carriage type with telescopic cross feed screw control. Bolted to and traveling with the carriage, it is always in position for instant service and is so designed and its weight so distributed as not to destroy the easy and sensitive movement of the carriage along the bed.

The U-type supporting bracket, tied rigidly together at the top into a complete box section, effectually resists the severest stresses and distributes them equally throughout the box section, preventing a concentration of stresses at any one location. The taper bar support, which slides on the base of the U bracket, has a very large bearing area on the bracket, giving a solid and unyielding support to the taper bar.

The taper bar bearing on the bar support has been made unusually large to resist the thrust of the sliding shoe and to insure extreme accuracy on steepest tapers. A very sensitive adjustment for the taper bar, for accurate settings, is provided thru a knurled knob and fine pitch screw. The sliding shoe which contacts the taper bar is rectangular in form, is of generous proportions, and is equipped with adjustable anti-friction bearings, resulting in a smooth, steady, frictionless movement along the bar.

The clamp dog is of generous proportions and is clamped to the bed by two heavy bolts and a large area clamp under the outer vee. To insure smooth and easy movement of the dog along the bed when unclamped and traveling with the carriage, an auxiliary draw bar is provided close to the bed bearing, which, when clamped to the dog by the bolt provided for that purpose, directs the pull of the carriage close to the bearing on the bed and eliminates the cramping tendency which would otherwise be encountered were all of the moving effort applied at the outer end of the dog.

The telescopic cross-feed screw is of large diameter and made of a fine grade of steel heat treated and hardened. It is provided with a bronzed-lined journal in the yoke and is equipped with ball thrust bearings at each end. The cross feed nut is made of heat-treated bronze and is automatically oiled. It is of the two-piece compensating type, with wedge adjustment for wear.

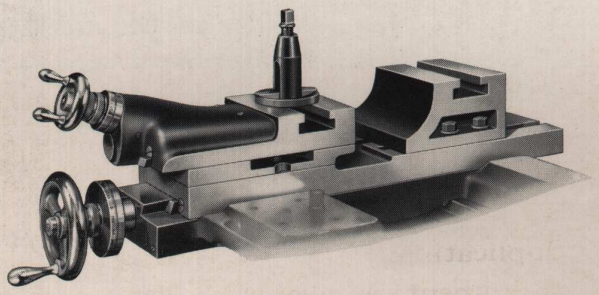
A dirt guard shields the cross feed screw and nut from chips and dirt.

Showing Anti-friction Bearing Application to Taper Attachment and hardened steel "ways"

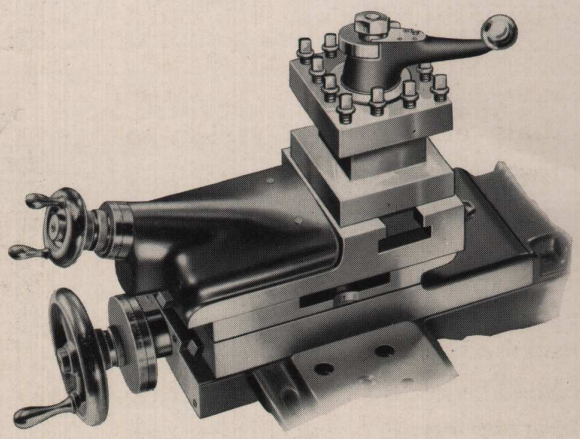


TOOL RESTS and HOLDERS

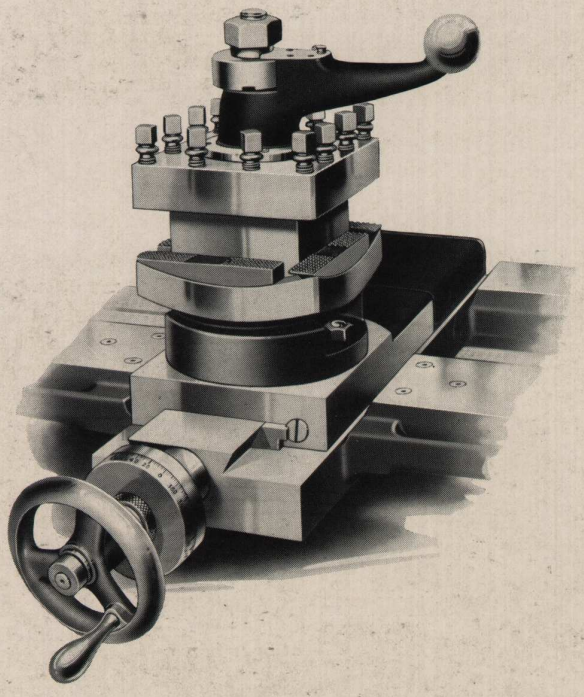
A great variety of tool rest and tool holder combinations is available to select from, facilitating the choice of just the proper tooling arrangement for the work. The selection of the most advantageous tool rest and tool holder combination for the character of the work to be performed is very important to the ultimate value of the lathe inasmuch as the actual volume of work produced is often largely dependent upon the correct tooling for it.



