

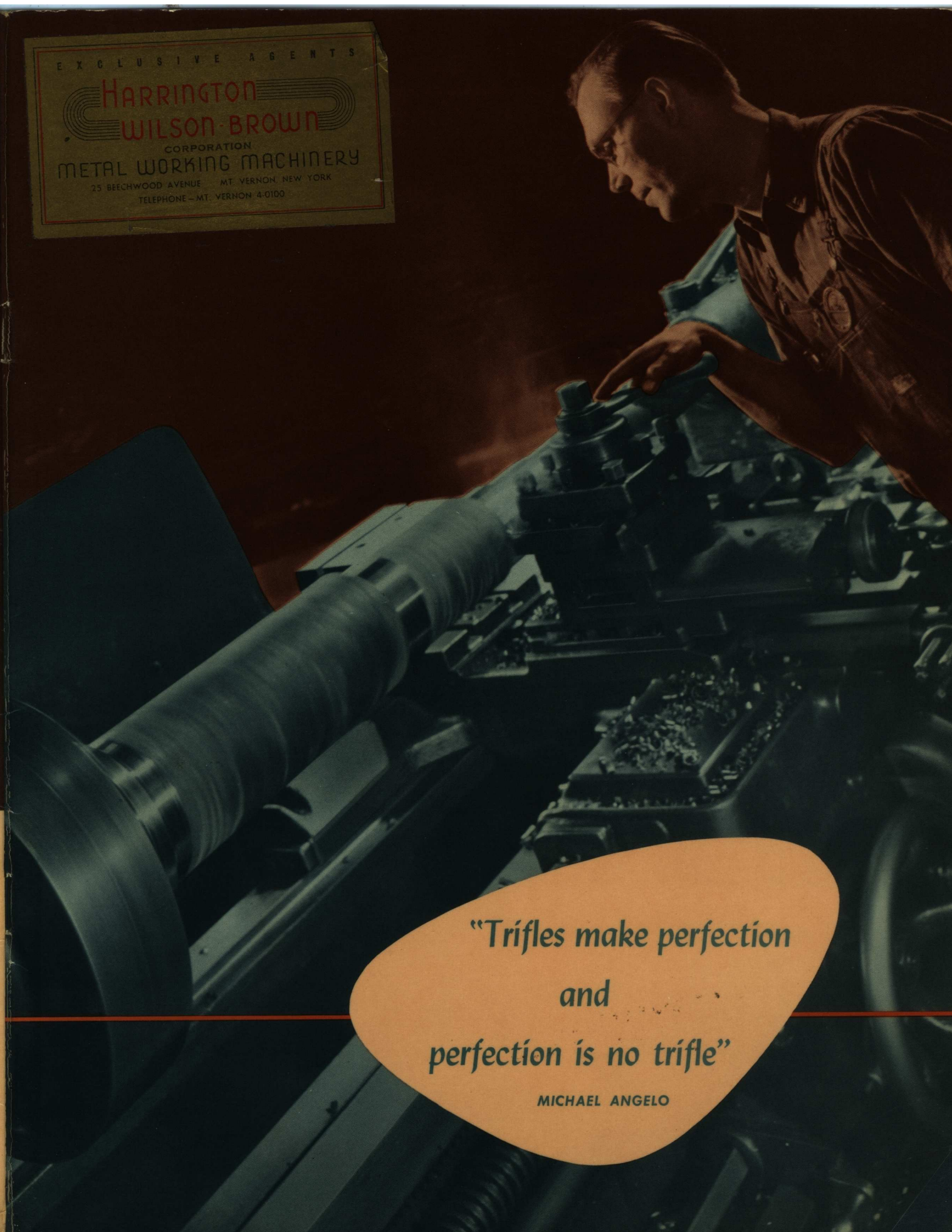
EXCLUSIVE AGENTS

**HARRINGTON
WILSON-BROWN**

CORPORATION

METAL WORKING MACHINERY

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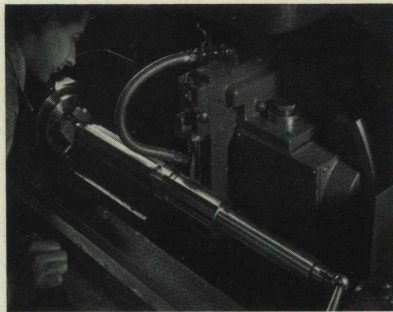
**"Trifles make perfection
and
perfection is no trifle"**

MICHAEL ANGELO

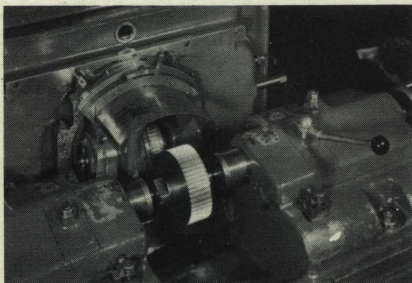
Model X Lathes by Lodge and Shipley



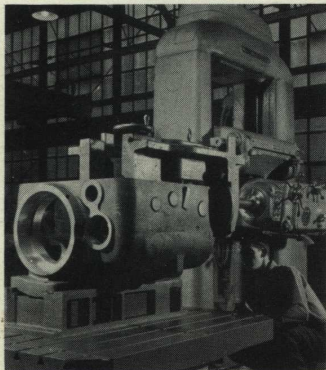
Precision thread grinding



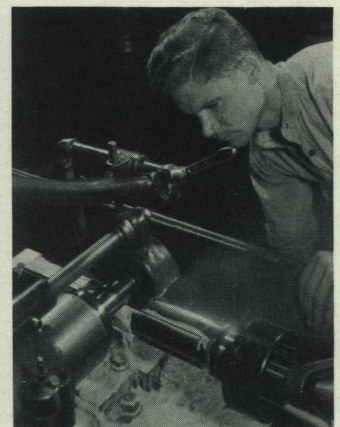
Gear shaving before hardening



Jig drilling headstock



Flame hardening gears



Grinding splined transmission shafts

For the most part, this booklet deals with those important features of design and construction of Lodge & Shipley Model X Lathes that are of major interest to anyone considering the purchase of new lathe equipment. The title has been selected to emphasize the fact that the less interesting things have not been overlooked. In producing Model X lathes equal attention is paid to those little niceties of design, workmanship and finish—the trifles which Michael Angelo has told us lead to perfection.

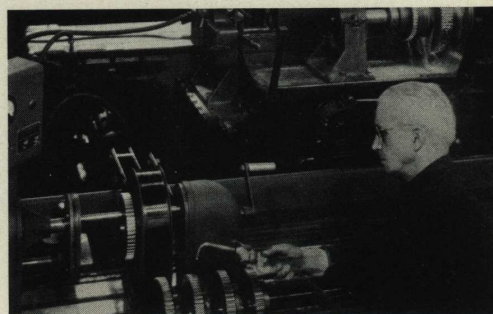
Here in Model X lathes is the climax of over half a century of forward-looking imagination and common sense in lathe engineering and research. The goal has been to produce an ultra-modern lathe with well bred appearance but most of all a lathe having the accuracy and productive capacity to make it the greatest value in Lodge & Shipley history. The following pages will describe the methods followed to realize this goal. Countless satisfied users of Model X lathes will attest how well it has been achieved.

A fine machine tool is not produced solely by combining intelligent engineering with the high standards of workmanship and material for which Lodge & Shipley lathes are known the world over. Of equal importance are high standards of inspection.

Lodge & Shipley have always emphasized the necessity for step by step inspection of all parts and units during manufacture and assembly. Each department has its own inspectors, answerable only to the chief inspector, but this does not relieve the foreman of responsibility for the work produced. The result is a constant and thorough check from time of receipt of raw material to finished lathe. Customer satisfaction reflects the worth of this advanced policy.

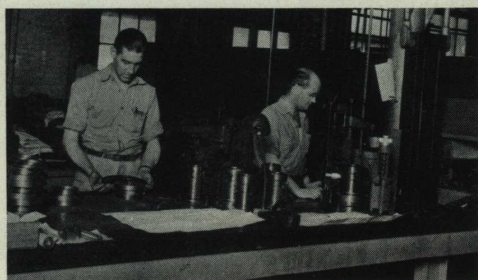
The value a purchaser receives in his Model X lathe could not be realized unless these machines were built in a well equipped plant utilizing up-to-date methods. A number of illustrations have been included showing the Lodge & Shipley way of using "the tools that make the tools that make the world go 'round'".

Checking for hardness cracks

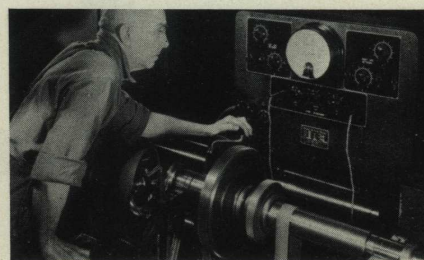
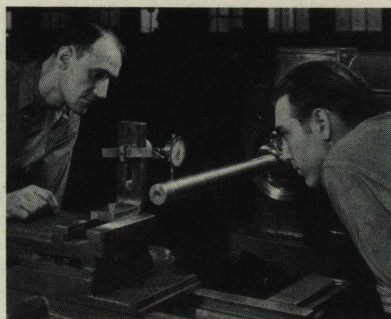


Accent on Inspection

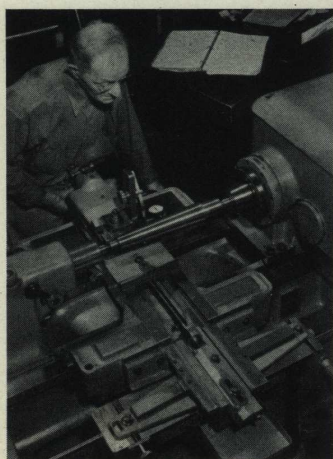
One of many inspection stations



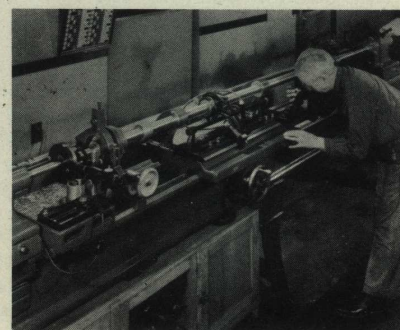
Inspecting head alignment during erection



Precision balancing headstock spindle



Final inspection in process



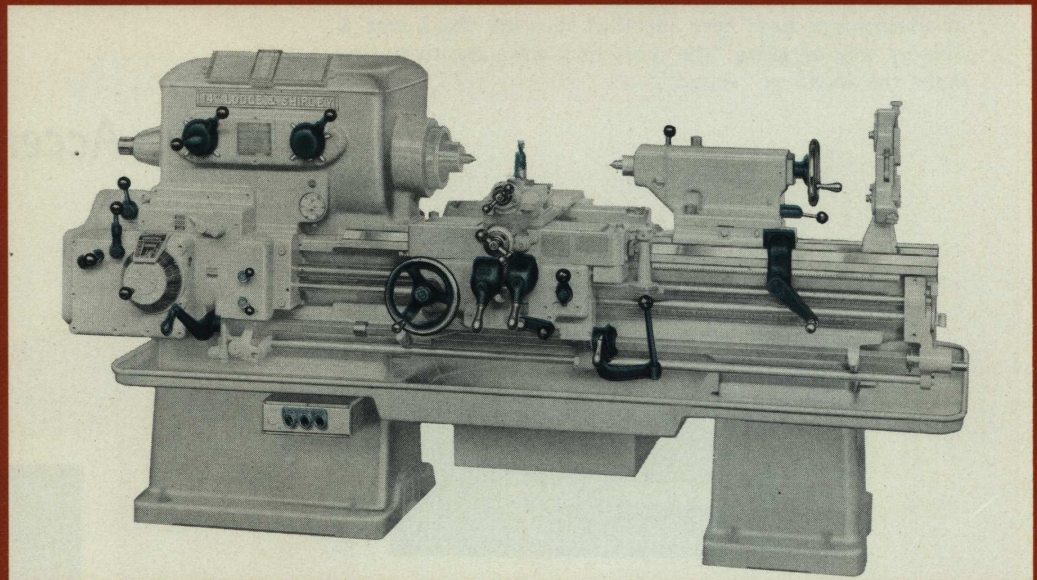
Checking leadscrew on Zeiss Leadscrew Tester



Invitation to Profitable Performance

IN A NUTSHELL

*Conveniently grouped
controls.
Smooth, easy operation.
Less operator fatigue.*



When purchasing new lathes, ease of operation is a most important consideration. Lathes naturally lend themselves to convenient grouping of controls at head end and carriage. On Model X lathes illustrated above attention has been concentrated on designing controls that function smoothly and easily with correct spacing for quick engagement.

Any of the 24 spindle speeds can be selected by positioning only three levers, in fact the short lever doubles or halves speeds without shifting either of the other levers. There are only three controls to select any one of the 55 quick changes of feeds and threads, and again one lever doubles or halves a number of these.

Dual controls, one at head end, the other at carriage, start, stop or reverse the spindle of the machines not using the magnetic brake. In that case, a safety interlock prevents shifting from forward to reverse or vice-versa

without stopping in neutral, and brake engagement is automatic in the neutral position. For the large lathes using the magnetic brake, just one control lever is required — at the carriage. It serves the same function as the dual controls, except that the reverse speeds are furnished only when ordered and the safety for the reverse operates electrically. Hand and power cross and longitudinal feeds, half nuts and direction of feed are controlled at the carriage and apron. All sizes of Model X lathes have crank and pinion arrangement for moving tailstock along the bed.

Toolmaker lathes (illustrated above) have an additional control rod on which the Apron Controlled Reverse to Leadscrew lever is mounted at the right-hand side of the apron and adjacent to the mechanical apron control lever. No lost motion and minimum operator fatigue spells increased production with fewer personnel problems. It's profitable to use a Model X lathe.

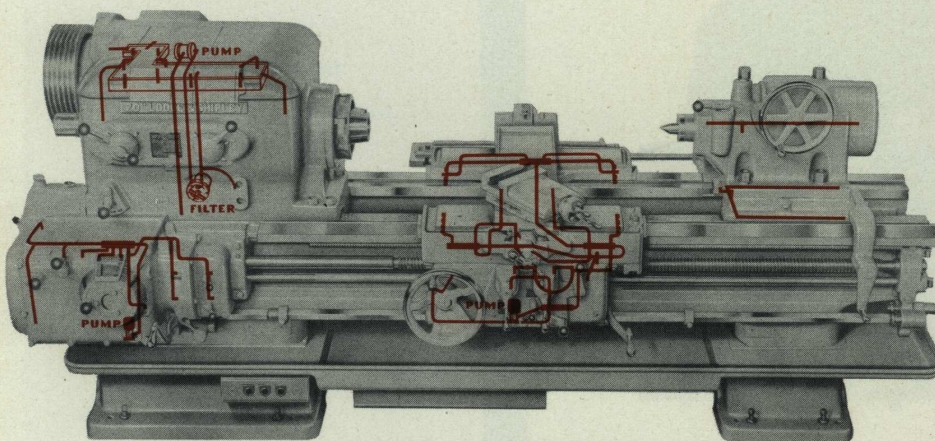
In most shops, regular and adequate lubrication presents management with something of a problem. If left up to the operator he may forget. If handled by a special department one man may have so many different types of machines to lubricate that vital spots can be overlooked. In either event automatic lubrication of machines simplifies the problem. The illustration clearly shows the completeness with which Lodge & Shipley have applied automatic lubrication to Model X lathes.

A pump, in operation whenever the main drive motor is running, supplies the headstock mechanism with clean oil which passes through a laminated plate type filter. The oil is delivered via a distributor plate to the main spindle and its bearings, the transmission shafts, gears, bearings and shifter mechanism, the main drive clutch and brake assembly and part of the feed gearing all of which is mounted inside the main casting. The same system lubricates the drive pulley gears outside the main casting.

The quick change gear box is totally enclosed, oil tight and dirt and chip proof, and is equipped with its own automatically operated pump. The tailstock base has a reservoir from which the tailstock ways on the bed are automatically lubricated.

The apron has its own pump which is operated whenever hand or power longitudinal feed or power cross feed is in use. This distributes filtered oil under forced feed through metered fittings to all bed ways on which the carriage takes a bearing and to the cross slide. The same system lubricates the entire apron mechanism. Manual operation of this pump through a lever on the front of the apron prevents having to move carriage or cross slide with bearing ways dry after periods of lathe idleness.

Manual lubrication requirements have been reduced to the absolute minimum. The lathe user is assured of reduced maintenance costs and longer accurate life of Model X lathes.



