

(LATHES) (11)

1936



Model "B" Lathes  
13"-16"-20"

**LATHES**

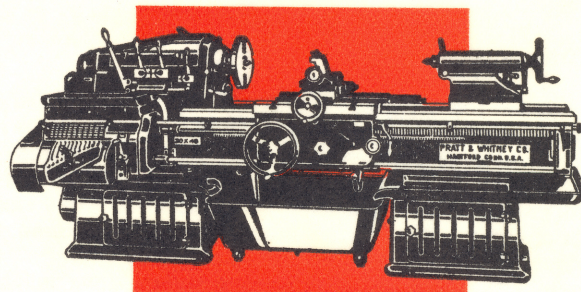
**PRATT & WHITNEY**  
HARTFORD, CONN.

DRAWER 11



# THE STANDARD BY WHICH ALL FINE LATHES ARE JUDGED

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1936.

# MODEL "B" LATHES

FOR PRECISION OR PRODUCTION

*Industry has used Pratt & Whitney lathes for seventy years. During all that time Pratt & Whitney engineers have watched the ever changing problems of cutting metal and have developed P&W machine tools to meet those problems. Model "B" Lathes are the culmination of seventy years of intimate Pratt & Whitney contact with lathe requirements. They represent all that is known of the machine tool builder's art assembled into the finest modern lathe we know how to build.*



PRATT & WHITNEY COMPANY  
HARTFORD, CONNECTICUT, U. S. A.





## EXECUTIVES

**I**N quiet offices in the skyscrapers of huge cities keen eyed men sit behind polished desks and direct the finances of great enterprises. Theirs is the gift to see broadly and to judge the finished product rather than its details. Their business is to see that a good profit results from every investment.

Such men know Model B Lathes — not as the mechanic does — but as a dollar building investment. Shrewd eyes scan neat columns of figures and cull the true story of Model B Lathe economy. Lessened production costs, slashed repair bills, speedier schedules and finer workmanship are all part of that story. The executive recognizes a sound investment. Model B Lathes have become his criterion whenever lathes are under discussion. He knows their worth.

The story of the balance sheet has never failed to show that Model B Lathes produce black figures. That is one of the reasons why they are specified as standard equipment when new shops are planned.



## OWNERS

**T**HERE is a real thrill in owning the best of anything. The man whose possessions are unquestionably of the best is in an enviable position indeed. Mixed with his honest "pride of ownership" is the feeling that his judgment is respected as sound by his fellow men. Others come for his opinion and follow his leadership.

# WHEREVER FINE LATHES ARE DISCUSSED THE MODEL "B" LATHE IS THE STANDARD BY WHICH ALL COMPARISONS ARE MADE



## ENGINEERS

**H**AVE you ever listened to a group of engineers discuss the design of a machine tool? Give them a chance to take it apart and they never miss a point. Model B Lathes have been examined that way time and time again by engineers whose business it was to report their findings to prospective purchasers.

Such a searching inspection has never failed to reveal the real quality and perfection of detail that lies under the paint of a Model B Lathe. Every part is finished to the closest limits, heat treated till it is tough and long wearing. The lathe functions with that smooth, silent action that indicates so much to the man who knows. Engineers have pronounced every detail of the Model B Lathe to be the best in design, workmanship, material and heat treatment that modern machine ingenuity can conceive.

Ask any engineer or designer of machines what he thinks of Model B Lathes. You will find him using them as the standard by which all others are judged.

Such is the position of the owners of Model B Lathes. Their equipment is the best and in that knowledge they are secure. They have purchased wisely and are realizing good returns.

Ask such an owner to take you through his shop and see for yourself the pride with which he will show you his lathes. He is more voluble than a salesman in describing every little



## MECHANICS

**G**IVE your mechanic — one who has used lathes all his life — the chance to get acquainted with a Model B Lathe. If he's a good man he'll feel it out little by little. Perhaps its quietness and smoothness will startle him when the first cut takes hold. Watch him increase the feed little by little, and see his slow grin when the cut becomes double what he expected without a quiver from the lathe.

Ask him what he thinks of it. He'll tell you that the lathe was "made to fit his own particular reach". That's a peculiar thing about the Model B Lathe — any number of machinists of all sizes find the handwheels and control levers right where they want them every time. They like the way the levers are interlocked. They appreciate the direct reading index plates that have eliminated bothersome gear tables. They can depend on the un-failing precision of the dials.

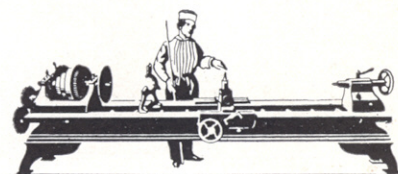
Mechanics in the shops of the world are asking of other lathes "is it as good as the Model B?"

point of superiority. He dwells lovingly on the smooth precision that has become a byword in his plant as a result of those machines.

Owners of Model B Lathes are their best boosters. Once acquainted with the sterling quality and dependability of Model B Lathes no shop owner feels that he can afford to install anything else in his shop.



# THE LATHE IS MAN'S MOST IMPORTANT MACHINE TOOL. HE STRIVES CONSTANTLY TO IMPROVE IT



*A Lathe of 1860  
The Year Pratt & Whitney was Founded*

**I**T would be difficult to imagine industry without a lathe. Since man began to cut metal there have been lathes of one sort or another — turned by hand or by foot treadle, by treadmill, waterpower, steam, and by every other means that ever has been developed for mechanical power. The lathe always has been and always will be man's most important machine tool.

The old lathes were ingenious. The brains and hands that made them could not copy — they had to create. There was no precedent to follow — nothing but the knowledge of a need to be filled, a problem to solve. As industry developed, its needs changed. Higher speeds, better steels, stronger iron, new ideas and better methods supplanted the old, year after year. And lathes have changed to meet those changing conditions.

Pratt & Whitney have had much to do with lathes. Our contributions during seventy odd years have been many, but the greatest of all has been accuracy. As in every other P & W product, Pratt & Whitney lathes always have been built to the finest precision standards. As new ways to cut metal more accurately have been discovered, we have incorporated those ways, and made our machine tools to closer and closer standards.