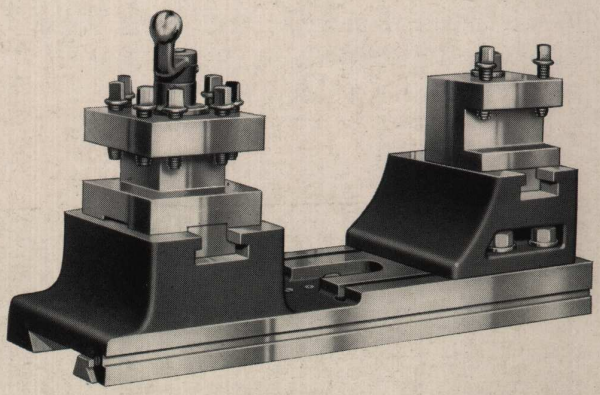
Combined Compound and Plain Block Rests
(Fig. No. 511)



Compound Rest with 4-Way Tool Block mounted on Top Slide and interchangeable with other Tool Posts.
(Fig. No. 503)



Turret Tool Block mounted on Compound Rest Bottom Slide and quickly interchangeable with standard swivel and top slide (Fig. No. 505)

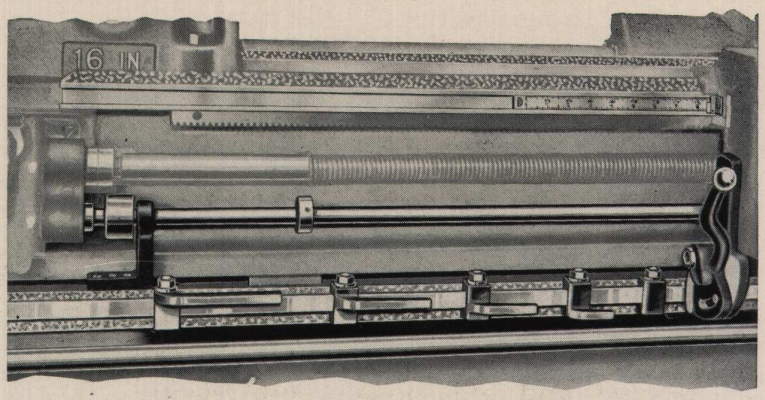


Combined Plain Block Rest with 4-Way Tool Holder at front and Adjustable Block Rest with High Duty Tool Holder at rear (Fig. No. 514)

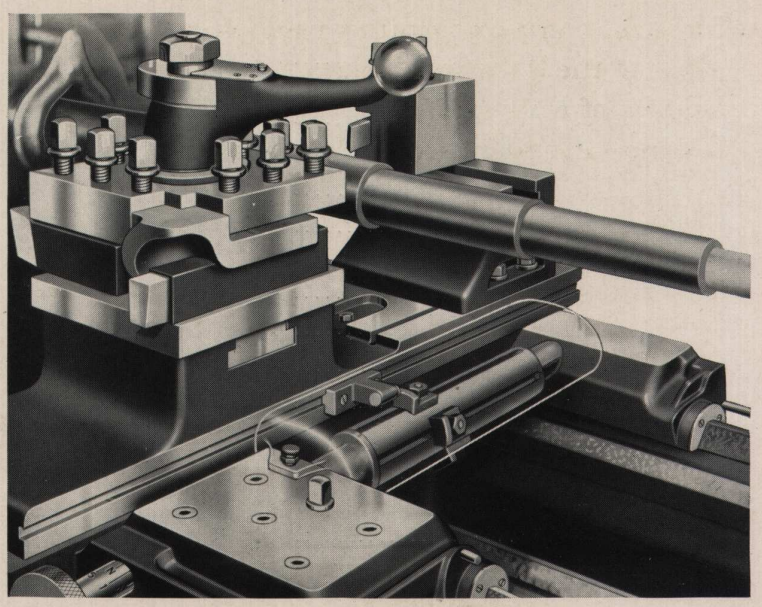
PRODUCTION EQUIPMENT . . .

For intensive production service a complete assortment of duplicating and measuring equipment is available consisting of automatic longitudinal stops, positive cross-feed stops, accurate scale fitted to bed for quick and accurate setting of stop dogs, built-in anti-friction tailstock center, patented direct-reading cross-feed dials and a wide variety of rests and tool holders.

The design, application and use of these various units are thoroughly illustrated and described in the "AMERICAN" Multi-Production Lathe Catalog which also contains interesting examples of the effectiveness of this equipment.