IN A NUTSHELL

*Automatic lubrication
for headstock.*

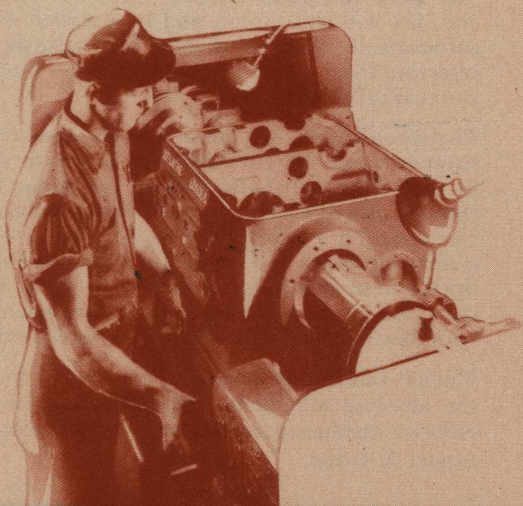
*Automatic lubrication
for quick change gear box.*

*Automatic lubrication
for bed, cross slide
and apron.*

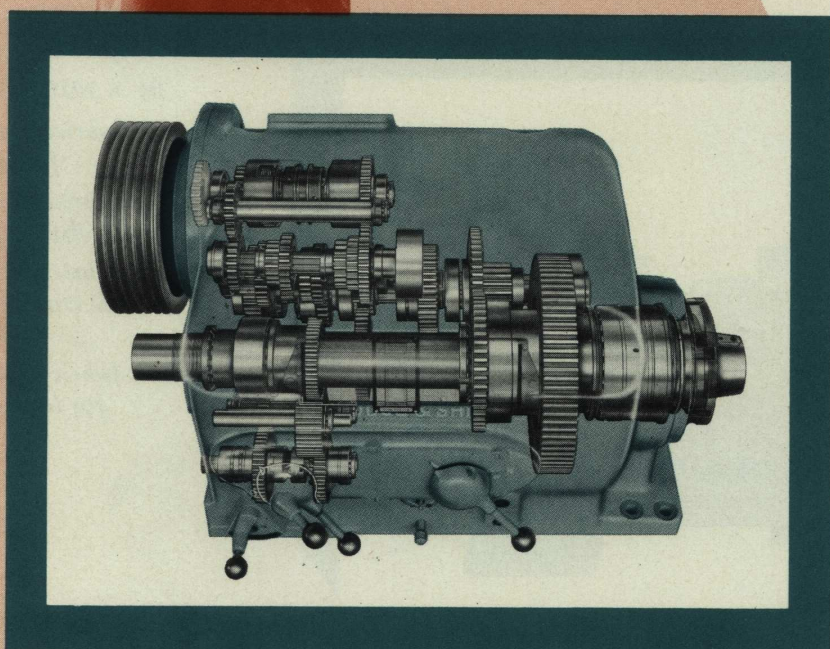
*Automatic lubrication
for tailstock ways.*

**Automatic is the word
for Model X
Lubrication**





There's Economy in using the Correct Cut Speed



IN A NUTSHELL

*24 forward
spindle speeds and
positive brake.*

*Sliding gear transmission
with hardened and
ground spur gears.*

*Hardened and ground gear
shafts with ground splines.*

*100% anti-friction
bearing equipped.*

*Precision roller bearing
spindle mounting.*

With Model X lathes selecting the most economical cut speed is a simple proposition. A multiplicity of spindle speeds, 24 forward and 16 reverse on the lathes without magnetic brake, and 24 forward and reverse (when ordered) on the lathes with magnetic brake, are available to choose from. There are speeds low enough for efficient chasing and speeds high enough for the most efficient use of newly developed carbide tools, while in between will be found usable speeds for any and all kinds of lathe operations.

All speed changes are made through sliding alloy steel spur gears with only two integral positive clutches, eliminating frictional losses caused by end thrust inherent with other types of gearing. Depending on the service for which they are used these gears are either hardened and then have the tooth profiles ground, or they are shaved after gear cutting and then flame hardened. In either

case smooth, quiet flow of power from driving motor to workpiece is assured.

The hardened alloy steel transmission shafts are carried in bearing supports cast integral with the headstock. Shortened distance between supports increases rigidity and minimizes shaft deflection. The splines of the shafts are ground to reduce back lash. Model X headstocks are 100% anti-friction bearing equipped. The oversize spindle is carried on roller bearing spindle mountings, details of which will be found on the circulars covering each size lathe.

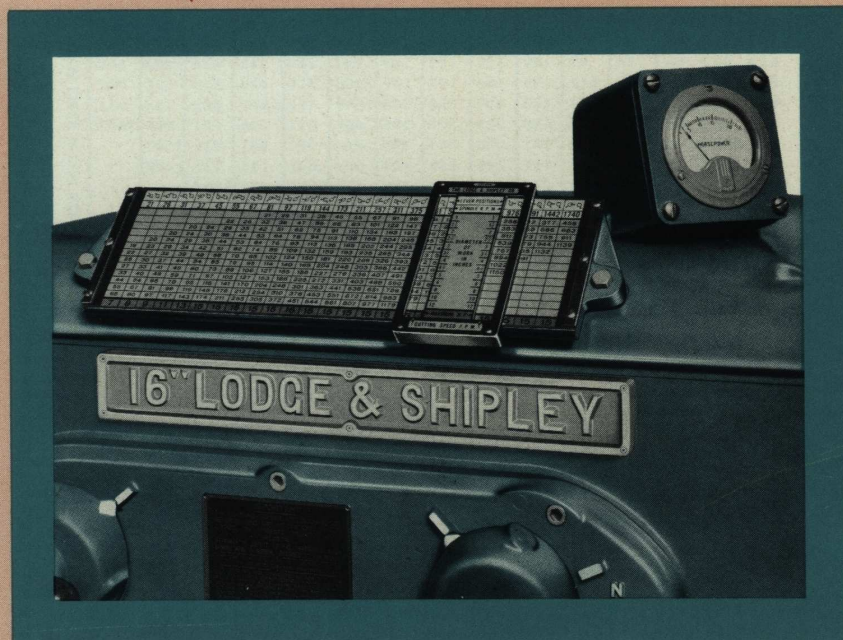
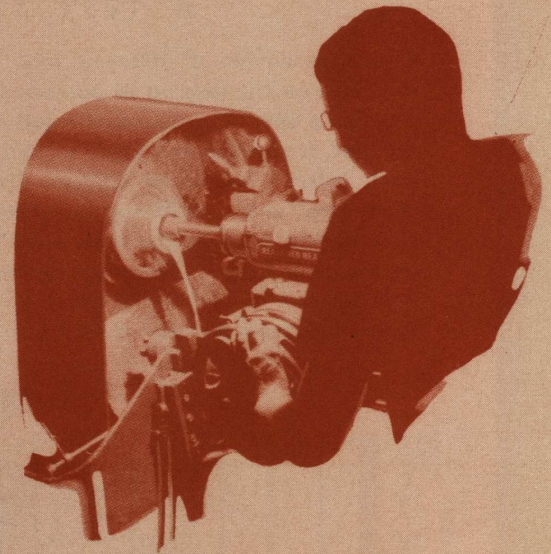
Seeing a Model X lathe headstock inspires a feeling of confidence in its ability to transmit maximum horsepower for the heaviest jobs. Taking advantage of the wide range of spindle speeds available assures that each job will be run at the most economical cut speed for the lowest cost per piece.

PERMANENT ACCURACY WITH KEY DRIVE SPINDLE NOSE

The American Standard long taper key-drive spindle nose has been adopted for simpler design, increased support for chucks and fixtures and the speed and accuracy with which these can be interchanged.

The nose is hardened to 50 Rockwell C scale and then finish ground. After the headstock is assembled and tested the taper bore is ground with the spindle running in its own bearings for perfect alignment. Chucks, face plates or fixtures are located and firmly seated on the cylindrical taper which is several times longer than on other noses so there is less wear and overhang and greatly increased rigidity. Any slight wear that might occur in the taper bore of the chuck or fixture due to frequent changing is compensated for by merely drawing same a bit higher on the taper without impairing the original accuracy.

The hardened key permanently affixed to the nose does the driving, the ring lock nut merely secures the chuck on the nose. There are no maintenance costs with the key drive spindle nose.



IN A NUTSHELL

*Key drive spindle nose
reduces chuck overhang.*

*Alloy steel headstock spindle
with hardened nose.*

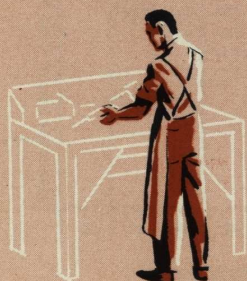
*Maximum horsepower
capacity at each
spindle speed.*

*Speed index plate shows
safe horsepower cut
and cutting speed.*

SOMETHING NEW IN SPINDLE SPEED INDEX PLATES

This innovation could only be made on lathes with a multiplicity of spindle speeds in correct geometrical progression capable of transmitting maximum horsepower at each speed. It obviously invites comparison. Model X lathes are designed and built for maximum transmission of horsepower at each speed and the operator knows the horsepower cut he can safely take at each and every spindle speed.

The operator determines the most economical cut speed for the kind of material and grade of tool used, moves the slider plate to the nearest economical cut speed shown for the diameter being machined, and obtains the correct lever settings for the spindle speed required as well as the safe horsepower cut that can be taken at this speed. If the lathe has been ordered with an ammeter, calibrated to indicate horsepower consumption, he can increase the depth of cut and/or feed up to the maximum the job will stand without fear of overloading the machine. He does not have to depend on the motor slowing down to warn him of an overloaded condition.



A TEST YOU WILL WANT TO MAKE

Choose a number of different jobs that will be machined on the lathe to be purchased. From past experience select the most economical cut speed for the kind of material and grade of tool that will be used. Select a number of different diameters from those listed in the following tables and note how close to this cut speed the work could be machined on Model X Lathes. Next note the maximum safe horsepower cut that can be taken at this spindle speed, determine the rate of feed and depth of cut

that could be used before this horsepower is exceeded and figure the time per piece compared to present practice.

Model X 24 Spindle Speeds enable using the most economical cut speed irrespective of diameter, kind of material or grade of tool, with ample horsepower capacity available for maximum feed and depth of cut and this means lower time per piece and increased profits for each machine tool dollar invested.

OPTIONAL SPEED RANGES

RPM of Spindle	14	17	21	25	30	37	45	54	65	79	96	115	140	171	207	250	300	366	444	535	651	794	961	1160	
DIAMETER OF WORK IN INCHES																									
1"																									
1 1/2"																									
2"																									
2 1/2"																									
3"																									
3 1/2"																									
4"																									
4 1/2"																									
5"																									
6"																									
8"																									
10"																									
12"																									
Max. H.P.	5	6	7	8	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Table No. 1—Standard Spindle Speed Range—14" Heavy—16" Heavy—20" Standard

RPM of Spindle	21	26	31	37	45	55	67	81	97	119	144	173	211	257	311	375	451	549	665	803	976	1191	1442	1740	
DIAMETER OF WORK IN INCHES																									
1"																									
1 1/2"																									
2"																									
2 1/2"																									
3"																									
3 1/2"																									
4"																									
4 1/2"																									
5"																									
6"																									
8"																									
10"																									
12"																									
Max. H.P.	7	8	9	11	13	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Table No. 2—Intermediate Spindle Speed Range—14" Heavy—16" Heavy—20" Standard

RPM of Spindle	24	29	36	43	52	64	77	93	112	136	165	199	242	295	357	431	518	632	765	923	1122	1368	1657	2000	
DIAMETER OF WORK IN INCHES																									
1"																									
1 1/2"																									
2"																									
2 1/2"																									
3"																									
3 1/2"																									
4"																									
4 1/2"																									
5"																									
6"																									
8"																									
10"																									
12"																									
Max. H.P.	8	8.5	10	12	15	18	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

Table No. 3—High Spindle Speed Range—14" Heavy—16" Heavy—20" Standard

OPTIONAL SPEED RANGES

RPM of Spindle	9	11	13	15	18	22	26	31	36	43	52	61	73	88	105	125	144	173	206	244	294	353	420	500	CUTTING SPEED IN FEET PER MINUTE
2"								16	19	22	27	32	38	46	55	65	75	91	108	128	154	185	220	262	
4"				16	19	23	27	32	38	45	54	64	76	92	110	131	151	181	216	256	308	370	440	524	
6"		17	20	24	28	35	41	49	57	68	82	96	115	138	165	196	226	272	325	383	462	554	660	785	
8"	19	23	27	31	38	46	54	65	75	90	109	128	153	184	220	262	302	362	433	511	616	739	880	1047	
10"	24	29	34	39	47	58	68	81	94	113	136	160	191	230	275	327	377	453	541	639	770	924	1100	1309	
12"	28	35	41	47	57	69	82	97	113	135	163	192	229	276	330	393	452	543	649	767	924	1109	1319	1571	
14"	33	40	48	55	66	81	95	114	132	158	191	224	268	323	385	458	528	634	757	894	1078	1294	1539	1833	
16"	38	46	54	63	75	92	109	130	151	180	218	256	306	369	440	524	603	725	866	1022	1232	1479	1759	2094	
18"	42	52	61	71	85	104	123	146	170	203	245	287	344	415	495	589	679	815	974	1150	1385	1663	1979	2356	
20"	47	58	68	79	94	115	136	162	188	225	272	319	382	461	550	654	754	906	1082	1278	1539	1848	2199		
22"	52	63	75	86	104	127	150	179	207	248	299	351	420	507	605	720	829	996	1190	1405	1693	2033	2419		
24"	57	69	82	94	113	138	163	195	226	270	327	383	459	553	660	785	905	1087	1298	1533	1847	2218			
26"	61	75	88	102	123	150	177	211	245	293	354	415	497	599	715	851	980	1178	1407	1661	2001	2403			
Max. H.P.	7.5	9	10.5	12	15	18	19	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	

Table No. 4—Standard Spindle Speed Range—20" Heavy—25" Standard

RPM of Spindle	13 1/2	16	19	23	28	33	39	47	54	65	77	92	110	132	158	188	216	259	309	368	441	529	632	752	CUTTING SPEED IN FEET PER MINUTE
2"							21	25	28	34	41	48	58	69	83	99	113	136	162	193	231	277	331	394	
4"			20	24	29	35	41	49	57	68	81	96	115	139	165	197	226	271	324	386	462	554	662	788	
6"	21	26	30	36	43	52	62	74	85	102	122	145	173	208	248	295	339	407	486	579	693	831	992	1182	
8"	28	34	41	48	58	69	83	98	113	136	162	193	231	277	330	394	452	543	648	771	924	1109			
10"	35	42	51	60	72	87	103	123	141	170	203	241	289	346	413	492	565	679	810	964	1154				
12"	42	51	61	72	87	104	124	148	170	204	243	289	346	416	495	591	678	814	972	1157					
14"	50	59	71	84	101	121	145	172	198	238	284	338	404	485	578	689	791	950	1134						
16"	57	68	81	96	115	139	165	197	226	272	324	386	462	554	660	788	905	1086							
18"	64	76	91	109	130	156	186	222	254	306	365	434	519	624	743	886	1018								
20"	71	85	101	121	144	173	207	246	283	340	405	482	577	693	825	985	1131								
22"	78	93	111	133	159	191	227	271	311	374	446	530	635	762	908	1083									
24"	85	102	122	145	173	208	248	295	339	408	486	579	693	831	990	1181									
26"	92	110	132	157	188	225	269	320	367	442	527	627	750	901	1073										
Max. H.P.	11	14	17	19	21	25	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	

Table No. 5—High Spindle Speed Range—20" Heavy—25" Standard

RPM of Spindle	7.5	9	11	13	15	18	22	26	30	36	43	51	61	73	88	104	121	145	174	207	247	297	355	422	CUTTING SPEED IN FEET PER MINUTE
4"						19	23	27	31	38	45	53	64	76	92	109	127	152	182	217	259	311	372	442	
6"				20	24	28	35	41	47	57	68	80	96	115	138	163	190	228	273	325	388	466	558	663	
8"		19	23	27	31	38	46	54	63	75	90	107	128	153	184	218	253	304	364	434	517	622	744	884	
10"	20	24	29	34	39	47	58	68	79	94	113	134	160	191	230	272	317	379	456	542	647	778	929	1105	
12"	24	28	35	41	47	57	69	82	94	113	135	160	192	229	276	327	380	456	547	650	776	933	1115		
14"	27	33	40	48	55	66	81	95	110	132	158	187	224	268	323	381	443	531	638	759	905	1089			
16"	31	38	46	54	63	75	92	109	126	151	180	214	256	306	369	436	507	607	729	867	1035				
18"	35	42	52	61	71	85	104	123	141	170	203	240	287	344	415	490	570	683	820	975	1164				
20"	39	47	58	68	79	94	115	136	157	189	225	267	319	382	461	545	634	759	911	1084					
22"	43	52	63	75	86	104	127	150	173	207	248	294	351	420	507	599	697	835	1002	1192					
24"	47	57	69	82	94	113	138	163	188	226	270	320	383	459	553	653	760	911	1093						
26"	51	61	75	88	102	123	150	177	204	245	293	347	415	497	599	708	824	987	1184						
28"	55	66	81	95	110	132	161	191	220	264	315	374	447	535	645	762	887	1063							
Max. H.P.	7.5	9	11	13	15	18	21	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	