Lathes used to have many moving parts exposed, and frequently the operator's clothes caught and drew him into the moving machine to be maimed for life. Now there is very little that moves left outside. Modern lathes as exemplified by the Model B are safely covered and guarded.

Cone head lathes driven by belt used to be the only kind built. They had several advantages at that time in smooth operation, although the belt could not transmit enough power for heavy cuts. But belt driven lathes continued in vogue until we learned

how to make precision gears that would not chatter, and which ran quietly. With these the geared head lathe has come into its own, and its advantages of full power and simple control are obvious.

Combined with the individual motor drive this modern type of lathe is supplanting all others. Forests of belts have disappeared, and one lathe replaces two of the old ones. Lathe users who know true economy have discovered that the modern lathe is able to supplant machines only a few years old and pay for itself several times over.

Pratt & Whitney Model B Lathes are modern — built to meet the lathe needs of today and tomorrow. They are strong to take the heavier cuts needed, and gear driven to waste no power. They are accurate as modern methods demand, and they retain their accuracy. That means plenty of metal, broad wearing surfaces, proper heat treatment, with the finest of craftsmanship thruout. Model B Lathes are built to stand heavy production work as well as fine toolroom precision.

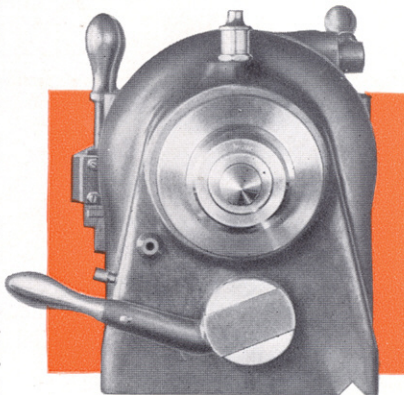
There are three sizes of Pratt & Whitney Model B Lathes — 13", 16" and 20", and each size is available in

several nominal lengths of bed. We have standardized on these three swings. On pages 5, 6 and 7 of this book these three sizes and the different lengths of bed are described in detail.

No discussion of modern lathes is complete without a word about convenience. Pratt & Whitney engineers have studied this subject carefully for years. They have done this in conjunction with actual users of lathes who have had wide experience. The result has been that every lever on a Model B Lathe is where the hand finds it naturally. There is no excessive reaching or bending. But even more important than the mere placing of levers are the many conveniences built into the lathe. There is the quick withdrawing attachment that has halved the work and doubled the speed of thread cutting. The thread chasing dial does away with engaging the lead screw nut at the wrong point, and in addition provides for cutting certain multiple starts. There are many such features in Model B Lathes. Every one has been designed to make the operator's task easier, and at the same time maintain a high standard of accuracy in the work he turns out.

This book describes Model B Lathes and their various attachments in detail. As completely as space permits we have brought you our lathes in picture. But no picture can show you as much as actually seeing the lathe "in metal" first hand. We urge you to visit a nearby installation or come to our factory at Hartford. Then you can appreciate best the true quality of the Pratt & Whitney Model B Lathe.

We would like to show you our lathe assembly floor, and the rigid rules of precision that are practiced there. You can examine every piece that goes into a lathe, and see the quality that exists whether the piece shows or not. Come to Hartford and see for yourself.





# THE CHIPS A LATHE CAN CUT SUCCESSFULLY ARE THE TRUE INDICATIONS OF ITS RIGIDITY, ACCURACY AND STAMINA



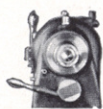
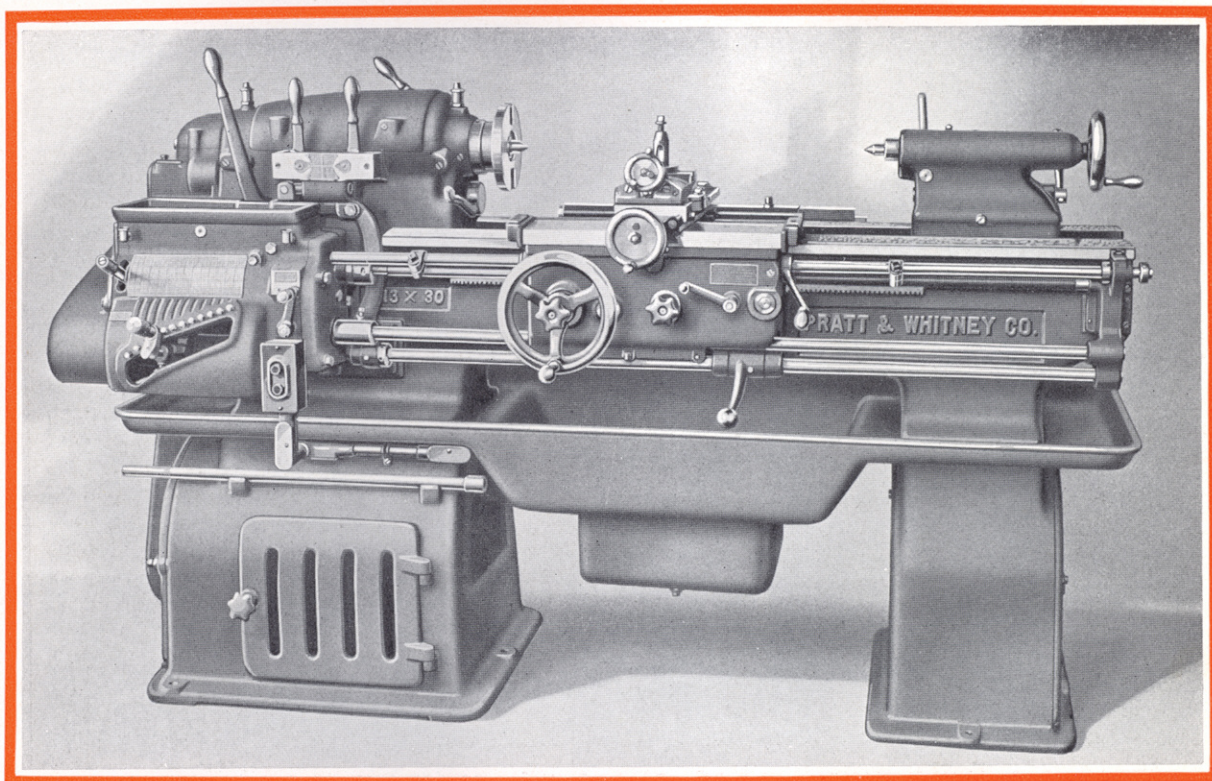
**H**ERE are three chips, widely different, yet all cut on the same Model B Lathe. At the left is a piece of "lace chip", two inches wide and more than 200 feet of unbroken length. A two inch face tool was set at an acute angle, and the finest feed used. The actual computed thickness of this chip is only .00014", *but it did not break!*