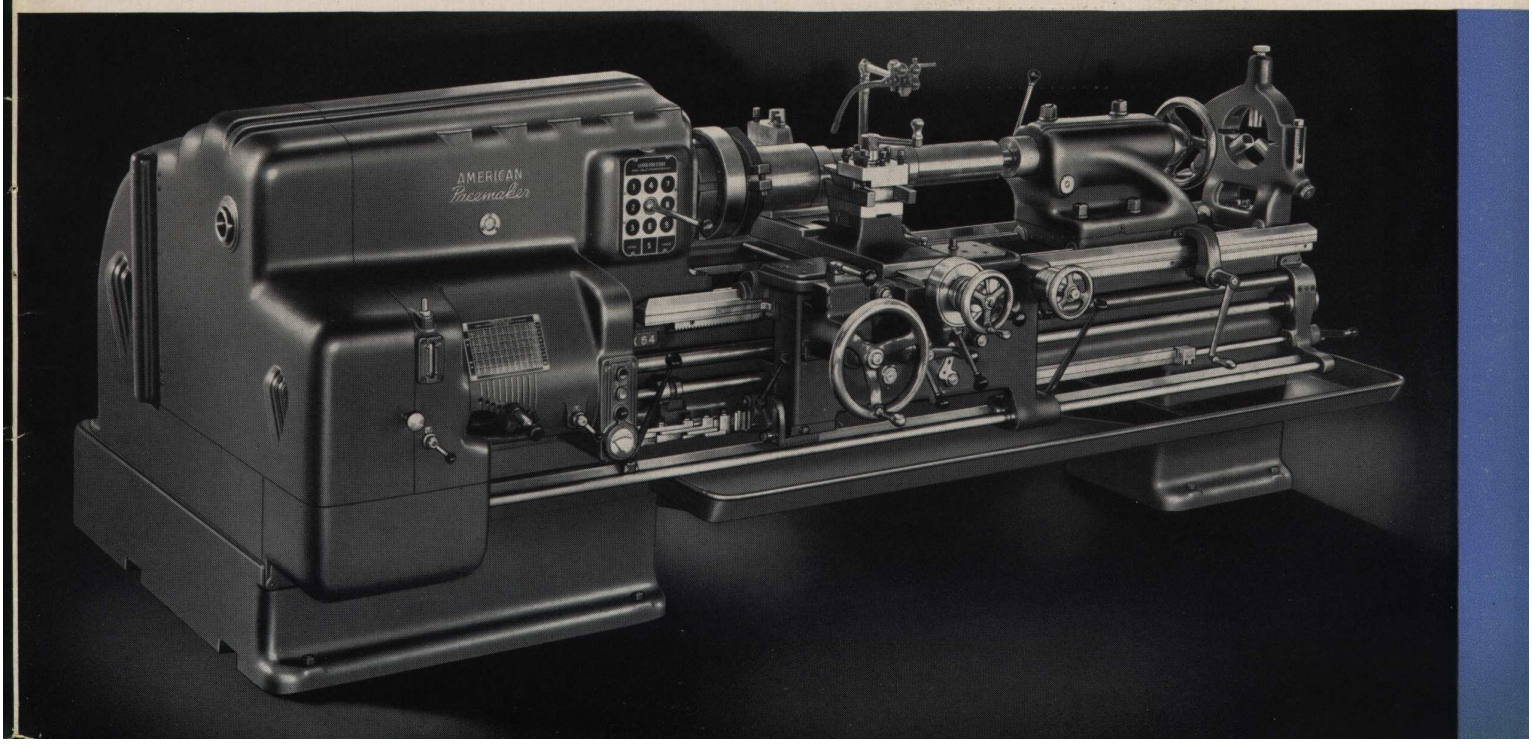


Automatic Longitudinal Stops (Fig. No. 1)



Positive Diameter Stops (Fig. No. 2)

"American" Multi-Production Lathe (Fig. No. 3)



DIMENSIONS

SIZES	14″	16″	18″	20″	22″
Swing Over Carriage Wings	16½″	18½″	20½″	22½″	24½″
Swing Over Compound Rest	9⅞″	11¼″	13½″	15″	17¼″
Swing Over Taper Attachment	9⅞″	11¼″	13½″	15″	17¼″
Swing Over Connected Plain Block and Adjustable Rear Rest	6″	6″	8″	8″	8″
Takes Between Centers Tailstock Flush	30″	30″	30″	48″	48″
Inches Lost thru Use of Roller Bearing Tailstock Center	None	None	None	None	None
Diameter Large Face Plate	15″	17″	19″	21″	23″
Base Length—Net Weight	4000	4200	6700	7450	7650
Extra 2 Feet of Bed	325	325	450	450	450
Base Length—Domestic Shipping Weight	4400	4600	7200	8000	8200
Extra 2 Feet of Bed	450	470	600	600	600
Base Length—Boxed Weight	5500	5700	8900	9250	9500
Extra 2 Feet of Bed	500	500	650	650	650
Cubic Feet, Shipped Assembled—Base machine, boxed	170	175	210	260	270
Each additional 24″ between Centers	50	55	60	65	65
Maximum size motor recommended	10 H. P.	10 H. P.	20 H. P.	20 H. P.	20 H. P.