Table No. 6—Standard Spindle Speed Range—25" Heavy—32" Standard

RPM of Spindle	8	10	11	14	16	20	23	28	32	38	46	55	65	78	94	111	129	155	186	221	264	317	379	451	CUTTING SPEED IN FEET PER MINUTE
2"						21	25	29	34	40	48	57	68	82	98	117	136	163	194	231	277	332	397	472	
4"				18	21	26	31	37	44	50	60	72	86	103	123	147	175	203	244	292	347	415	499	595	
6"		20	24	29	34	41	49	58	67	80	96	114	137	164	196	233	271	326	389	463	554	665	794	945	
8"	21	25	30	36	43	51	61	73	84	101	120	143	171	205	250	292	339	407	486	578	692	831	992	1181	
10"	25	30	36	43	51	62	74	88	100	121	144	171	205	246	294	350	407	488	583	694	831	997	1190		
12"	29	35	42	50	60	72	86	102	117	141	168	200	239	287	343	408	475	570	680	810	969	1163			
14"	34	40	48	57	68	82	98	117	134	161	192	229	274	328	392	467	542	651	777	925	1108				
16"	38	45	54	64	77	92	110	131	151	181	216	257	308	369	441	525	610	733	874	1041					
20"	42	50	60	71	86	103	123	146	167	201	240	286	342	410	490	583	678	814	972	1157					
22"	46	55	66	79	94	113	135	160	184	221	264	314	376	451	539	642	746	895	1069						
24"	50	60	72	86	103	123	147	175	201	241	288	343	410	492	588	700	814	977	1166						
26"	54	65	78	93	111	133	159	190	218	261	312	371	444	534	637	758	881	1058							
Max. H.P.	7	8	10	12	13	17	19	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	

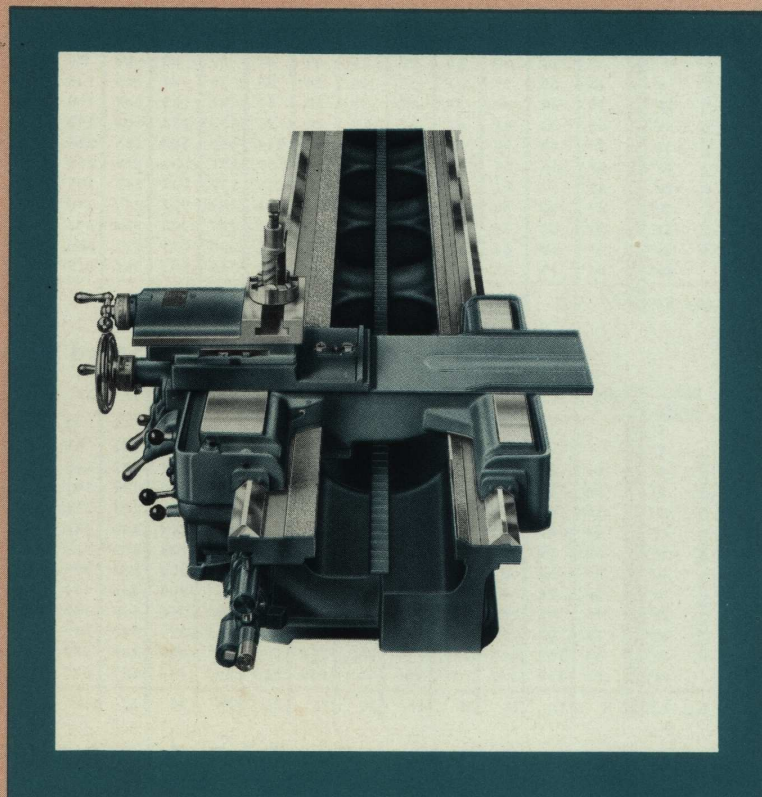
Table No. 7—Standard Spindle Speed Range—25" Standard 8 7/8" Hole

Elliptical Girths for Rigidity

Just as a building can be no stronger than its foundation, a lathe can be no more rigid than its bed. Years ago, LODGE & SHIPLEY engineers foresaw the time when lathes would be required to withstand far greater strains and stresses. The elliptical girth bed was developed after exhaustive tests and patented. It has since been an exclusive feature of Lodge & Shipley lathes.

Comparative tests between the same sizes of conventional square and saw tooth girth and elliptical girth beds clearly prove that the elliptical girth construction has greater rigidity and offers an appreciable increase in resistance to the forces which cause twisting action and horizontal as well as vertical deflection.

Model X Lathe beds are wide and deep, but above all they have elliptical girth construction, something which cannot be obtained on any other make of lathe.

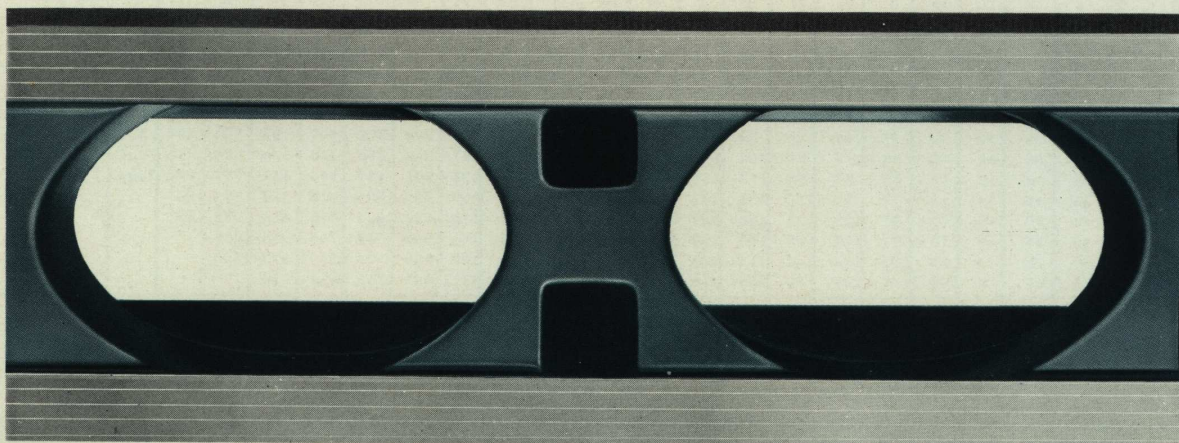


IN A NUTSHELL

*Wide beds absorb
full swing tool thrusts.*

*Elliptical girths greatly
increase rigidity.*

*Hardened and
ground renewable
alloy steel ways.*



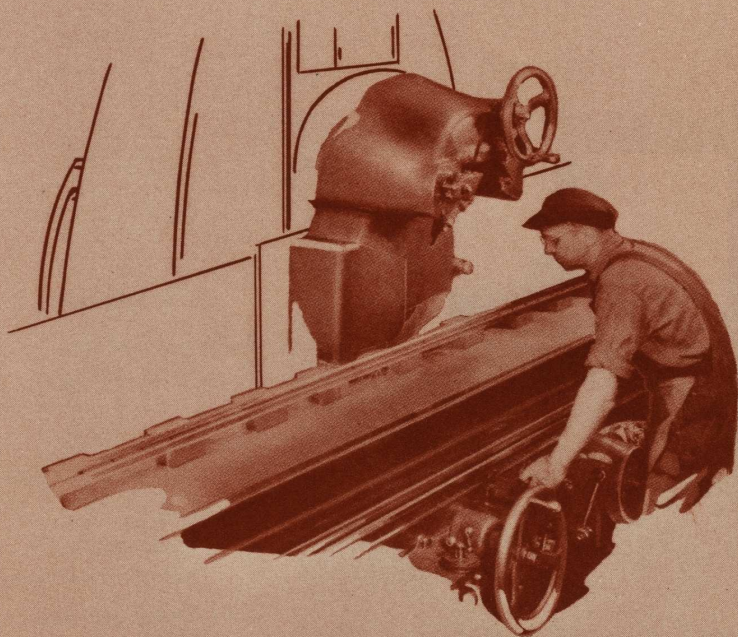
Model X lathe bedways solve a problem that has plagued lathe users for years. Generously proportioned, replaceable hardened and ground alloy steel outside bedways are furnished, located by tongue and groove construction and securely bolted to main bed castings. Special bolts are spaced four inches apart and uniformly tightened by use of a torque wrench.

The major reason for using such bedways is that it is important that the bedways can be replaced. Any reconditioning after many years of hard use or accidental damage is handled simply as a replacement part . . . in the field, with important savings in cost and downtime. These savings can amount to a considerable sum.

Consider the freight, handling, reconditioning cost, millwright and electrician time, lost productivity, and inconvenience occasioned by the factory reconditioning of a lathe with integral bedways.

Wear on the ways is effectively reduced by the hardness of 60-65 Rockwell C. A uniform adjustment can always be maintained by the gibs under the front, center, and rear ways.

Model X lathe carriages are massively constructed and the bridge is wide and deep, tying front and rear wings securely together. The carriage can be locked in position for facing operations.



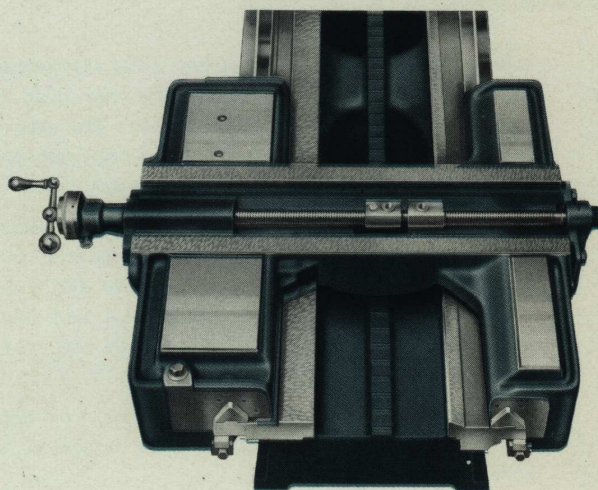
Hardened Bedways for Sustained Accuracy

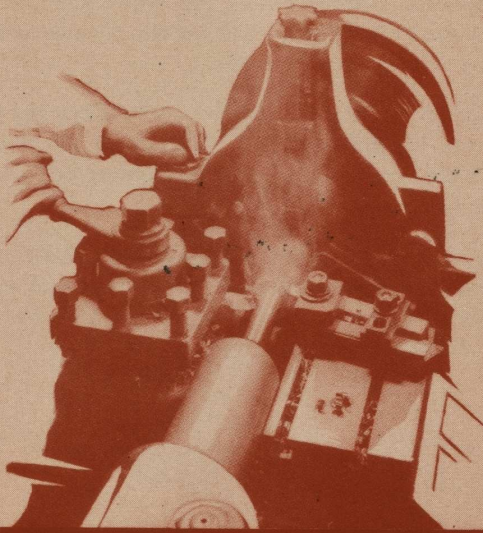
IN A NUTSHELL

*Hardened and ground
alloy steel bedways
for sustained accuracy.*

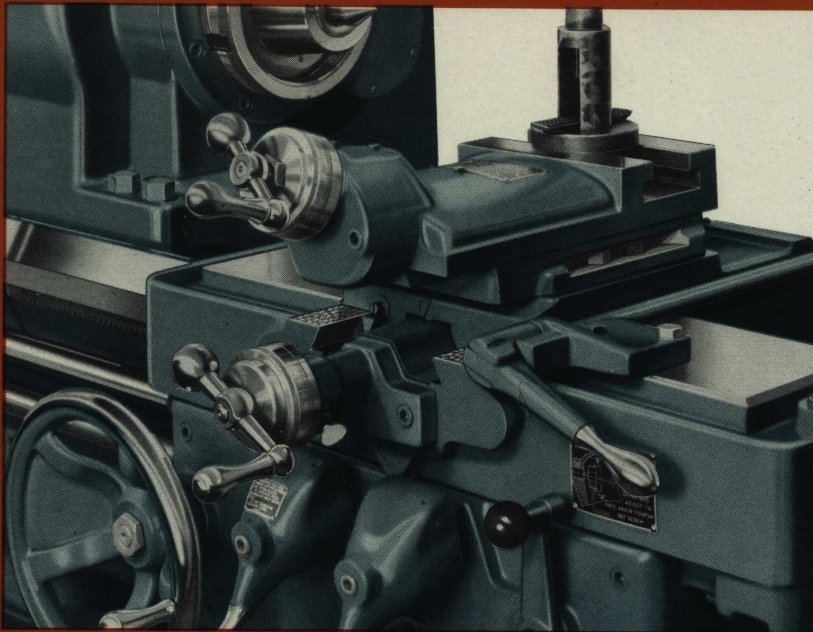
*Reconditioning of ways
handled simply
as replacement part.*

*Uniform adjustment assured
by tapered gibs at
front, center, and rear.*





Maximum Swing without Sacrificing Rigidity



IN A NUTSHELL

*Inverted dovetail
slides increase
strength.*

*Maximum swing
over cross slide.*

*Square base
compound rest
reduces overhang.*

*Ball thrust bearings
facilitate moving
top slide.*

Sound engineering principles have been devoted to developing a compound rest substantial enough to absorb the strains of heavy cuts without limiting the diameter of workpiece that can be held between centers, something of a problem due to the restricted space available between the carriage and centerline of lathe. By using an inverted dovetail cross slide and top slide, it has been possible to add rigidity where needed to obtain the required strength and still retain maximum swing capacity over the cross slide.

Another feature is the square compound rest base which reduces overhang of the top slide to a minimum, regardless of the angle to which it is swivelled. Four bolts are used to securely lock the swivel to the base. Adjustable

tapered gibs for top and bottom slides compensate for wear and maintain alignment. The top slide can be swivelled 360° on its graduated base. The rear of the base is machined so that a connected rear rest for extra toolholding capacity can be added at any time.

The top slide screw is equipped with ball bearing end thrusts to advance the slide with a minimum of effort and the micrometer dial is graduated to .001". On the smaller lathes the top slide screw dial and handle is elevated to eliminate interference with the cross feed screw handle.

A single screw round tool post is regularly supplied, but other heavy duty tool blocks are available on special order.

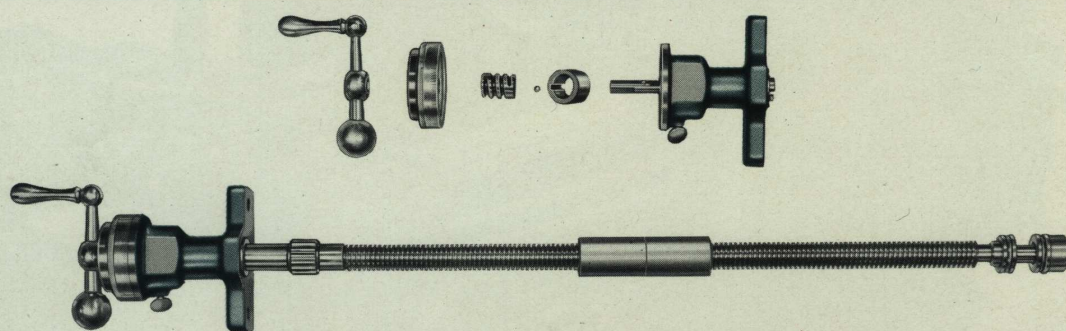
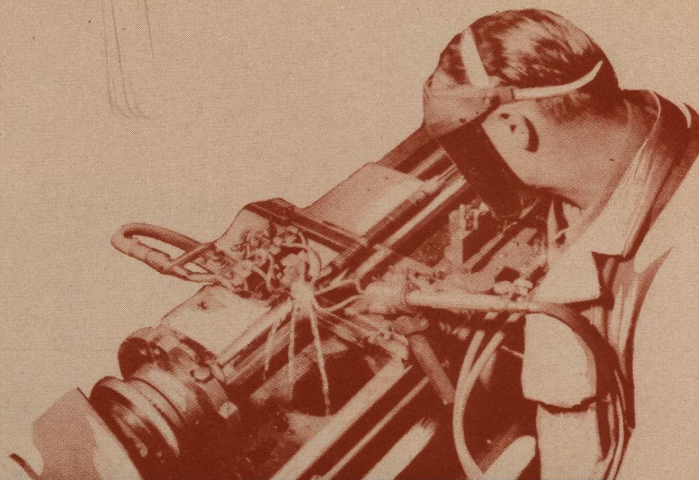
IN A NUTSHELL

*Micrometer ball stop for faster,
accurate threading operations.*

*Hardened cross feed screw for
long life service.*

*Double compensating type cross
feed nuts to take up backlash.*

*Ball bearing end thrust for
smooth cross slide travel.*



Micrometer Ball Stop Speeds Threading Operations

The Micrometer Ball Stop was another "first" for Lodge & Shipley and for many years was an exclusive feature. The fundamental design has never been changed since it provided maximum efficiency while retaining the simplest possible construction to insure trouble-free service.