Above is one continuous ribbon chip, four inches wide, about one thousandth thick, and 496 feet long. A four inch solid tool was used, set at about 30° with the centers. Similar long chips six inches wide have been cut successfully on Model B Lathes.

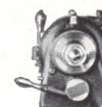
To the right is a typical heavy steel chip picked up at random during a hogging demonstration. On test we have increased the cut on every size of Model B Lathe until the motor stalled, and the lathe has not been injured.







## 13-INCH MODEL "B" LATHE



**I**LLUSTRATED above is the 13-inch Model B Lathe with a nominal center capacity of 30 inches. Below is the same lathe with the center capacity increased to 48 inches. These two sizes are standard and are carried in stock. The 13-inch lathe is designed with a built-in steel chip pan.

This lathe, the smallest of the Model B line, is a high class commercial lathe capable of doing fine toolroom precision work, and at the same time having the necessary strength and power to render the complete lathe service which every lathe user has a right to expect. Hundreds of these small lathes are being used in a wide variety of shops and industries. There is an installation nearby which we will be glad to show you at any time.

Cuts have been taken on this small machine that would tax the strength and rigidity of a much larger lathe, and yet it was not injured in any way. In addition the 13-inch lathe has the speed and precision necessary to handle very small jobs.

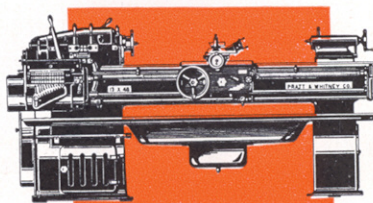
Specifications are on Page 16

This small lathe occupies very little floor space, which is a distinct advantage in manufacturing shops, yet it is powerful enough to do work which might otherwise have to be put on a larger machine. A battery of 13-inch Model B Lathes occupies a surprisingly small space.

Detailed specifications of the 13-inch Model B Lathe are listed on Page 16. These include complete capacity specifications, motor drive data, speeds, feeds, etc. On Page 17 is a list of the many attachments available for these lathes.

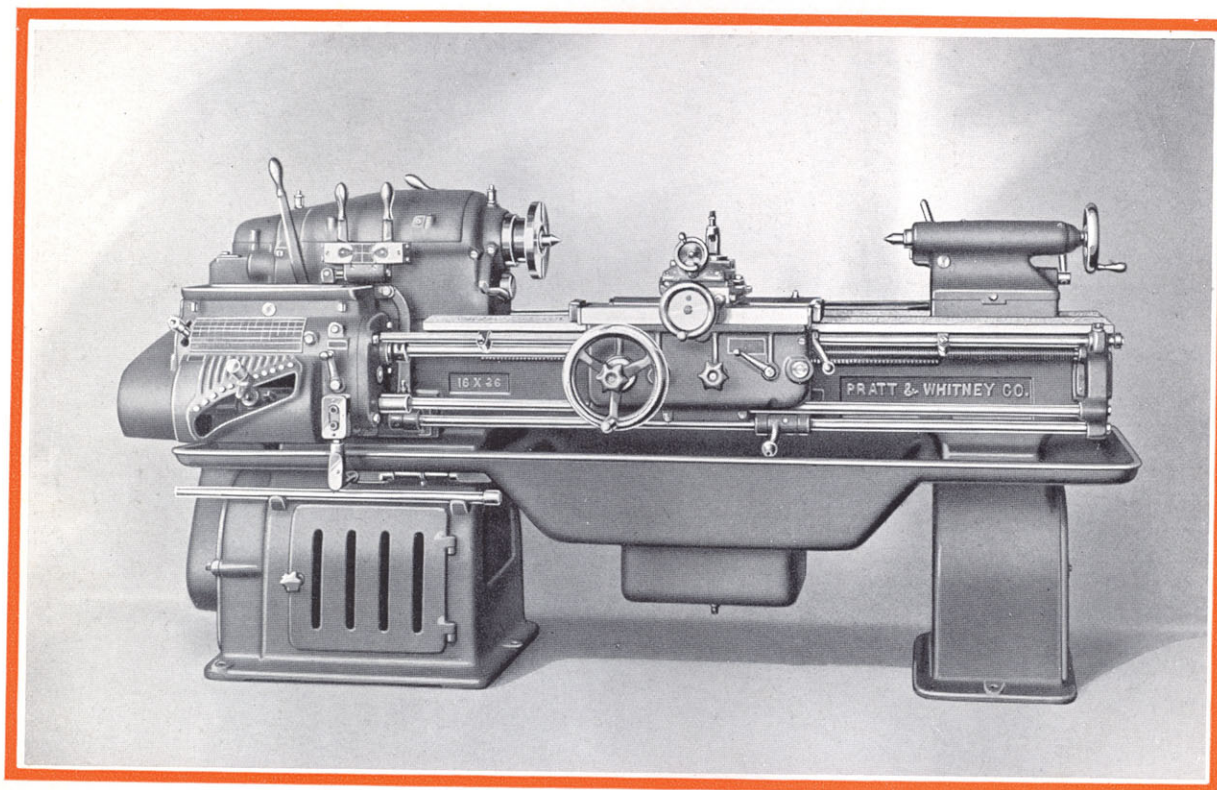
Model B Lathes are finished in the National Machine Tool Builders' Association standard gray. Other colors may be applied to order.