HEADSTOCK					
Length on Bed	26¼″	26¼″	32⅝″	32⅝″	32⅝″
Front Spindle Bearing	Timken	Timken	Timken	Timken	Timken
Intermediate Spindle Bearing	Timken	Timken	Timken	Timken	Timken
Rear Spindle Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing
Radial Load Capacity—Front Bearing at 100 R.P.M.	9230 lbs.	9230 lbs.	12,320 lbs.	12,320 lbs.	12,320 lbs.
Thrust Load Capacity at 100 R.P.M.	7400 lbs.	7400 lbs.	9,310 lbs.	9,310 lbs.	9,310 lbs.
Hole in Spindle	1¾″	1¾″	2¼″	2¼″	2¼″
Taper of Center	No. 4	No. 4	No. 5	No. 5	No. 5
Number of Vee Belts	5	5	8	8	8
Number of Spindle Speeds	9-18-27	9-18-27	9-18-27	9-18-27	9-18-27

For range of spindle speeds see page 15

DIMENSIONS

SIZES	14″	16″	18″	20″	22″
BED					
Depth of Bed	11″	11″	12 7/8″	12 7/8″	12 7/8″
Width of Rack and Pitch	7/8″ x 10P.	7/8″ x 10P.	1 1/4″ x 8/10P.	1 1/4″ x 8/10P.	1 1/4″ x 8/10P.
CARRIAGE					
Length of Carriage on Bed	26 3/4″	26 3/4″	32 1/8″	32 1/8″	32 1/8″
Width of Carriage Bridge	7″	7″	9″	9″	9″
Square Inches Bearing Surface on Bed	67	67	104	104	104
QUICK CHANGE BOX					
Number of Threads Can be Cut	48	48	60	60	60
Range Threads Can be Cut Per Inch	1 1/2 to 92	1 1/2 to 92	1 to 60	1 to 60	1 to 60
Number of Feeds Can be Cut	48	48	60	60	60
Range Feeds in Thousandths Per Revolution	.002 to .118	.002 to .118	.003 to .200	.003 to .200	.003 to .200
Diameter of Leadscrew	1 3/8″	1 3/8″	1 3/4″	1 3/4″	1 3/4″
Pitch of Lead Screw	1/4 Pitch	1/4 Pitch	1/4 Pitch	1/4 Pitch	1/4 Pitch
COMPOUND REST					
Length of Bottom Slide	14″	14″	18 1/2″	18 1/2″	18 1/2″
Width of Top Slide	6 3/4″	6 3/4″	8 3/4″	8 3/4″	8 3/4″
Travel of Top Slide	4″	4″	6″	6″	6″
Size of Tool	5/8″ x 1 1/4″	5/8″ x 1 1/4″	3/4″ x 1 1/2″	3/4″ x 1 1/2″	3/4″ x 1 1/2″
TAILSTOCK					
Length on Bed	14″	14″	19″	19″	19″
Diameter of Tailstock Spindle	2 3/8″	3″	3 7/8″	4 5/8″	4 5/8″
Length of Tailstock Spindle	13 3/8″	13 3/8″	18 7/8″	18 7/8″	18 7/8″
Set Over on Tailstock, on Side	1/8″	1/8″	1/8″	1/8″	1/8″
Spindle Travel	6 1/2″	6 1/2″	10″	10″	10″
TAPER ATTACHMENT					
Maximum Taper Per Foot	6″	6″	6″	6″	6″
Maximum Length at one setting	18″	18″	24″	24″	24″
STEADY REST					
Capacity, Standard	1/2″ to 6″	1/2″ to 6″	3/4″ to 8″	3/4″ to 8″	3/4″ to 8″
FOLLOW REST					
Capacity, Standard	1/2″ to 4″	1/2″ to 4″	3/4″ to 6″	3/4″ to 6″	3/4″ to 6″

PATENTED

MANUFACTURED UNDER ONE OR MORE
OF THE FOLLOWING PATENTS:

1,854,672	1,971,956
1,910,334	1,982,612
1,926,996	2,011,318
1,926,998	2,018,363
1,938,906	2,074,961
1,966,409	2,173,557

OTHER PATENTS PENDING

THE AMERICAN TOOL WORKS CO.

CINCINNATI, U. S. A. 4591



BULLETIN No. 15—5M-B-2-40.

Printed in United States of America

THE AMERICAN TOOL WORKS CO., Cincinnati, U.S.A.

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