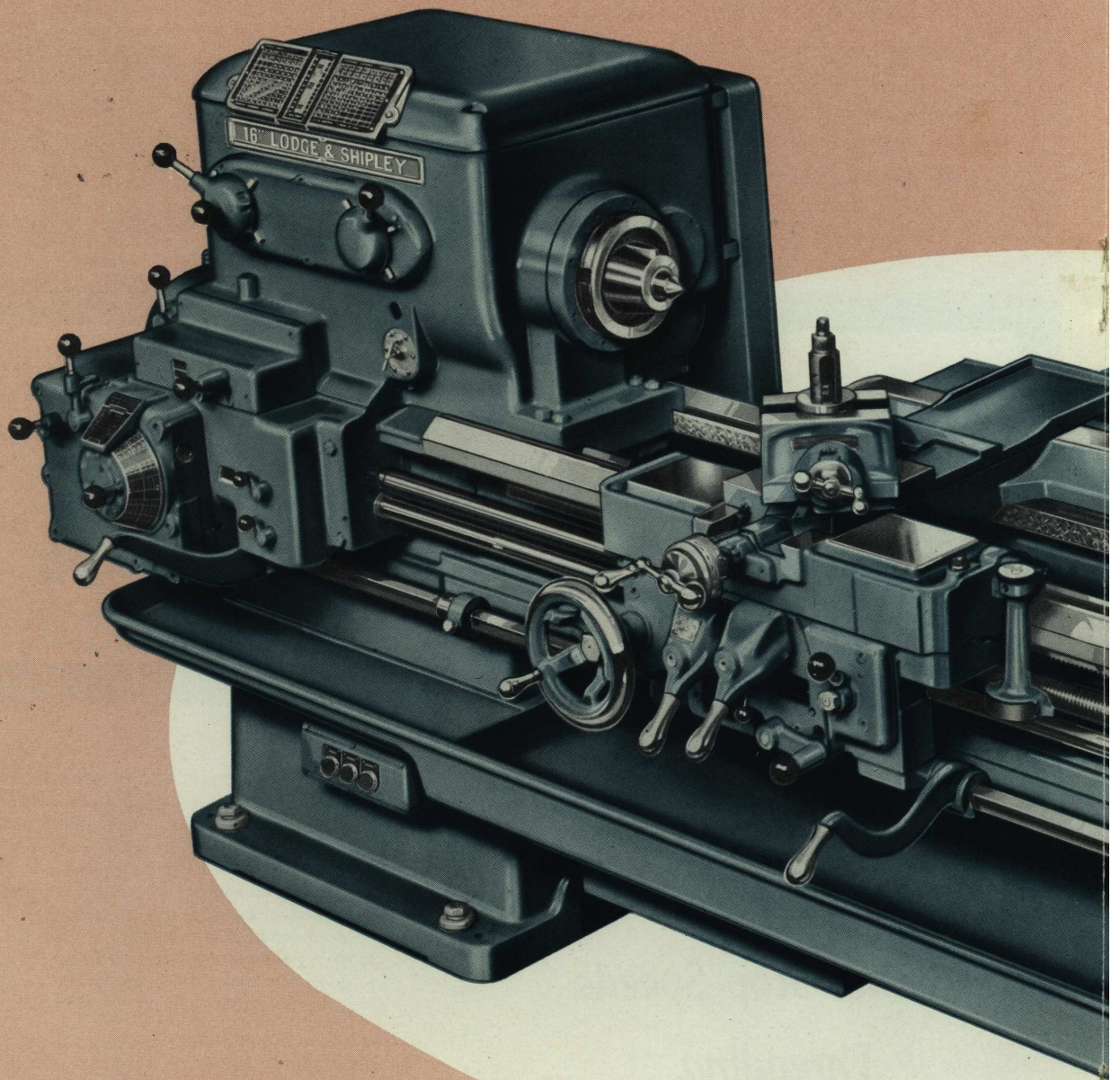
This design consists of a friction arrangement which is controlled by a thumb screw and acts as a stop for the cross feed screw. The friction can be tightened to form a

positive stop or can be adjusted to form a halting stop which can be slipped by increased pressure on the cross feed screw handle. By an ingenious arrangement of a ball travelling in a straight groove of the micrometer sleeve and a spiral groove of the micrometer bush the tool can be withdrawn from the work up to three revolutions of the cross feed screw and run in again to the stop which brings the tool back to the bottom of the preceding cut without changing the micrometer reading. When the thumb screw is loose, the cross feed screw can be used in the normal manner for full length travel of the cross slide.

Its value for thread chasing will be readily appreciated. The stop can be set to locate the depth of cut for the first pass of the tool. At the end of the cut, the tool can be quickly withdrawn from the work, the carriage returned to the starting point, and the tool run in again to the stop. The tool can then be advanced with the top slide screw or by increased pressure on the cross feed screw handle.

The micrometer ball stop is operable forward and backward and can be used for external and internal thread chasing. It can also be employed as a positive single diameter stop in turning operations.

The cross feed screw is generously proportioned for each size lathe and the threads are flame hardened to insure long service. It is the telescopic type with adjustable ball bearing end thrust permitting the addition of a Taper Attachment to the lathe at some later date without having to change the cross feed screw assembly. Double compensating type bronze cross feed nuts are supplied and can be adjusted to take up backlash.



MODEL **X** 16" HEAVY DUTY
SELECTIVE HEAD ENGINE LATHE
A FINER MACHINE TOOL

PRECISION BUILT IN FOLLOWING SIZES AND TYPES:

AS ENGINE AND MANUFACTURING LATHES

14" Heavy	20" Heavy
16" Heavy	25" Standard
20" Standard	25" Heavy
32" Standard	

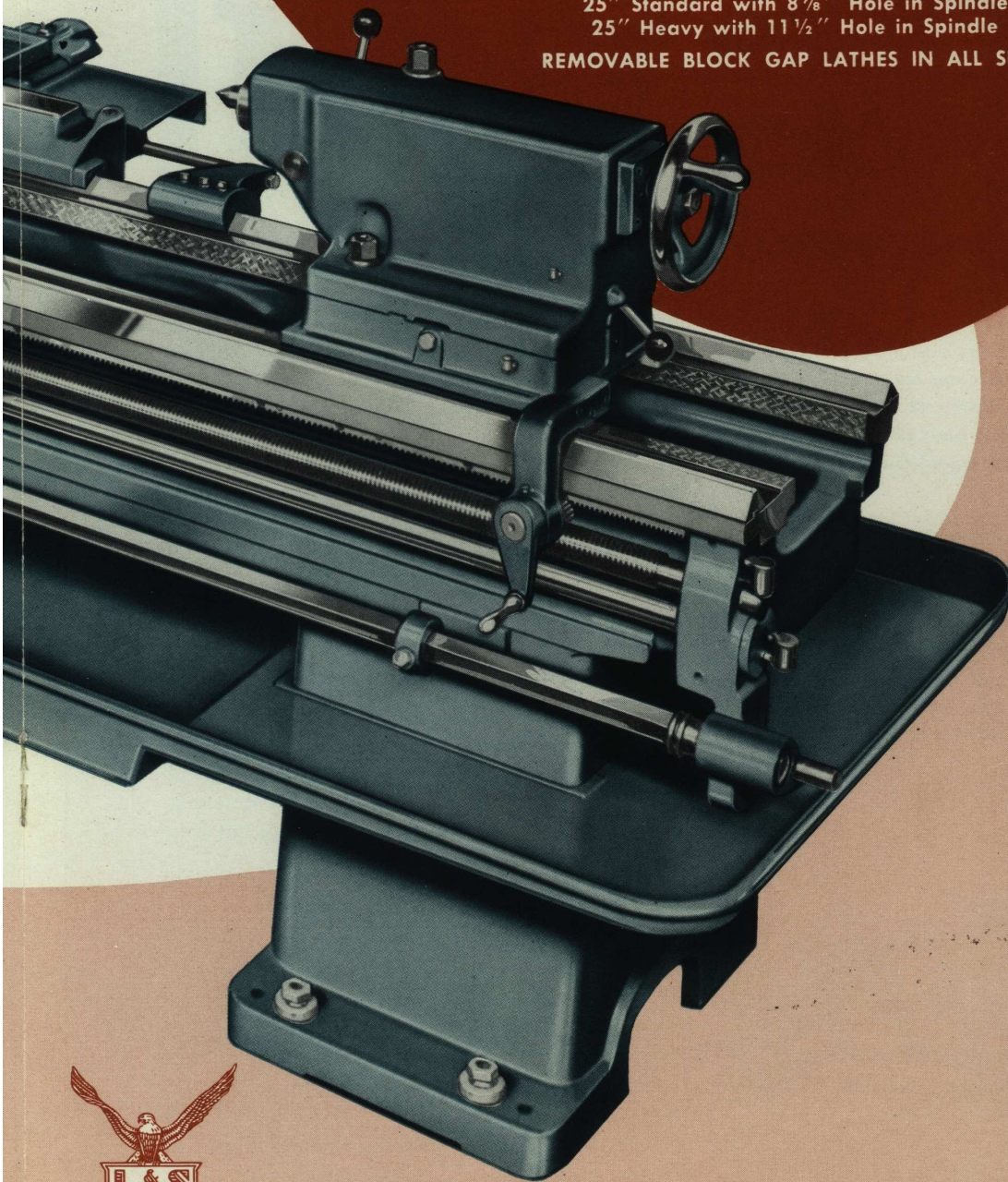
AS TOOLMAKER LATHES

14" Heavy	20" Standard
16" Heavy	20" Heavy
25" Standard	

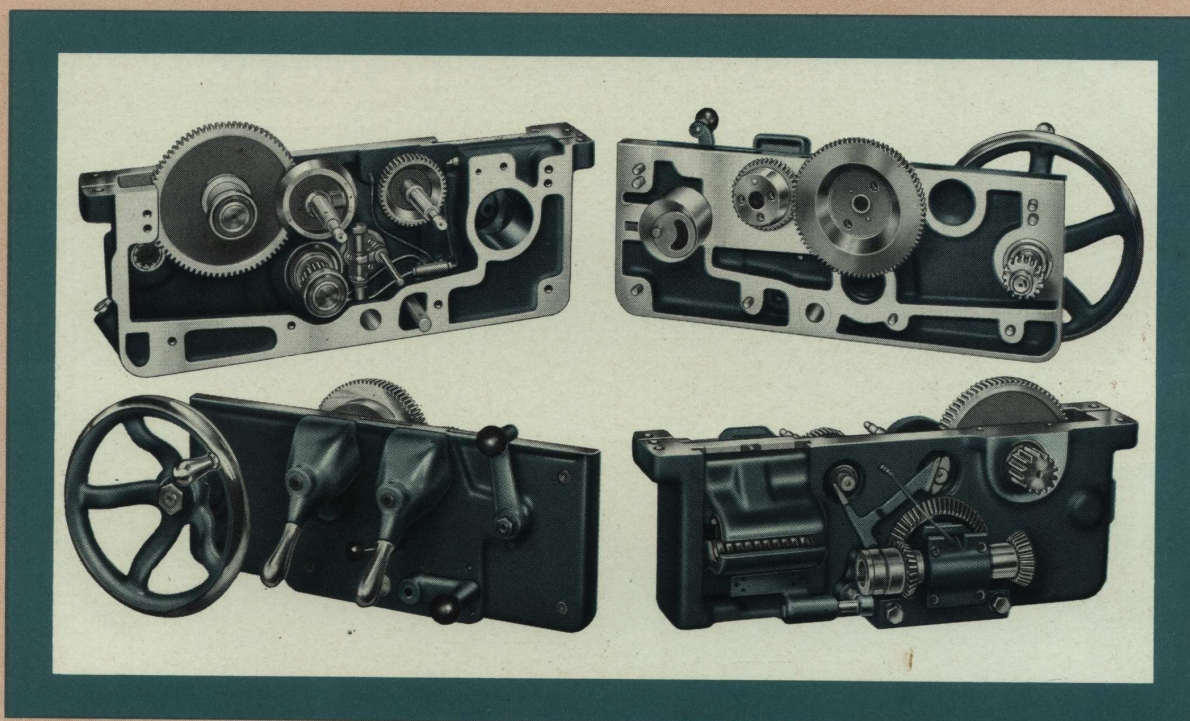
AS OIL COUNTRY LATHES

25" Standard with $8\frac{7}{8}$ " Hole in Spindle
25" Heavy with $11\frac{1}{2}$ " Hole in Spindle

REMOVABLE BLOCK GAP LATHES IN ALL SIZES



SMOOTH EVEN FLOW OF POWER THROUGH APRON GEARING



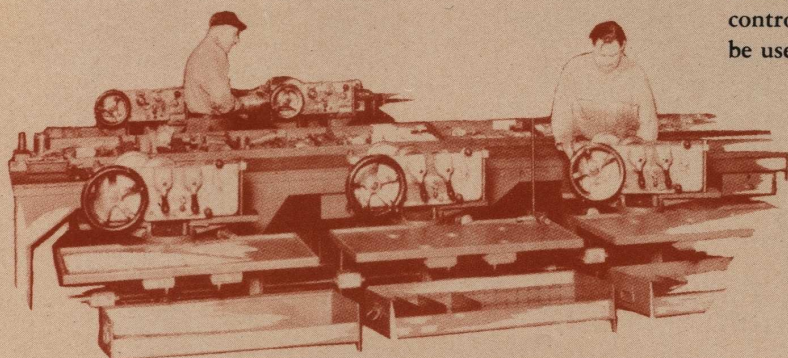
Model X lathe aprons are featured by the use of heat-treated alloy steel gears and shafts carried on anti-friction bearings and cone friction clutches to insure the smooth transmission of power. Slippage and sticking of clutches has been eliminated and the ease with which they are engaged and disengaged greatly increased.

The apron itself is of box-type construction with all shafts supported in both walls. The apron front plate is removable without dismantling the apron or removing it from the lathe, a maintenance convenience. The use of anti-friction bearings and careful attention to tolerances and alignments result in a unit which provides smooth, easy movement of the carriage along the bed with either hand or power feed.

The usual controls are mounted on the front of the apron and properly spaced to enable quick engagement and disengagement without interference. An interlock prevents engaging the halfnuts without having the feed reverse lever in neutral. When it is in neutral, it is impossible to engage the cross or longitudinal feed in either direction. The automatic pump is operated by cams on the cross feed and longitudinal feed clutch shafts.

The leadscrew is made from alloy steel turned and ground leadscrew stock and is chased on precision leadscrew chasing lathes. It is equipped with specially selected precision radial thrust bearings.

All Model X lathes are equipped with two adjustable automatic length stops, one for each direction of carriage travel, which are mounted on the square control rod. On lathes not equipped with apron controlled reverse to leadscrew, these stops can only be used for feeding operations.



IN A NUTSHELL

Cone friction clutches for smooth drive without sticking.

Alloy steel gears and shafts carried on anti-friction bearings.

All shafts supported front and rear.

Removable apron front plate for convenient maintenance.

APRON CONTROLLED REVERSE TO LEADSCREW

Toolmaker lathes are regularly equipped with apron controlled reverse to leadscrew. This can also be supplied for any Model X Engine Lathe except those equipped with Multiple Length Stops, 25" Heavy Duty and larger lathes and Large Hole in Spindle Oil Country Lathes. An additional control rod is supplied which, when rotated by the Reverse to Leadscrew Lever, shifts a single tooth clutch in the thread and feed gear train mounted inside the headstock to provide forward and reverse rotation of leadscrew. Right and left-hand threads and leads are chased in this manner.