All Model B Lathes are available with either motor drive or single pulley belt as described on Page 8. A belt driven lathe may be changed to motor drive easily at any time by adding the necessary platform to mount the motor inside the cabinet leg under the headstock and placing the electrical controls in the other leg.



*The 13" x 48" Model B Lathe*



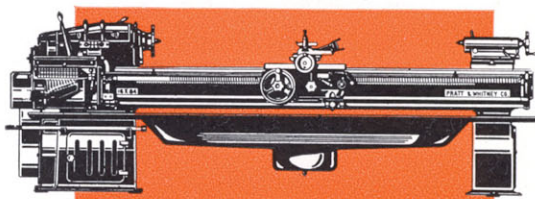


## 16-INCH MODEL "B" LATHE

**I**LLUSTRATED above is the P & W 16-inch Model B Lathe with a center capacity of 36 inches. Lathes with center distances of 60 inches and 84 inches also are standard, and all three lengths are carried in stock. These sizes also are illustrated on this page. Longer beds may be had to order.

This lathe is equally as accurate but is heavier and more powerful than the 13-inch machine. Consequently it will accommodate a wider range of work and take heavier cuts. Like the 13" lathe this machine is furnished with a built-in steel chip pan which is part of its regular equipment.

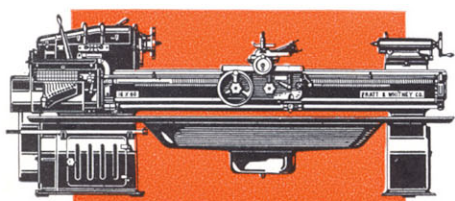
Model B Lathes are built as accurately as is practicable in the finest of commercial lathes. As



*The 16" x 84" Model B Lathe*

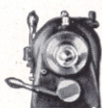
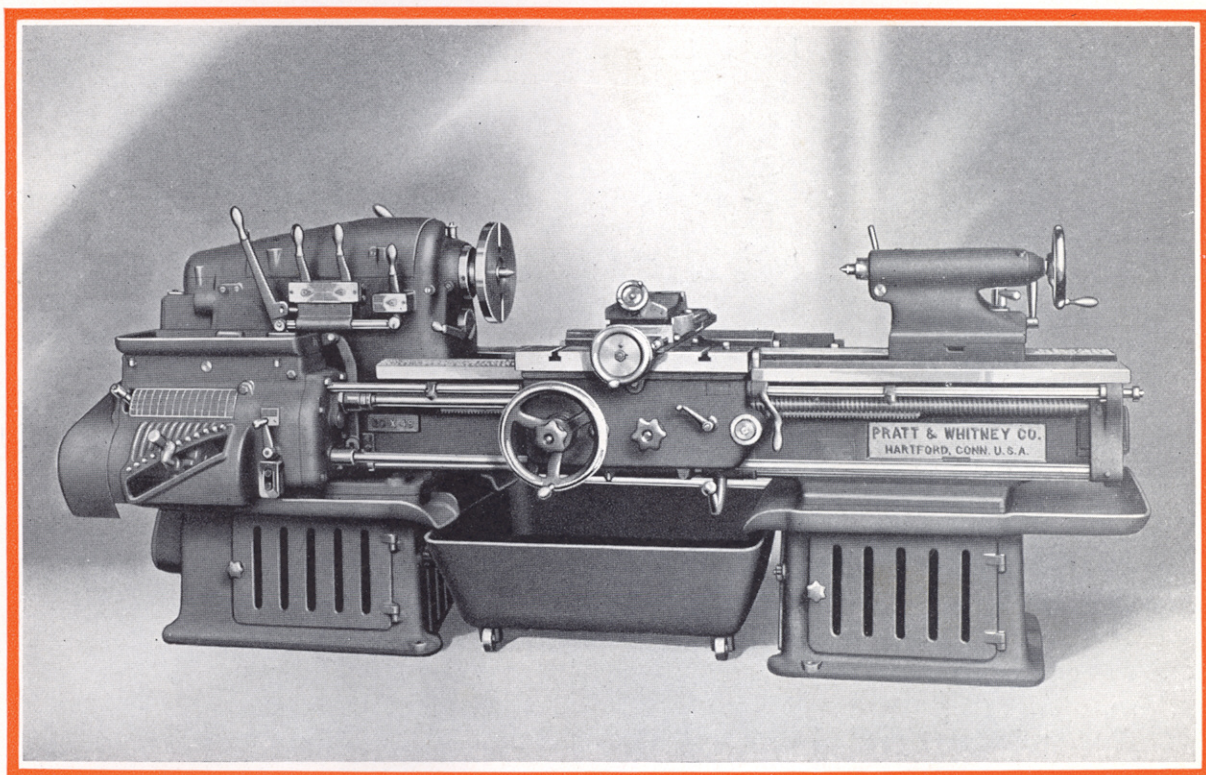
such they will do precision toolroom work to meet most requirements. For ultra precision work such as gage making, however, it is possible for us to supply Model B Lathes to order with special precision lead screws, etc. When a Model B Lathe is ordered for work requiring ultra precision, we advise customers to communicate with us beforehand, giving us complete details of what is expected. By telling us the nature of the work to be done, a customer enables us to render better and more complete service.

Complete specifications and attachments for the 16" Model B Lathe are listed on Pages 16 and 17, and the attachments are illustrated on Pages 18, 19 and 20.

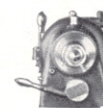


*The 16" x 60" Model B Lathe*



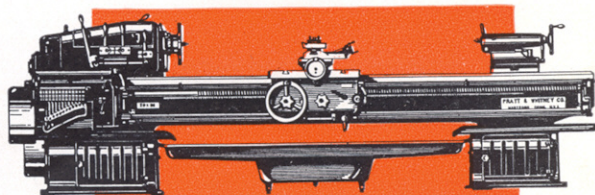


## 20-INCH MODEL "B" LATHE



**T**HIS is the largest and heaviest of the Model B Lathes. It is regularly carried in stock in center capacities of 48 inches (illustrated above), 72 inches and 96 inches. Longer beds may be had to order if desired. On Page 15 of this book there is illustrated a special 20-inch Model B Lathe having a center capacity of 120 inches. This lathe was built to order for a large publishing house.