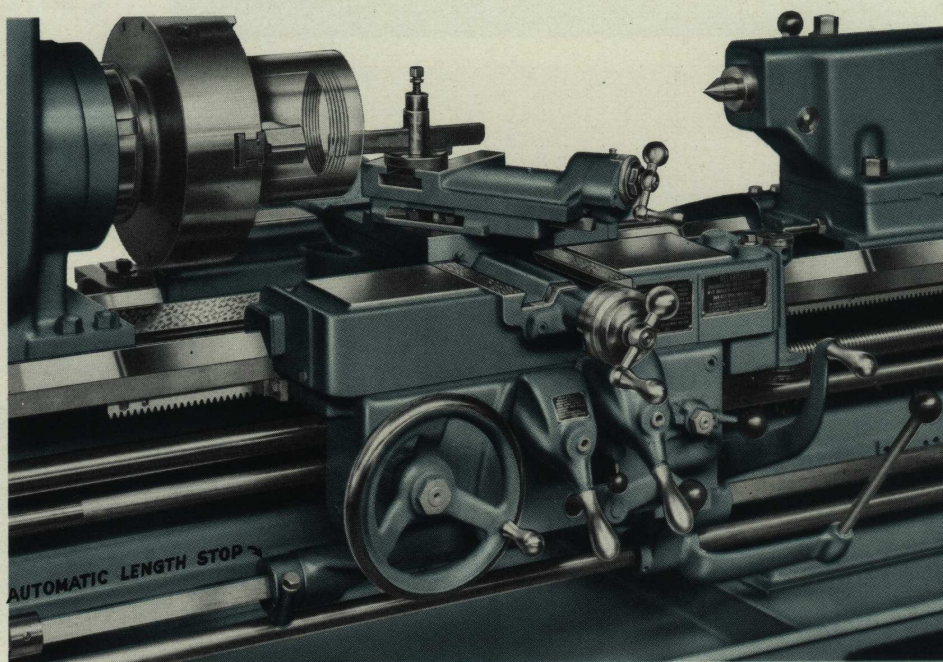
On lathes not equipped with apron controlled reverse to leadscrew multi-tooth clutches, lever operated at head

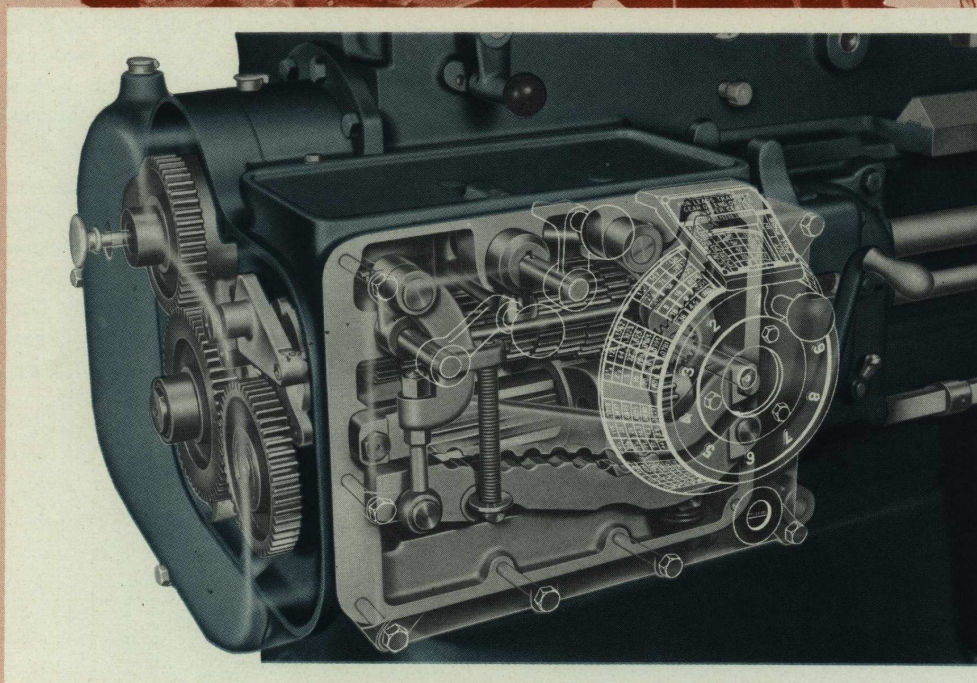
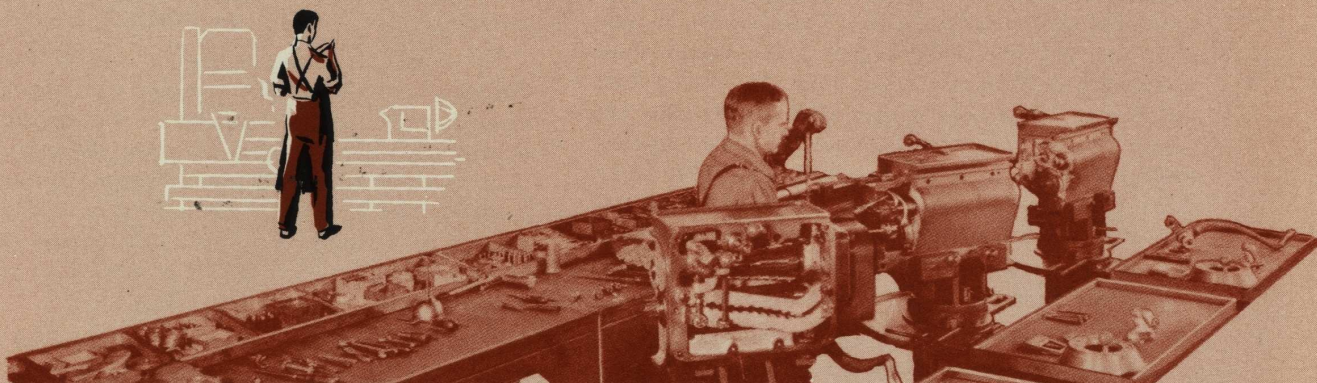
end of machine, are used so that right and left hand threads can be chased on all Model X lathes.

The reverse to leadscrew lever is used to reverse the direction of travel of the carriage with the halfnuts closed for each successive pass of the tool during thread chasing operations without changing the direction of rotation of the spindle. Register between the lead of the leadscrew and the lead of the work is maintained since a single tooth clutch is shifted. Odd threads or leads, or metric pitches which cannot be picked up with the thread indicator can then be chased.

On lathes not equipped with apron controlled reverse to leadscrew, the carriage can be reversed with the half nuts closed for each successive pass of the tool by using the spindle reverse so odd pitches and metric leads can be chased without difficulty on lathes without reverse to leadscrew. A thread indicator is regularly supplied except on metric leadscrew lathes.

Probably the major advantage in having apron controlled reverse to leadscrew on Model X lathes which are supplied with spindle reverse is the fact that the two adjustable automatic length stops can then be used for both feeding and thread chasing in either direction. This permits chasing threads in blind holes or on work where the thread runout is limited or close to a shoulder, an undeniable advantage on many tool room jobs.





IN A NUTSHELL

*Totally enclosed, oil tight
quick change gear box.*

*Alloy steel gears and shafts
carried on ball bearings.*

*Patented dial operated,
finger tip controlled
sliding tumbler.*

*Wide range of
threads and feeds for
profitable operation.*

Fingertip Control of Threads and Feeds

This patented Model X lathe feature is the most notable improvement in method of selecting threads and feeds since the introduction of the quick change gear box over 50 years ago. The convenience of the Lodge & Shipley method is appreciated by any operator who has had to forcibly move the old fashioned sliding tumbler from one position to another.

By dropping the lever in the upper left hand corner of the quick change gear box, the alligator-jaw arrangement is opened and the sliding tumbler gear is disengaged from the cone of gears. Turning the index dial, accomplished by finger touch on the knob, revolves a pinion engaging a segment lever connected to the sliding tumbler gear by a fork and shoe. The sliding tumbler gear is thus freely shifted to any desired position along the cone of gears.

The index plate is mounted on the dial and, when the column in which the desired feed or thread comes into view through the opening in the dial indicator plate, the alligator jaws are closed by raising the above mentioned lever. This locates and locks the sliding tumbler gear in positive mesh with the proper gear on the cone of gears against any possibility of accidental disengagement. Two additional levers when positioned provide the full range of 55 threads and feeds.

Heat treated alloy steel gears and shafts are mounted in the totally enclosed oil tight quick change gear box. This is anti-friction bearing equipped throughout and has pump operated automatic lubrication. The gears are shaved for smooth, quiet operation. While the standard ranges of threads or leads and feeds is ample to cover most machining operations, this design lends itself to the addition of supplementary gearing mounted on the end gear plate for odd threads or leads and ranges of metric, module and diametral pitches.

Ease of operation and elimination of waste effort is the answer to increased production which spells profitable operation. The Model X lathe quick change gear box, featuring finger-tip control of thread and feed changes, is a major step toward accomplishing this goal.

THREADS — LEADS — FEEDS

Model X lathes offer almost inexhaustible possibilities for selecting any desired thread, lead or feed. The standard ranges meet all usual requirements. By adding a few gears special ranges are readily obtained. For example 19 or 27 threads per inch, used in certain industries, require only one extra gear.

As will be noted from the following tables, two complete ranges of 55 quick changes of threads, leads and feeds are regularly obtained on 14" Heavy

to 20" Standard lathes without extra gears. Note the exceptionally fine feeds this provides, so necessary when using carbide tools. Note the fact that 1" lead is standard for these small machines. On 20" Heavy and larger lathes compound gears are available which by transposition provide threads and feeds twice as fine and twice as coarse as standard.

An 8 to 1 ratio Spindle Nose Speed Reducer is also available for leads 8 times coarser than those shown when coarse threading work is necessary.

MODEL X 14" HEAVY — 16" HEAVY — 20" STANDARD
STANDARD RANGE WITH ENGLISH LEADSCREW

	4	4½	5	5½	5¾	6	6¾	7	7½	8
THREADS PER INCH	8	9	10	11	11½	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
	32	36	40	44	46	48	52	56	60	64
	64	72	80	88	92	96	104	112	120	128
	128	144	160	176	184	192	208	224	240	256
FEEDS IN THOUSANDTHS PER R.P.M. OF SPINDLE	46.9	41.7	37.5	34.0	32.6	31.3	28.9	26.8	25.	23.4
	23.4	20.8	18.7	17.0	16.3	15.6	14.4	13.4	12.5	11.7
	11.7	10.4	9.4	8.5	8.1	7.8	7.2	6.7	6.25	5.9
	5.9	5.2	4.7	4.3	4.0	3.9	3.6	3.4	3.1	2.9
	2.9	2.6	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5
	1.45	1.3	1.15	1.05	1.0	.95	.90	.85	.80	.75
LEADS PER R.P.M. OF SPINDLE	.0039	.0044	.0049	.0054	.0056	.0059	.0063	.0068	.0073	.0078
	.0078	.0087	.0097	.0108	.0112	.0117	.0126	.0136	.0146	.0156
	.0156	.0175	.0195	.0215	.0225	.0234	.0253	.0273	.0292	.03125
	.03125	.0352	.0390	.0430	.0449	.0469	.0508	.0547	.0586	.0625
	.0625	.0703	.0781	.0859	.0899	.0937	.1015	.1093	.1172	.125
	.125	.1406	.1562	.1719	.1797	.1875	.2031	.2187	.2344	.250

Table No. 8—With Standard Gear Set-up

	1	1½	1¾	1¾	1⅞	1½	1¾	1¾	1¾	2
THREADS PER INCH	2	2¼	2½	2¾	2⅞	3	3¼	3½	3¾	4
	4	4½	5	5½	5¾	6	6¾	7	7½	8
	8	9	10	11	11½	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
	32	36	40	44	46	48	52	56	60	64
FEEDS IN THOUSANDTHS PER R.P.M. OF SPINDLE	187.	167.	150.	136.	130.	125.	115.	107.	100.	93.8
	93.8	83.4	75.0	68.2	65.2	62.5	57.7	53.6	50.0	46.9
	46.9	41.7	37.5	34.1	32.6	31.3	28.9	26.8	25.0	23.4
	23.4	20.8	18.7	17.0	16.3	15.6	14.4	13.4	12.5	11.7
	11.7	10.4	9.4	8.5	8.1	7.8	7.2	6.7	6.2	5.9
	5.9	5.2	4.7	4.3	4.0	3.9	3.6	3.4	3.1	2.9
LEADS PER R.P.M. OF SPINDLE	.0156	.0176	.0195	.0215	.0225	.0234	.0254	.0273	.0293	.0312
	.0312	.0351	.0391	.0430	.0449	.0469	.0508	.0547	.0586	.0625
	.0625	.0703	.0781	.0859	.0898	.0937	.1016	.1094	.1172	.125
	.125	.1406	.1562	.1719	.1797	.1875	.2031	.2187	.2344	.250
	.250	.2812	.3125	.3437	.3594	.375	.4062	.4375	.4687	.500
	.500	.5625	.625	.6875	.7187	.750	.8125	.875	.9375	1.000

Table No. 8A—By Transposing Two Gears

	0.25	0.281	0.312	0.344	0.359	0.375	0.406	0.437	0.469	0.50
LEADS IN M/M	0.50	0.562	0.625	0.687	0.719	0.750	0.812	0.875	0.937	1
	1	1.125	1.25	1.375	1.437	1.50	1.625	1.75	1.875	2
	2	2.25	2.50	2.75	2.875	3	3.25	3.50	3.75	4
	4	4.50	5	5.50	5.75	6	6.50	7	7.50	8
	8	9	10	11	11.50	12	13	14	15	16
FEEDS IN M/M	0.047	0.053	0.059	0.064	0.067	0.070	0.076	0.082	0.088	0.094
	0.094	0.106	0.117	0.129	0.135	0.141	0.152	0.164	0.176	0.188
	0.188	0.211	0.235	0.258	0.270	0.281	0.305	0.328	0.352	0.375
	0.375	0.422	0.469	0.516	0.539	0.563	0.610	0.657	0.704	0.750
	0.750	0.844	0.938	1.032	1.079	1.126	1.220	1.313	1.407	1.501
	1.500	1.688	1.876	2.064	2.158	2.251	2.440	2.627	2.814	3.001

Table No. 9—With Metric Translating Gears

MODEL X 14" HEAVY — 16" HEAVY — 20" STANDARD
STANDARD RANGE WITH METRIC LEADSCREW

LEADS IN M/M	0.125	0.141	0.156	0.172	0.179	0.1875	0.203	0.218	0.234	0.25
	0.25	0.281	0.312	0.344	0.359	0.375	0.406	0.4375	0.469	0.50
	0.50	0.562	0.625	0.687	0.719	0.750	0.812	0.875	0.9375	1
	1	1.125	1.25	1.375	1.437	1.50	1.625	1.75	1.875	2
	2	2.25	2.50	2.75	2.875	3	3.25	3.5	3.75	4
	4	4.50	5	5.50	5.75	6	6.50	7	7.50	8
FEEDS IN M/M	0.019	0.021	0.023	0.026	0.027	0.028	0.030	0.032	0.035	0.037
	0.037	0.042	0.047	0.051	0.054	0.055	0.060	0.065	0.070	0.074
	0.074	0.084	0.093	0.102	0.107	0.112	0.121	0.130	0.140	0.149
	0.149	0.168	0.186	0.205	0.214	0.223	0.242	0.261	0.279	0.298
	0.298	0.335	0.372	0.409	0.428	0.446	0.484	0.521	0.558	0.596
	0.596	0.670	0.745	0.819	0.856	0.893	0.968	1.042	1.117	1.191

Table No. 10—With Standard Gear Set-up

LEADS IN M/M	0.50	0.562	0.625	0.687	0.719	0.750	0.812	0.875	0.937	1
	1	1.125	1.25	1.375	1.437	1.50	1.625	1.75	1.875	2
	2	2.25	2.50	2.75	2.875	3	3.250	3.50	3.75	4
	4	4.50	5	5.50	5.75	6	6.50	7	7.50	8
	8	9	10	11	11.50	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
FEEDS IN M/M	0.074	0.084	0.093	0.102	0.107	0.112	0.121	0.130	0.140	0.149
	0.149	0.168	0.186	0.205	0.214	0.223	0.242	0.261	0.279	0.298
	0.298	0.335	0.372	0.409	0.428	0.446	0.484	0.521	0.558	0.596
	0.596	0.670	0.745	0.819	0.856	0.893	0.968	1.042	1.117	1.191
	1.191	1.340	1.489	1.638	1.712	1.787	1.936	2.085	2.234	2.382
	2.382	2.680	2.978	3.276	3.425	3.574	3.872	4.169	4.467	4.765

Table No. 10A—By Transposing Two Gears

THREADS PER INCH	2	2 1/4	2 1/2	2 3/4	2 7/8	3	3 1/4	3 1/2	3 3/4	4
	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	7	7 1/2	8
	8	9	10	11	11 1/2	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
	32	36	40	44	46	48	52	56	60	64
	64	72	80	88	92	96	104	112	120	128
FEEDS IN THOUSANDTHS PER R.P.M. OF SPINDLE	74.5	66.	59.5	54.	52.	50.	46.	42.5	40.	37.2
	37.2	33.	29.7	27.	26.	25.	23.	21.2	20.	18.6
	18.6	16.5	14.8	13.5	13.	12.5	11.5	10.6	10.	9.3
	9.3	8.2	7.4	6.7	6.5	6.2	5.7	5.3	5.	4.6
	4.6	4.1	3.7	3.4	3.2	3.1	2.8	2.6	2.5	2.3
	2.3	2.	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1
LEADS PER R.P.M. OF SPINDLE	.0078	.0087	.0097	.0107	.0112	.0117	.0126	.0136	.0146	.0156
	.0156	.0175	.0195	.0214	.0224	.0234	.0253	.0273	.0292	.0312
	.0312	.0351	.0390	.0429	.0449	.0468	.0507	.0546	.0585	.0625
	.0625	.0703	.0781	.0859	.0898	.0937	.1015	.1093	.1171	.125
	.125	.1406	.1562	.1718	.1796	.1875	.2031	.2187	.2343	.25
	.25	.2812	.3125	.3437	.3593	.375	.4062	.4375	.4687	.5

Table No. 11—With English Translating Gears

SPECIAL RANGES WITH EITHER ENGLISH OR METRIC LEADSCREW

MODULE LEADS	3/8	9/32	5/16	11/32	23/64	3/16	13/64	7/32	15/64	1/4
	7/4	3/2	7/8	11/4	23/8	3/4	13/8	7/4	15/8	2
	1	1 1/8	1 1/4	1 3/8	1 7/8	1 1/2	1 5/8	1 3/4	1 7/8	2
	2	2 1/4	2 1/2	2 3/4	2 7/8	3	3 1/4	3 1/2	3 3/4	4
	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	7	7 1/2	8

Table No. 12—With Module Lead Translating Gears

DIAMETRAL PITCHES	4	4 1/2	5	5 1/2	5 3/4	6	6 1/2	7	7 1/2	8
	8	9	10	11	11 1/2	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
	32	36	40	44	46	48	52	56	60	64
	64	72	80	88	92	96	104	112	120	128
	128	144	160	176	184	192	208	224	240	256

Table No. 13—With Diametral Pitch Translating Gears

MODEL X 20" HEAVY DUTY AND LARGER LATHES

RANGES WITH ENGLISH LEADSCREW

THREADS PER INCH	1	1 $\frac{1}{4}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$	2
	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	2 $\frac{7}{8}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4
	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	5 $\frac{3}{4}$	6	6 $\frac{1}{2}$	7	7 $\frac{1}{2}$	8
	8	9	10	11	11 $\frac{1}{2}$	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
	32	36	40	44	46	48	52	56	60	64
FEEDS IN THOUSANDTHS PER R.P.M. OF SPINDLE	160.	142.	128.	116.	110.	106.	98.	92.	85.	80.
	80.	71.	64.	58.	55.	53.	49.	46.	42.	40.
	40.	36.	32.	29.	27.	26.	24.	23.	21.	20.
	20.	18.	16.	14.5	13.6	13.	12.	11.5	10.5	10.
	10.	9.	8.	7.2	6.8	6.5	6.	5.7	5.3	5.
	5.	4.5	4.	3.6	3.4	3.3	3.	2.8	2.6	2.5

The leads in inches listed below only obtainable on lathes with Toolmaker Type Quick Change Gear Box.

LEADS PER R.P.M. OF SPINDLE	.0156	.0176	.0195	.0215	.0225	.0234	.0254	.0273	.0293	.0312
	.0312	.0351	.0391	.0430	.0449	.0469	.0508	.0547	.0586	.0625
	.0625	.0703	.0781	.0859	.0898	.0937	.1016	.1094	.1172	.125
	.125	.1406	.1562	.1719	.1797	.1875	.2031	.2187	.2344	.250
	.250	.2812	.3125	.3437	.3594	.375	.4062	.4375	.4687	.500
	.500	.5625	.625	.6875	.7187	.750	.8125	.875	.9375	1.000

Table No. 14—With Standard Gear Set Up

LEADS IN M/M	.5	.5625	.625	.6875	.7187	.75	.8125	.875	.9375	1
	1	1.125	1.25	1.375	1.437	1.5	1.625	1.75	1.875	2
	2	2.25	2.5	2.75	2.875	3	3.25	3.5	3.75	4
	4	4.5	5	5.5	5.75	6	6.5	7	7.5	8
	8	9	10	11	11.5	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
FEEDS IN M/M	0.056	0.063	0.070	0.077	0.080	0.084	0.091	0.098	0.105	0.112
	0.112	0.126	0.140	0.154	0.161	0.167	0.181	0.195	0.209	0.223
	0.223	0.251	0.279	0.307	0.321	0.335	0.363	0.391	0.419	0.447
	0.447	0.502	0.558	0.614	0.642	0.670	0.726	0.782	0.837	0.893
	0.893	1.005	1.117	1.228	1.284	1.340	1.452	1.563	1.675	1.786
	1.786	2.010	2.233	2.456	2.568	2.680	2.903	3.126	3.350	3.573

Table No. 15—With Metric Translating Gears

MODULE LEADS	$\frac{3}{4}$	$\frac{9}{32}$	$\frac{5}{16}$	$\frac{11}{16}$	$\frac{23}{32}$	$\frac{3}{8}$	$\frac{13}{32}$	$\frac{7}{16}$	$\frac{15}{16}$	$\frac{1}{2}$
	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{8}$	$\frac{23}{8}$	$\frac{3}{4}$	$\frac{13}{8}$	$\frac{7}{8}$	$\frac{15}{8}$	1
	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	2
	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	2 $\frac{7}{8}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4
	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	5 $\frac{3}{4}$	6	6 $\frac{1}{2}$	7	7 $\frac{1}{2}$	8

Table No. 16—With Module Lead Translating Gears

DIAMETRAL PITCHES	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	2 $\frac{7}{8}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4
	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	5 $\frac{3}{4}$	6	6 $\frac{1}{2}$	7	7 $\frac{1}{2}$	8
	8	9	10	11	11 $\frac{1}{2}$	12	13	14	15	16
	16	18	20	22	23	24	26	28	30	32
	32	36	40	44	46	48	52	56	60	64
	64	72	80	88	92	96	104	112	120	128

Table No. 17—With Diametral Pitch Translating Gears

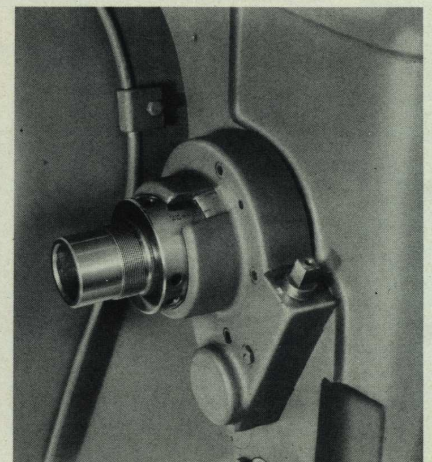
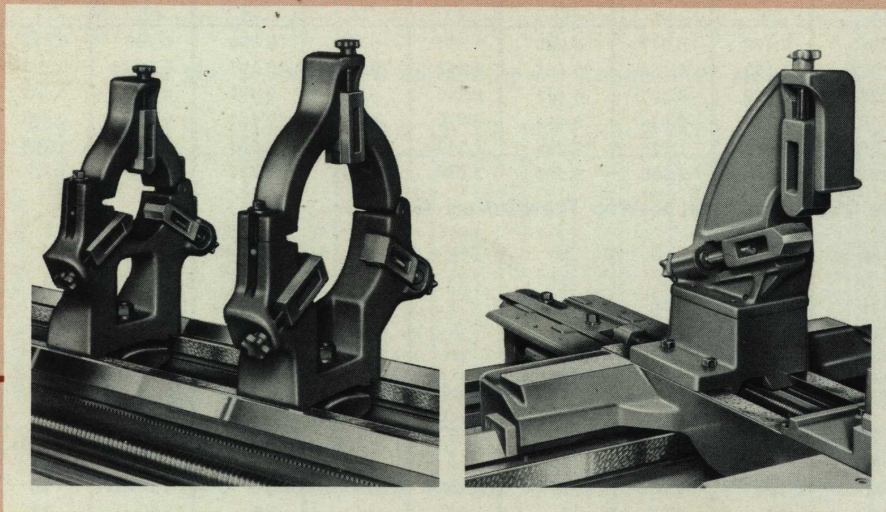
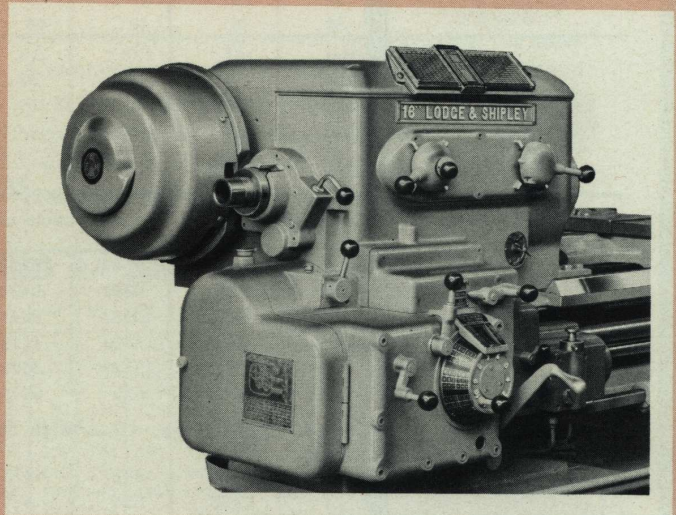
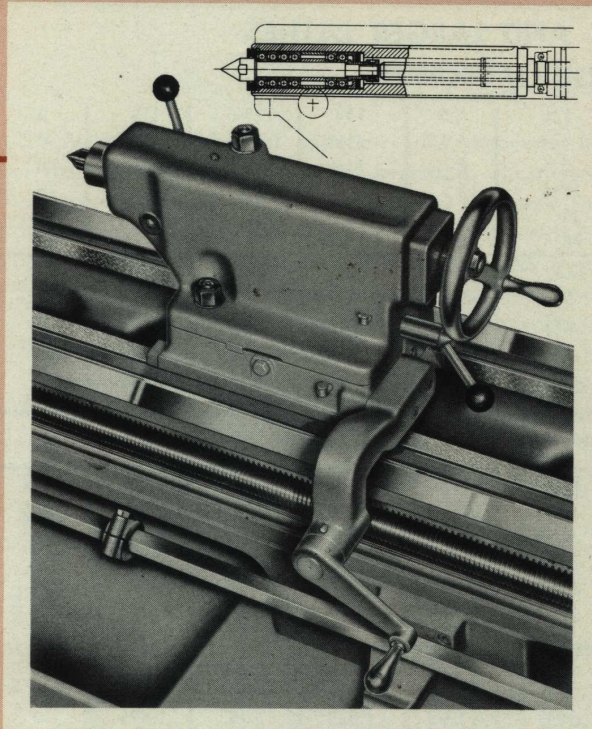
The tables of metric and module leads are of particular interest to customers in countries where the metric system is used. The choice of English or Metric leadscrews and quick change gear boxes is optional at no change in price.

When translating gears are used to convert from English to Metric or Metric to English the gear combination used does not cause any error in the thread or lead chased. Metric leads chased on English leadscrew lathes are just as accurate as if they were chased on Metric leadscrew lathes and vice-versa. Another feature is the fact that once the translating gears are mounted on the machine the full range shown in the tables above are ob-

tained by the quick change method. It isn't necessary to use separate pick-off gears. Since Model X lathes from 14" through 25" Standard are regularly equipped with both forward and reverse through the headstock no extra attachment is needed for chasing metric pitches. Electrical reverse in the larger sizes is an extra.

Since the versatility of a lathe is largely determined by its thread chasing possibilities and efficient operation by its facility in providing the most economical feed to suit job requirements, these tables clearly demonstrate why your next lathe should be a Model X Lodge & Shipley.

STANDARD AND



TAILSTOCK — Two notable innovations have been made — automatic lubrication and shear wipers — both well calculated to minimize wear and maintain years of precision alignment of tailstock on bed. The barrel is extended for clearance of cross slide on short work. The oversize spindle, made from heat-treated alloy steel forging, is finish ground to size and equipped with tang slot for drilling operations. The tailstock screw has ball bearing end thrust. Crank and pinion to facilitate positioning along bed is supplied on all sizes.

The smaller sizes are clamped to bed by two bolts at the front and at the rear by single lever quick clamping device. For 20" Heavy Duty and larger lathes double bolt clamping front and rear is used and a pawl is provided to engage rack teeth cast in center of bed to prevent backing off under heavy cuts.

Round solid dead center is standard but a precision built-in revolving ball bearing center assembly, illustrated by line drawing, can be supplied at extra cost in place of or in addition to standard.

STEADY AND FOLLOW RESTS — These are of substantial construction and available with plain jaws as illustrated or roller jaws either in place of or in addition to plain. Steady rests are supplied in two sizes, standard and oversize capacity.

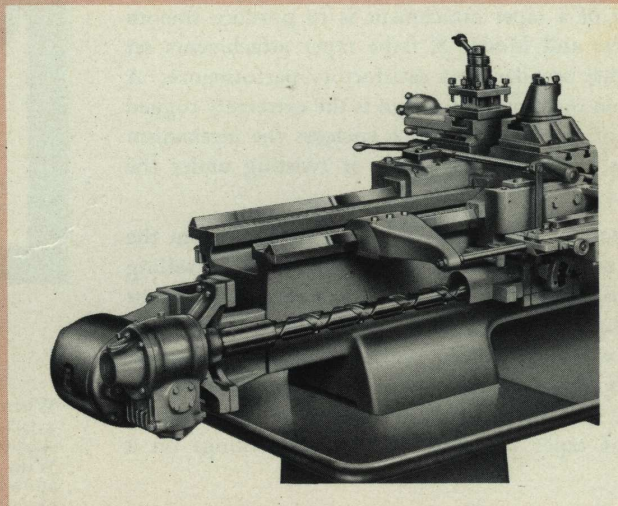
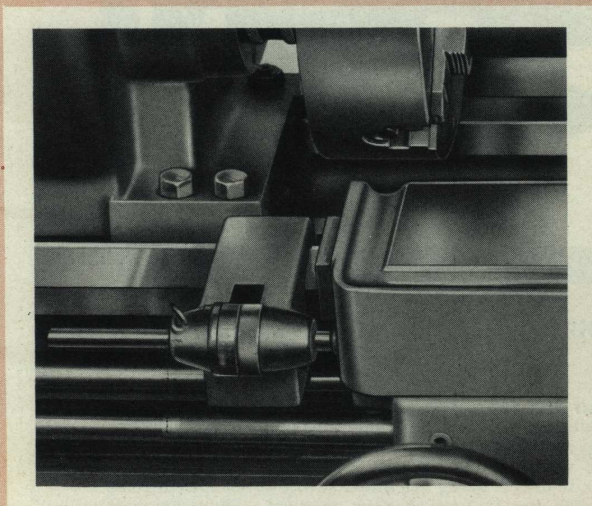
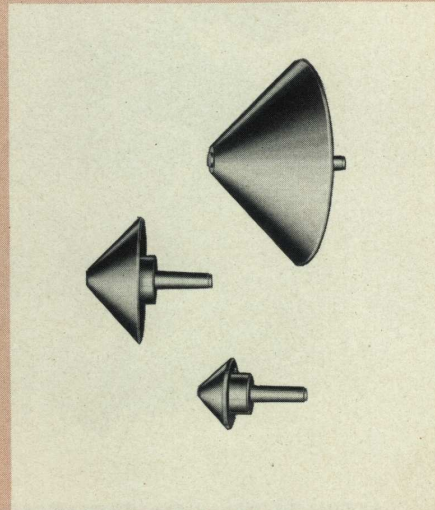
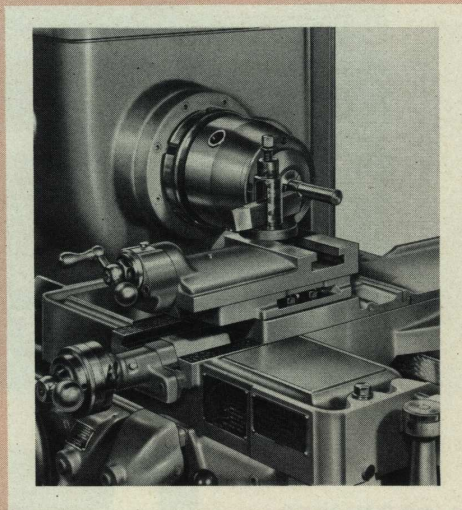
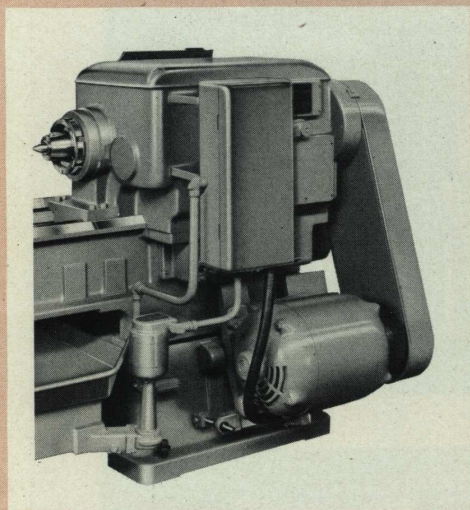
INDIVIDUAL MOTOR DRIVE — The optional types of motor drives — vee belt motor drive at rear of leg or direct connected flange motor drive — solve the problem of convenience in servicing and lubricating the electrical equipment. Both motor and starter are out in the open and available for instant maintenance. The air-gap type so called "pancake" motor illustrated is only available in limited

ratings. When larger capacity motors are needed the conventional flange type motor is supplied.

Also shown is the conveniently mounted motor driven gusher type pump and generously proportioned sump furnished when coolant pump and tubing is ordered.

BUILT-IN MULTIPLE THREAD INDEXING ATTACHMENT — This attachment is available for 14" and 16" Heavy Duty and 20" Standard Model X lathes and becomes an integral part of the lathe for which it is supplied. It can be used for chasing work with 2, 3, 4 and 6 multiple thread starts. It can also be used as a dividing head for multiples of these starts up to 24 divisions. Since it is mounted at the rear of the headstock spindle the workpiece can be supported between centers, held in chuck or in any other spindle nose fixture available. For

EXTRA ACCESSORIES



larger lathes a Multiple Thread Indexing Face Plate is available.

MICROMETER CARRIAGE LENGTH STOP — Accurate duplication of facing operations and shoulders, internal and external can be accomplished with the Micrometer Carriage Length Stop. This is clamped to the front bedways at any desired position and can be used on either side of the carriage. The micrometer dial is graduated to .0005".

DRAW-IN CHUCK AND COLLETS — The nose type draw-in chuck is recommended for convenient operation and large capacity. Manufactured by Lodge & Shipley it fits directly on the spindle nose and all operations for inserting or removing collets and work are performed right at the spindle nose. Bar stock can be extended through the collet and headstock spindle. Round, square and hex collets are available.