Due to its increased size, the 20-inch lathe requires a separate chip pan which rests on rollers on the floor. This enables the pan to be moved easily from under the lathe for cleaning out chips.

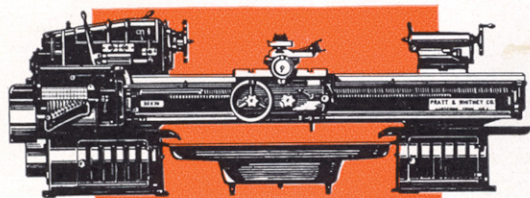


*The 20" x 96" Model B Lathe*

With this removable pan the motor and electrical equipment are easily accessible from under the bed if electrical repairs are necessary. This is a great convenience in shops where lathes are set end to end.

The spindle has sixteen speeds, and there is a suitable range of threads and feeds so that the larger work for which a 20-inch lathe is used can be accommodated most efficiently.

Complete specifications for the 20-inch Model B Lathe are listed on Page 16, and the list of attachments available is on Page 17. The latter include the relieving attachments which are illustrated and described on Page 19.



*The 20" x 72" Model B Lathe*

Specifications are on Page 16



# MODEL "B" LATHE CONSTRUCTION



It has required seventy years of experience in building precision machine tools to produce the excellence of craftsmanship that goes into all Model B Lathes.



**W**HEN you machine Pratt & Whitney castings the tool finds them hard and tough. We make them of semi-steel that is just machinable and no more. The result is a uniformly close, dense, homogeneous metal, that wears to a hard mirror surface and retains its accuracy. This sort of casting is far better than chilled iron or a casting equipped with steel inserts. The quality is all the way through.

The bed of a Model B Lathe is cast in box form as shown by the sectional view opposite. It is cast with very thick walls which, together with the heavy cross ribs, make it exceptionally rigid. When machined and scraped, one of these bed castings is a beautiful piece of work combining scientific structure with great strength and wear resisting qualities. And the same is true of all other castings thruout a Model B Lathe.

In designing Pratt & Whitney Model B Lathes, we have not only considered perfection of mechanical detail. These lathes have been made neat and trim in appearance, with smooth, clean, solid lines. A battery of Model B Lathes is a trim, efficient looking installation.

Each of the various units such as the headstock, tailstock and cross slides are designed generously with considerable solid metal which makes for rigidity and continued accuracy. All units are very carefully machined, scraped and fitted to close limits to insure exact alignment when mounted in position on the lathe bed.

## Constant Speed Drive

Pratt & Whitney Model B Lathes are available arranged either for motor drive or with a single pulley belt drive

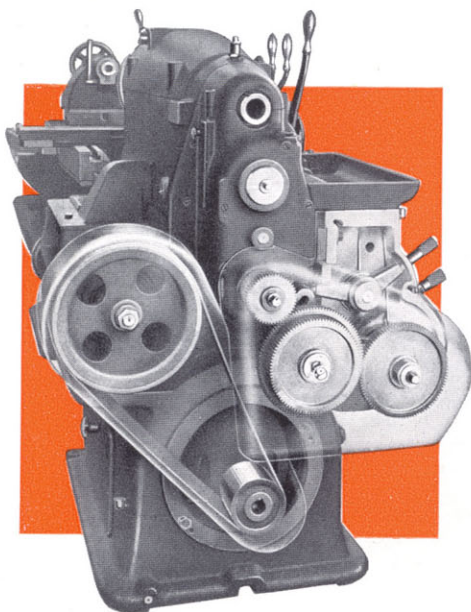


from a line shaft. A lathe equipped with motor drive is shown on this page, while the rear view opposite shows the same machine equipped for belt drive. In either case the same constant speed driving pulley is used. It is possible to change a lathe from belt to motor drive at any time merely by adding a few extra parts, together with the electrical equipment needed.

Regardless of the style of drive employed, power is delivered to the main driving pulley which is directly connected to a friction clutch which controls all power coming into the machine.