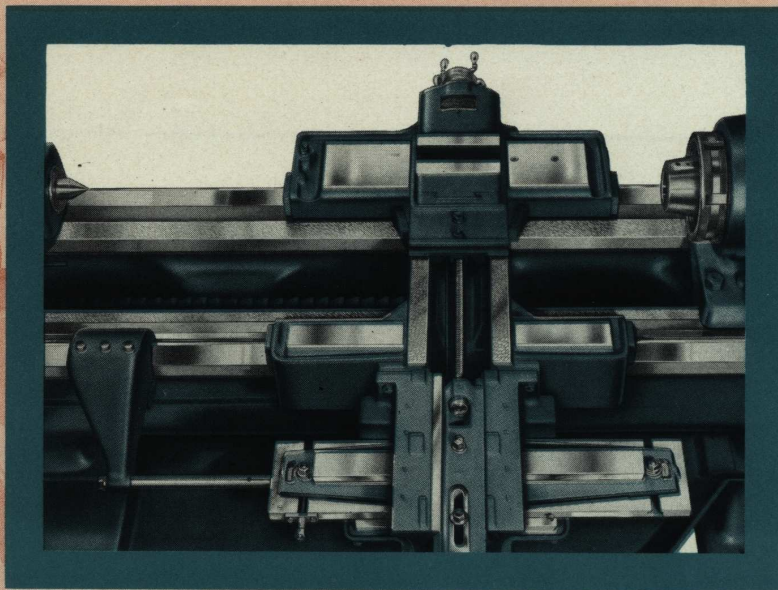
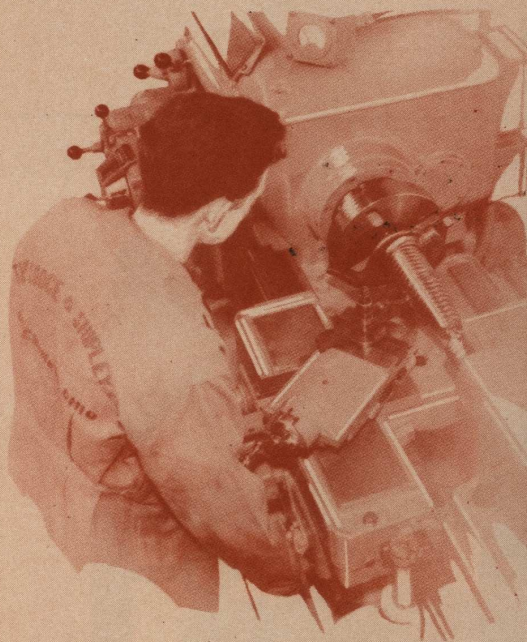
POWER RAPID TRAVERSE — Quick longitudinal traverse of the carriage in either direction along the bed is almost essential for the longer bed lathes in the larger sizes and is very desirable on any size or center

distance machine that is being used for quantity production.

Power is supplied by a gear motor through a right and left hand screw on which are mounted right and left hand nuts carried in the housing attached to rear of carriage. By restraining either right hand or left hand nut through operation of lever mounted on front of carriage forward or reverse traverse is accomplished.

PIPE CENTERS — Inserted type revolving ball bearing pipe centers for the tailstock are available in three sizes with capacities from 1½" to 6", 2¼" to 12" and 3½" to 18". Due to considerable overlap in capacities the quantity that must be ordered can be held to a minimum.





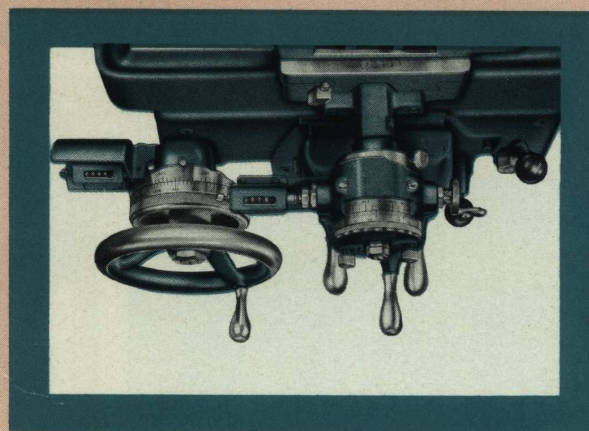
IMPROVED CONSTRUCTION PRODUCES SMOOTHER TAPERS

The function of a taper attachment is to produce smooth accurate tapers and Model X lathe taper attachments set new and higher standards of satisfactory performance. A departure from conventional design is the extremely rugged construction of the housing which encloses the mechanism on four sides to prevent cramping or twisting under the heaviest cuts.

The guide plate is extra long and takes its bearing in the solid casting of the top half of the housing. The swivelling bar and sliding shoe have square sides, assuring alignment and preventing cramping action. Tapered gibs compensate for wear between all sliding surfaces. A micrometer set screw adjusts the position of the swivelling bar to the correct angle and the scale is graduated in both degrees and inches of taper per foot with both markings on a single scale.

Mounted on the carriage, the taper attachment travels with it, always ready for instant use. The cross feed screw has hardened threads and is the telescopic type which can be used for adjusting the depth of cut while taper turning. Adjustable ball bearing end thrusts are furnished to take up thrust in both directions. Double bronze compensating cross feed nuts are used which can be adjusted to take up wear and back lash between screw and nuts. The taper attachment does not restrict positioning the compound rest on the carriage.

All carriages are machined to receive a taper attachment at a later date if desired. The taper attachment can be converted into a mechanical form turning attachment by the addition of a few parts available at extra cost.



DIRECT READING OF DIAMETERS AND LENGTHS

When dial and counter direct reading diameter and length attachments are ordered the time consuming "cut and try" machining methods can be discarded for most lathe operations. With the direct reading diameter attachment the operator knows the diameter being machined at any given time instead of measuring the amount of stock removal. The cross feed screw is 5-pitch so each complete revolution of the micrometer dial represents a change in diameter of 0.4". This dial is divided into four sections having 50 graduations each. Each graduation represents .002" change in diameter and a Vernier scale is provided to enable readings as close as .0005". Suitable gearing connects the dial to the counter so that each one-quarter revolution of the dial is registered on the counter in increments of 0.1". By combining the reading of counter and dial, as well as Vernier scale, actual diameters being machined can be directly measured within extremely close tolerances.

The direct reading length attachment registers the length of carriage travel toward the headstock. The micrometer dial has 100 graduations each representing .01" of carriage travel. A Vernier scale is provided to permit reading within .001". One complete revolution of the dial is the equivalent of 1" of carriage travel and the counter is geared to the dial to register the travel in inch increments. By combining the readings on the counter, dial and Vernier scale the length of carriage travel can be determined to within .001".

UNIVERSAL RELIEVING ATTACHMENT

The Model X lathe relieving attachment is truly universal and will efficiently perform internal and external, right hand and left hand, plain angular and end as well as spiral relieving. It becomes an integral part of the lathe for which it is supplied, does not interfere with the use of the machine for ordinary work and can be engaged or disengaged in a few minutes.

The range of relief is from 0 to $\frac{3}{16}$ " external and 0 to $\frac{1}{8}$ " internal on 14" Heavy and from 0 to $\frac{7}{16}$ " external and 0 to $\frac{3}{16}$ " internal on 16" Heavy and 20" Standard lathes. Larger lathes are not furnished with relieving attachment. Change gearing is regularly supplied to relieve work having 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22 and 24 flutes. Special gearing can be supplied to meet special requirements.

The top slide and not the complete compound rest is reciprocated thereby reducing the mass to be moved and strains on the operating mechanism. Since the top slide can be swiveled to any angle it is possible to perform end relieving, an exclusive design feature.

A single lobe cam is used to prevent variations in the amount of relief on different flutes of the workpiece which could otherwise occur due to uneven wear on double lobe cams. Precision setting for the desired amount of relief is obtained by adjusting a graduated pinion shaft which extends from the top slide.

An exclusive operating convenience permits adjusting the tool to the work rather than the work to the tool. Since it is possible to relieve with the spindle running in reverse, another exclusive design feature, internal relieving jobs which heretofore were difficult to machine can be performed with greater efficiency. The tool can be designed with proper strength and adequate backing.

For the lower spindle speeds required for some relieving jobs a two-speed motor can be used to drive the lathe at half-standard and standard speeds. Alternatively an 8 to 1 spindle nose speed reducer is available and should be ordered if leads coarser than 1" are required.

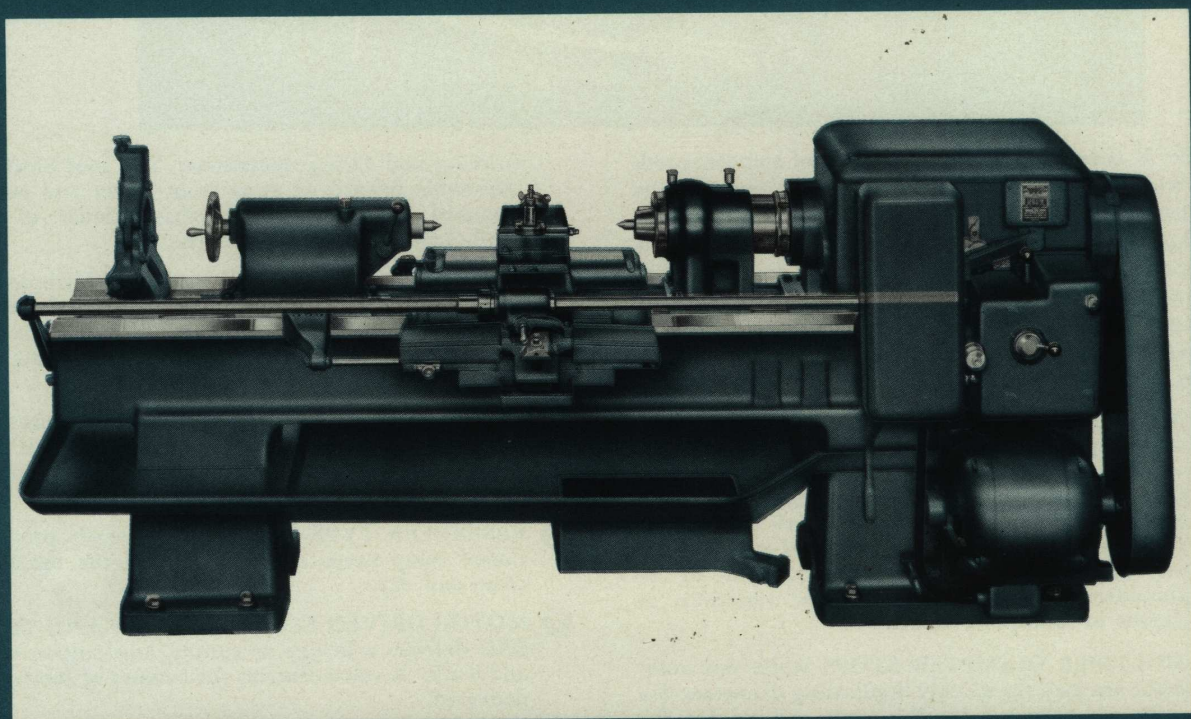
IN A NUTSHELL

Top slide only is reciprocated.

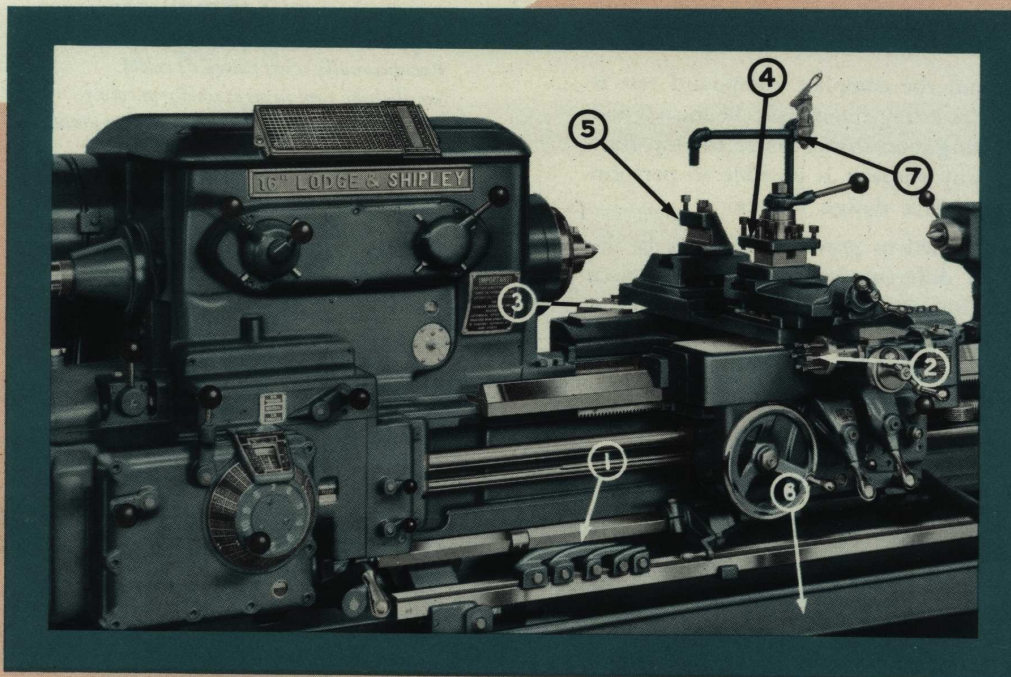
Exceptionally wide range of relief.

Single lobe cam insures uniform relief.

No interference with normal lathe operation.



The Manufacturing Lathe



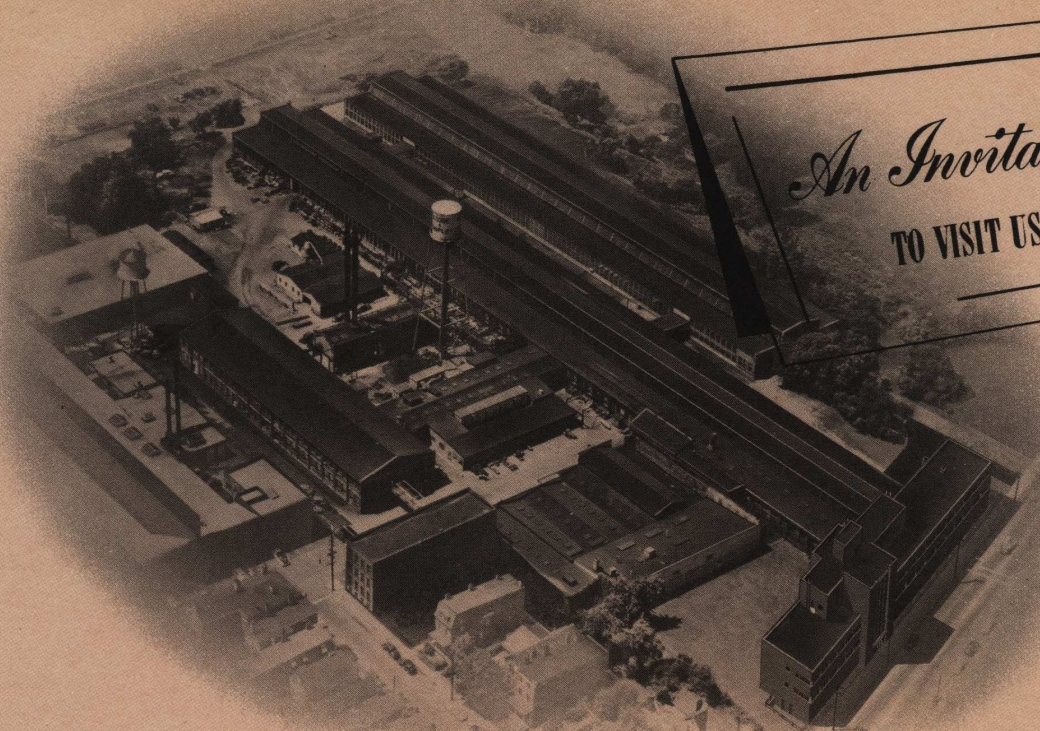
Model X lathes with their multiplicity of spindle speeds and wide range of feeds are converted into exceptionally efficient production units for quantity lots of workpieces by the addition of Manufacturing Lathe equipment. Proven time savings can be made on comparatively small quantity lots. The addition of these attachments does not make the machine a special purpose lathe, none of them interfere with ordinary lathe operations.

- ① **MULTIPLE LENGTH STOPS** automatically disengage power length feed in any of five positions when travelling toward the headstock for duplicating shoulder lengths. For extremely accurate work a positive stop is provided against which the carriage can be moved by hand after the feed is automatically disengaged. A micrometer adjustment to the shoulder stop bar compensates for variations in depths of workpiece centers.
- ② **MULTIPLE DIAMETER STOPS** while not automatic are used for quickly duplicating diameters. Six stops are provided for the front and six for the rear tools.
- ③ **CONNECTED REAR REST** greatly increases tooling possibilities since it enables mounting one or more toolholders on the rear for necking, grooving,

forming and facing operations. The tool block is adjustable toward or away from center and has a standard "T" slot for interchangeability of all toolholders on front or rear rests.