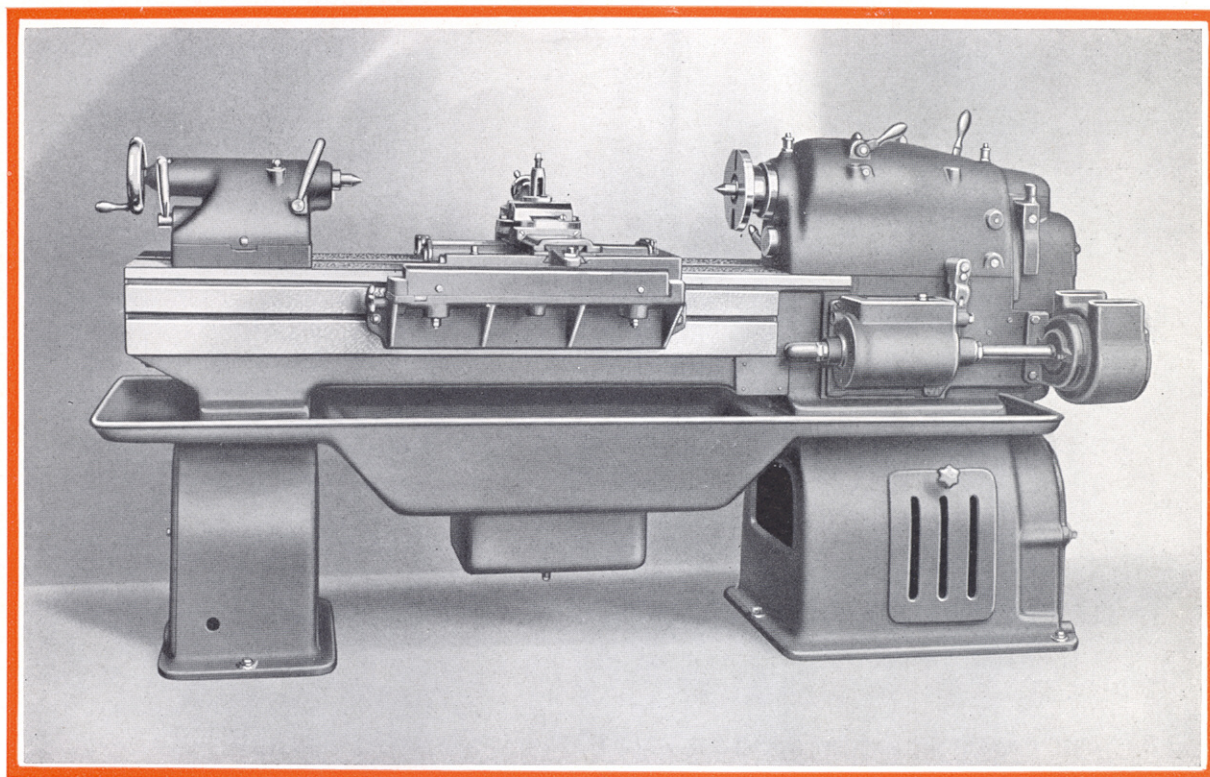
## Compact Motor Drive

The constant speed motor is mounted on a hinged platform in the cabinet leg beneath the headstock where it is protected from dirt and chips, and is well ventilated. It is easily accessible for oiling, and can be slid out entirely for servicing by removing the cover of the leg. All other electrical apparatus is housed in the opposite cabinet leg where it is protected but easily accessible. Push button control is used in conjunction with various protective relays which safeguard the motor and the machine. The push button is located on the gear box where the operator's left hand finds it easily. The various motor sizes and speeds are listed on page 17.



*The Model B Lathe motor drive arrangement accommodates either an A.C. or D.C. constant speed motor. It is housed in the cabinet leg as shown, while the electrical control apparatus is placed in the other leg. Push button control is used*





### All Lathe Beds Machined for Attachments

As shown above the rear of every lathe bed is machined and scraped to receive the taper attachment, collet rack, etc., while pads are machined, drilled and tapped for a coolant pump and for the relieving attachments. It is a simple matter to attach such extra equipment at any time after the lathe is installed.

### Built-in Steel Chip Pans

On the 13 and 16 inch sizes steel chip pans are built-in. These pans are made of pressed steel, and are much more durable and lighter than the ordinary cast iron pan. They are designed for easy removal of chips, and the bottom is arranged as an oil reservoir with the necessary screens for use when the lathe is equipped with pump and piping. The pan is arranged to catch oil dripping from all parts of the bed, and as a result the floor under a Model B Lathe is exceptionally dry. Every oil pan has a plug in the bottom for draining.

Due to its larger size, the 20-inch lathe has a separate oil and

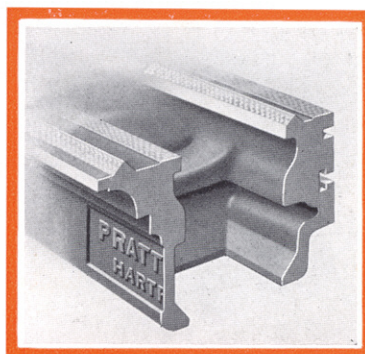
*A rear view of the 16 inch lathe arranged with belt drive from a line shaft. The taper attachment (additional equipment) is shown in place*

chip pan. This pan is mounted on casters and can be moved in and out easily from under the lathe for removing chips. This pan is illustrated on Page 7.

### Main Friction Clutch

The housing at the rear of the bed just below the headstock encloses the main friction clutch. This clutch is on the same shaft as the main driving pulley, and controls all power coming into the machine. It is operated by either of two levers, one on the headstock and one on the apron.

This clutch has three operating positions, power on, power off (neutral) and a third position which applies a friction brake for stopping the spindle quickly. Power from the clutch is carried to the spindle thru a train of gears, with these gears and the clutch itself running in oil at all times.

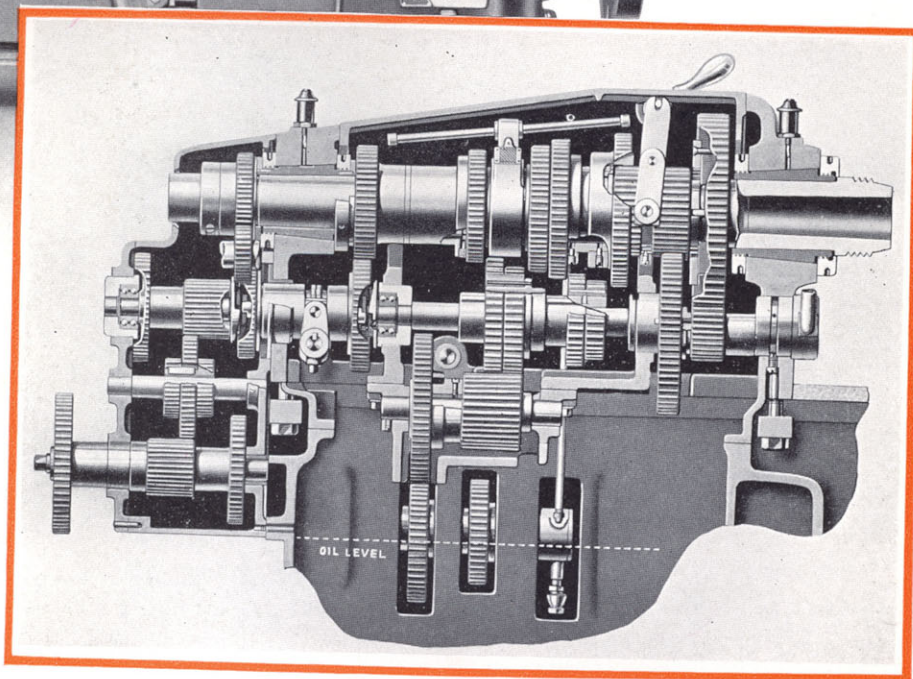


*Section thru the bed showing the heavy box form of construction*





The exterior of the 20 inch lathe headstock showing the convenient controls and the direct reading spindle speed plates



Section thru the 20 inch lathe headstock showing the gear train which produces 16 speeds, with back gears beneath the spindle. At the left is gear train leading to the gear box, including the three sets of ratio gears. Notice the oil pump which rains oil over the gearing

### The Model "B" Lathe Headstock

The headstock of a Model B Lathe is perhaps its most unique and certainly its most vital feature. It is symmetrical, with no overhanging parts, because the back gears are under the spindle. The sectional view above shows the interior construction with the all spur gear drive.

### Hardened and Ground Gears

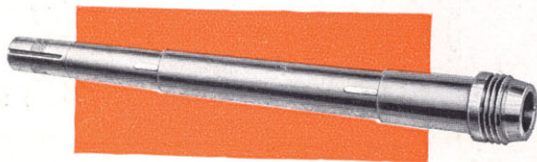
The gears in this headstock are made of chrome vanadium steel, heat treated for extreme toughness and durability. The teeth of the spindle gears are finished on generating grinders which produce accurate involutes and smooth surfaces. It is these gears with their almost perfect running qualities that have been largely responsible for much of this lathe's outstanding success.

### Convenient Headstock Controls

The spindle speed controls are placed so that it is possible to shift them with the greatest ease. The large lever to the left

controls the main friction clutch which starts and stops the entire lathe. There is also an apron lever connected to this clutch which performs the same function and is described later. The speeds are engaged by the twin headstock levers. As they are shifted a pointer indicates directly the spindle speed for which the lathe is set. There are no charts to misread with this visible system. An interlock prevents more than one set of spindle speed gears being engaged at a time, and it also is impossible to change the spindle speed until the main friction clutch has been disengaged.

The back gears are beneath the spindle and are engaged by the lever under the spindle nose. The small lever on top of the headstock controls the back gear clutch. This is a spur gear sliding in and out of an internal gear. With this



The hardened and ground spindle is made of selected steel. It is finished with extreme care by master craftsmen to provide the accuracy for which Model B Lathes are famous. The nose has straight, threaded and tapered sections for accurately seating chucks and face plates

Specifications are on Page 16



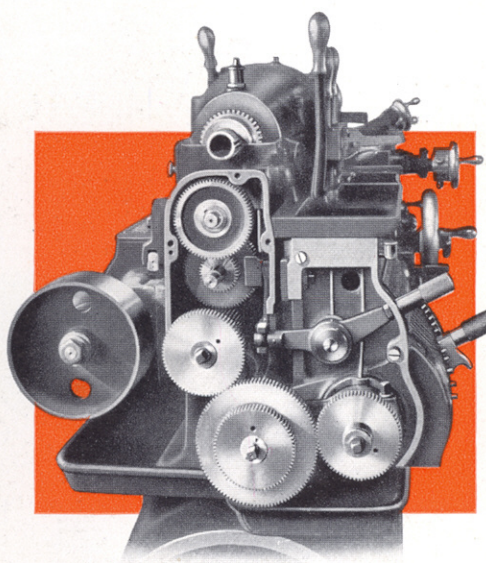
arrangement engagement is possible in as many positions as there are teeth in the gear.

### Spindle is Hardened and Ground

The spindle of a Model B Lathe is carefully hardened and ground. It is constructed heavily with large bearing surface running in adjustable bronze bearings. The spindle nose carries straight, threaded and conical surfaces for accurately seating face plates and chucks. The taper hole in the spindle also is hardened and ground.

### Single Tooth Clutches Transmit Power to Gear Box

Two single tooth clutches, one for forward and one for reverse carriage movement, transmit power from the spindle thru the ratio gears to the quick change gear box. There are no bevel gears in this drive. Large spur gears are used, mounted on ball bearings. The lever controlling



*End view with guards removed to show the ratio gears and change gears. The extra gear stored on the quadrant is for cutting 11½ threads per inch*

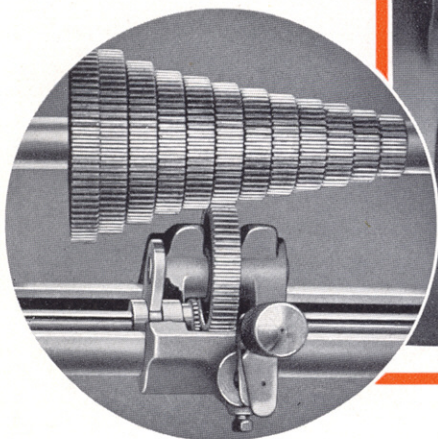
the clutches is mounted on the right side of the carriage.

### Quick Change Gear Box

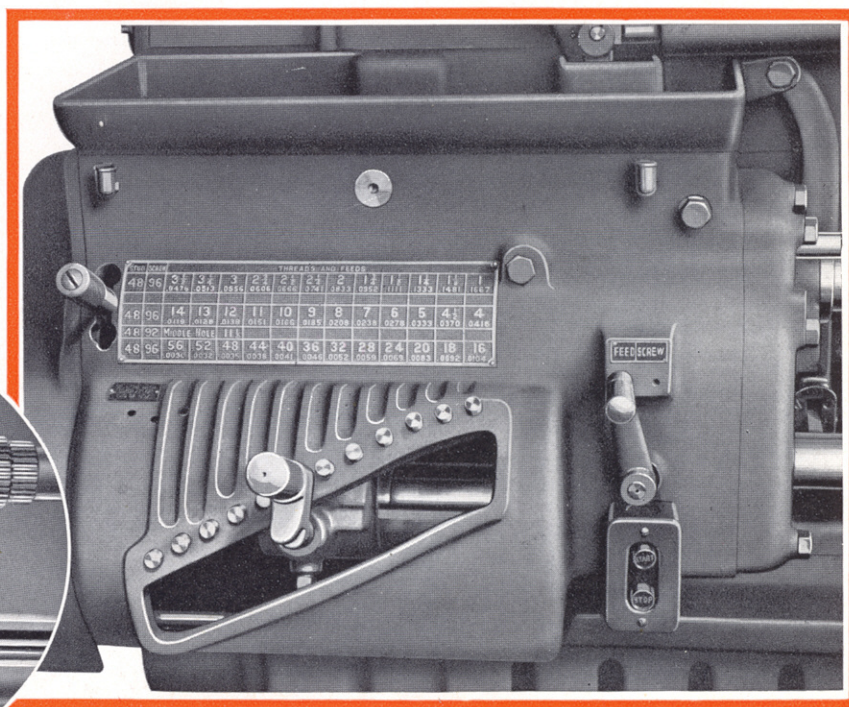
A direct reading index plate mounted on the gear box permits rapid setting and checking of threads or feeds without recourse to tables or charts. The reading is taken at the intersection of the horizontal and vertical lines through the positions of the ratio lever and quick change lever. In the illustration below, the lathe is set for a feed of .0185 inches.