- ④ **FOURWAY TOOL BLOCK** can be quickly indexed to any of twelve positions with accuracy limit of .001" and make it possible to perform various operations without changing tools by mounting up to four different tools in the block.
- ⑤ **HIGH DUTY TOOL BLOCK** is of heavy construction with double screws for holding the tool. It can be supplemented by or replaced with multiple toolholders at added cost.
- ⑥ **RESERVOIR TYPE PAN** with generously proportioned sump keeps the floor around the machine clean and dry.
- ⑦ **MOTOR DRIVEN COOLANT PUMP AND TUBING** delivers a deluge of cutting lubricant to tool and work. A valve controls the amount of lubricant delivered.

The Model X Manufacturing lathe, fast and efficient on quantity production and single piece jobs is a dual purpose machine giving double value in those shops where full automatic lathes would not prove a profitable investment.



An Invitation
TO VISIT US

When you visit Cincinnati, we hope you will accept our most cordial invitation to see the plant in which Lodge & Shipley Model X lathes are produced. In this booklet we can show only a few of the machines and methods used to manufacture these finest of lathes. Much more can be seen and demonstrated in a few hours in the plant. If your time permits, we hope you will spend a day or more with us.

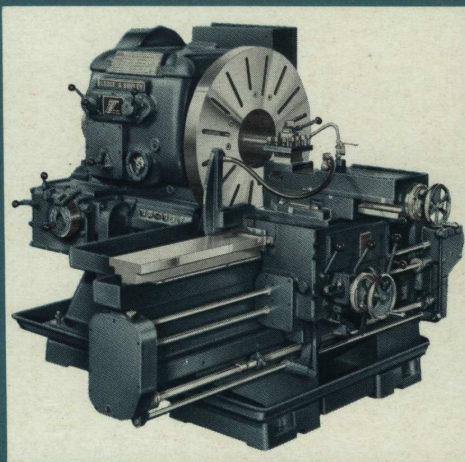
Then too, we would like to show you the latest additions to the Lodge & Shipley line: The Model X Copymatic, for example . . . its unique tracer control allows fast, extremely accurate duplication from round or flat templates, or standard lathe operation with immediate changeover. Copymatic versatility and productivity are a matter of record with many manufacturers.

You'll be interested too, in the new Lodge & Shipley T Lathe, 60" Right Angle Chucking Lathe and the even newer T-Matic,

30" Automatic Right Angle Chucking Lathe. Both of these lathes have been hailed as outstanding advancements for facing, turning and boring thin-walled section work of large diameter and short length.

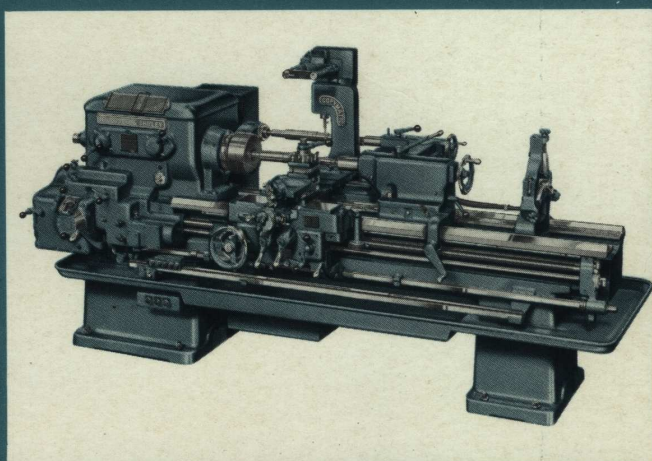
During your visit, make use of the facilities of the Lodge & Shipley Demonstration Room. Here, representative models of Lodge & Shipley Lathes are available for tests on your workpieces. With prior arrangements, highly-skilled operators will give you a practical, see-for-yourself demonstration of the production, precision and economy you may expect from Lodge & Shipley Lathes.

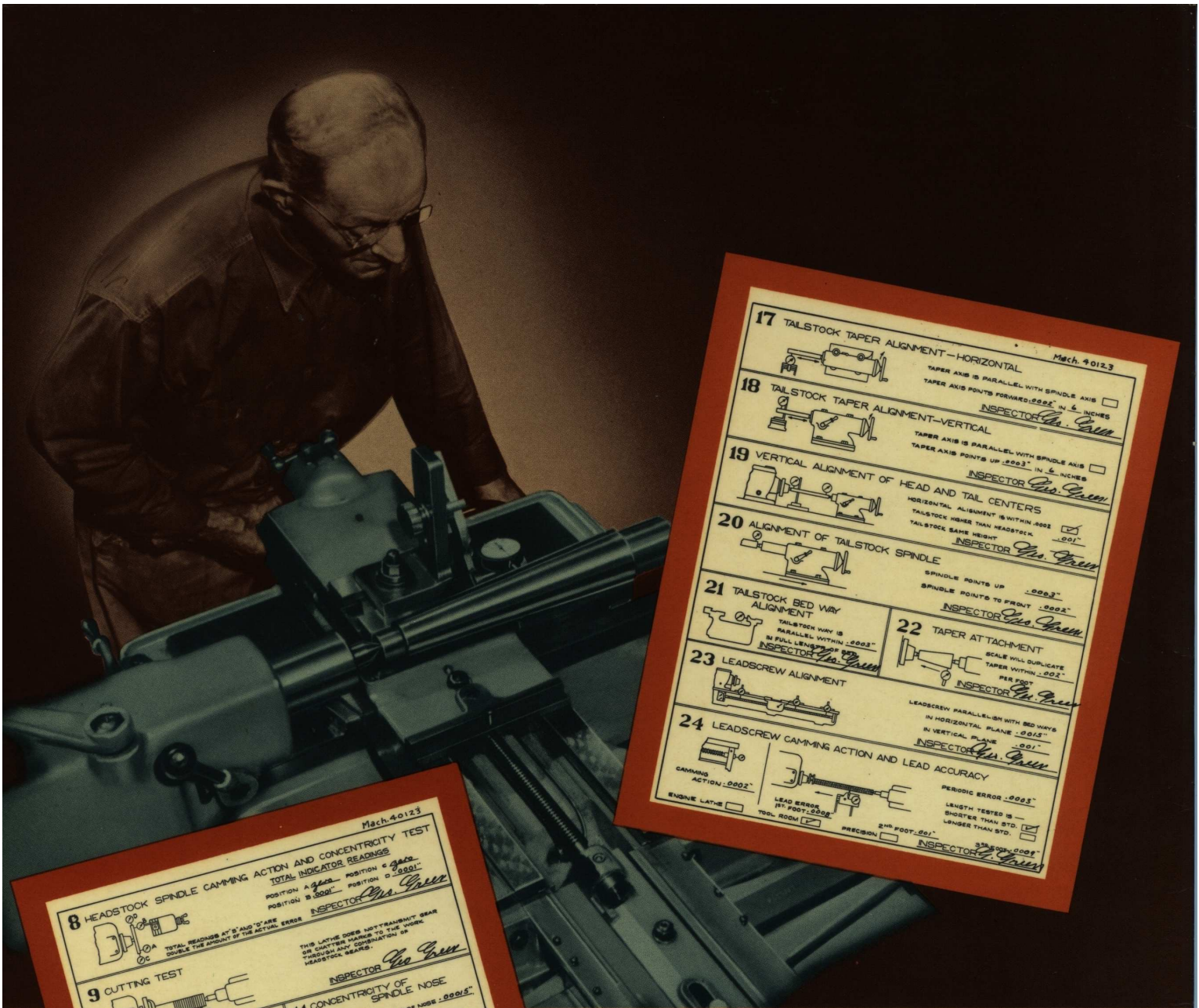
Even if you are unable to visit the plant, the facilities of the Demonstration Room are at your service. Send prints or parts for an unbiased estimate of the time savings possible with Lodge & Shipley Lathes.



60" T Lathe

Model X Copymatic





Mech. 40123

8 HEADSTOCK SPINDLE CAMMING ACTION AND CONCENTRICITY TEST
TOTAL INDICATOR READINGS
POSITION A .0002" POSITION B .0001"
POSITION C .0002" POSITION D .0001"
INSPECTOR *Geo. Green*

9 CUTTING TEST
THIS LATHE DOES NOT TRANSMIT GEAR OR CHITTER VIBRATION TO THE WORK THROUGH ANY COMBINATION OF HEADSTOCK GEARS.
INSPECTOR *Geo. Green*

10 CONCENTRICITY OF TAPER HOLE
JUG SET A-HOLE .0004" B-HOLE .0001"
INSPECTOR *Geo. Green*

11 CONCENTRICITY OF SPINDLE NOSE
RUN OUT OF NOSE .00015"
INSPECTOR *Geo. Green*

12 HEADSTOCK ALIGNMENT—HORIZONTAL
CHECK THE FOLLOWING
MACHINE IS LEVEL ☒ HEAD AXIS PARALLEL ☒
HEAD POINTS TO FRONT ☒
RUN-OUT DIVIDED ☒
INSPECTOR *Geo. Green*

13 SET TAPER ATTACHMENT STRAIGHT—VERTICAL
CHECK IF NOT REQUIRED ☐
CHECK THE FOLLOWING
BED IS STRAIGHT ☒ HEAD AXIS PARALLEL ☒
BED OUT DIVIDED ☒ HEAD POINTS UP ☒
INSPECTOR *Geo. Green*

14 HEADSTOCK ALIGNMENT—HORIZONTAL
CHECK THE FOLLOWING
SLIDE SET PARALLEL IN HORIZONTAL PLANE ☒
SLIDE ADJUSTED ☒
INSPECTOR *Geo. Green*

15 TOP SLIDE ALIGNMENT
SLIDE SET PARALLEL IN HORIZONTAL PLANE ☒
SLIDE ADJUSTED ☒
INSPECTOR *Geo. Green*

16 CONCENTRICITY OF HEAD AND TAIL CENTERS
HEADSTOCK CENTER .0002"
TAILSTOCK CENTER .0003"
INSPECTOR *Geo. Green*

Mech. 40123

17 TAILSTOCK TAPER ALIGNMENT—HORIZONTAL
TAPER AXIS IS PARALLEL WITH SPINDLE AXIS ☐
TAPER AXIS POINTS FORWARD .0002" IN 6 INCHES
INSPECTOR *Geo. Green*

18 TAILSTOCK TAPER ALIGNMENT—VERTICAL
TAPER AXIS IS PARALLEL WITH SPINDLE AXIS ☐
TAPER AXIS POINTS UP .0003" IN 6 INCHES
INSPECTOR *Geo. Green*

19 VERTICAL ALIGNMENT OF HEAD AND TAIL CENTERS
HORIZONTAL ALIGNMENT IS WITHIN .002" ☒
TAILSTOCK HIGHER THAN HEADSTOCK ☒
TAILSTOCK SAME HEIGHT ☒
INSPECTOR *Geo. Green*

20 ALIGNMENT OF TAILSTOCK SPINDLE
SPINDLE POINTS UP ☒ .0002"
SPINDLE POINTS TO FRONT ☒ .0002"
INSPECTOR *Geo. Green*

21 TAILSTOCK BED WAY ALIGNMENT
TAILSTOCK WAY IS PARALLEL WITHIN .0003" IN FULL LENGTH
INSPECTOR *Geo. Green*

22 TAPER ATTACHMENT
SCALE WILL DUPLICATE TAPER WITHIN .002" PER FOOT
INSPECTOR *Geo. Green*

23 LEADSCREW ALIGNMENT
LEADSCREW PARALLEL—OR WITH BED WAYS IN HORIZONTAL PLANE .0015" IN VERTICAL PLANE .001"
INSPECTOR *Geo. Green*

24 LEADSCREW CAMMING ACTION AND LEAD ACCURACY
CAMMING ACTION .0002"
ENGINE LATHE ☐ TOOL ROOM ☒ PERIODIC ERROR .0003"
LEAD ERROR 1ST FOOT .0002" 2ND FOOT .001"
LENGTH TESTED IS SHORTER THAN STD. ☒ LONGER THAN STD. ☒
INSPECTOR *Geo. Green*

FINAL INSPECTION

These charts show some of the exhaustive tests each Model X lathe must pass after it is built and before it is shipped. Nothing is left to chance in the hope that prior inspection during assembly will result in producing a precision tool.

When the lathe reaches the final inspection station it must be as nearly perfect as mechanical and human ingenuity can make it. The inspector must go through each step on the charts, record his readings, and unless they are within our established high standards reject the machine.

It is in this way that the Lodge & Shipley reputation has been built and fostered and each lathe shipped must enhance this reputation.

THE LODGE & SHIPLEY COMPANY
Cincinnati 25, Ohio



PRECISION BUILT IN FOLLOWING SIZES AND TYPES:

AS ENGINE AND MANUFACTURING LATHES

14" Heavy
16" Heavy
20" Standard
25" Standard
25" Heavy

32" Standard

AS TOOLMAKER LATHES

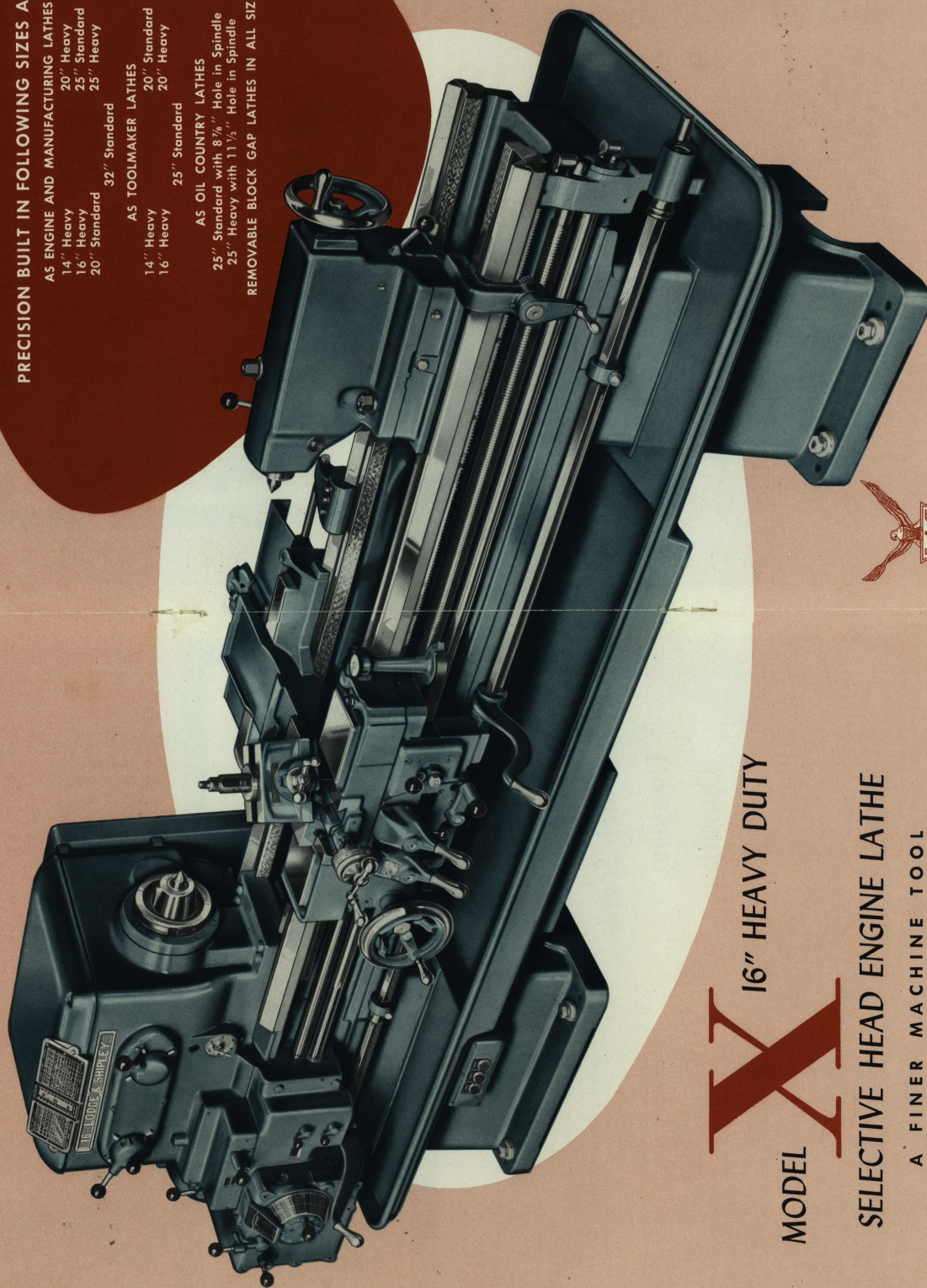
14" Heavy
16" Heavy
20" Standard
20" Heavy

25" Standard

AS OIL COUNTRY LATHES

25" Standard with 8 1/2" Hole in Spindle
25" Heavy with 1 1/2" Hole in Spindle

REMOVABLE BLOCK GAP LATHES IN ALL SIZES



MODEL X 16" HEAVY DUTY
SELECTIVE HEAD ENGINE LATHE
A FINER MACHINE TOOL