The rocker gear is controlled by the quick change lever. This gear meshes with a pinion mounted on a shaft that takes its drive from the gear train. This mounting of the small gear which drives the rocker gear is worthy of note. The small gear runs inside a large, heavy, three-quarter sleeve of steel which in turn forms the mounting of the rocker gear and handle. It is a very rigid construction which insures a smooth

*Below is the feed gear cluster and rocker assembly in the gear box. This arrangement with the three-quarter steel sleeve for mounting both the rocker arm and driving gear provides the easiest operated hand shift possible. Operators like this quick change gear box because it is so simple and efficient*

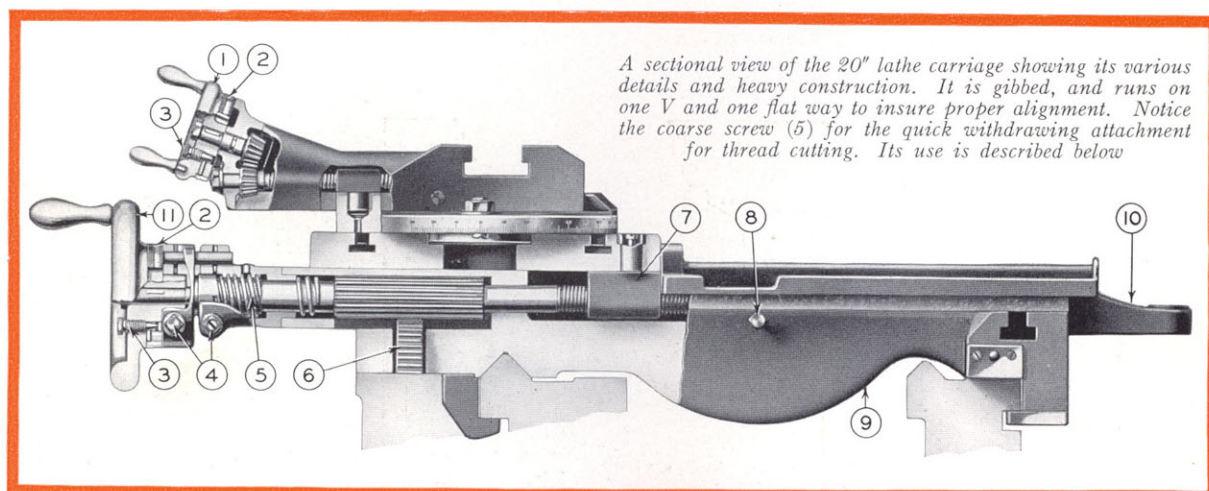


Specifications are on Page 16



*The quick change gear box with its direct reading index plate. Reading above and opposite the levers, it is set for a feed of .0185"*





*A sectional view of the 20" lathe carriage showing its various details and heavy construction. It is gibbed, and runs on one V and one flat way to insure proper alignment. Notice the coarse screw (5) for the quick withdrawing attachment for thread cutting. Its use is described below*

silent action of the lathe under power, combined with the easiest known hand shift on a lathe quick change gear box.

At the left end of the gear box is a removable guard which covers a quadrant and change gear arrangement. This is for change gears for special threads or for transposing gears when needed.

#### Separate Lead Screw and Feed Rod

In the right end of the gear box is a separate compartment containing the drive to the lead screw and feed rod. This drive permits either the one or the other to be engaged, but never both. It is controlled by a convenient lever shown below.

By having the lead screw and feed rod separate, all wear on the former is eliminated except during actual thread cutting. The lead screw does not even revolve except when actually in use, so that its accuracy is retained indefinitely. All ordinary cutting duty is taken by the splined feed rod.

#### The Model "B" Lathe Carriage

The Model B Lathe carriage is exceptionally free running. This is due to the high grade of workmanship put into it as well as the type of ways used which maintain alignment. You can slide a Model B Lathe carriage back and forth easily by hand without using the longitudinal handwheel.

The carriage is gibbed and runs on one V and one flat way to insure proper alignment in-

definitely. The deep bridge design makes for rigidity and accuracy under all conditions.

#### Many Special Features

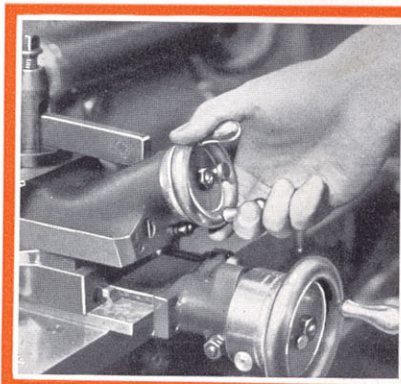
The keyed illustrations on these two pages show the many carriage and apron details which have made Model B Lathes so convenient and easy to use. Chief among these is the quick withdrawing attachment for thread cutting. The carriage is equipped with the regular cross feed screw, but by using the two binders (4) shown above, a coarse feed screw is substituted by means of which the threading tool can be jumped out of the thread with only a quarter turn of the cross feed handwheel. Experienced lathe operators have found this to be a great advantage. The compound rest screw and dial are used to advance the tool as necessary for each cut.

The thread chasing dial is another device that makes picking up a thread easy. This dial revolves with the lead screw, and suitable graduations indicate the proper points to engage the lead screw nut. This dial also may be used for cutting certain multiple threads. The thread chasing dial and the quick withdrawing attachment have become very popular with lathe operators.

#### Apron is Double Walled

The apron is of the double wall construction which makes for rigidity and provides ample support for the lead screw, stop

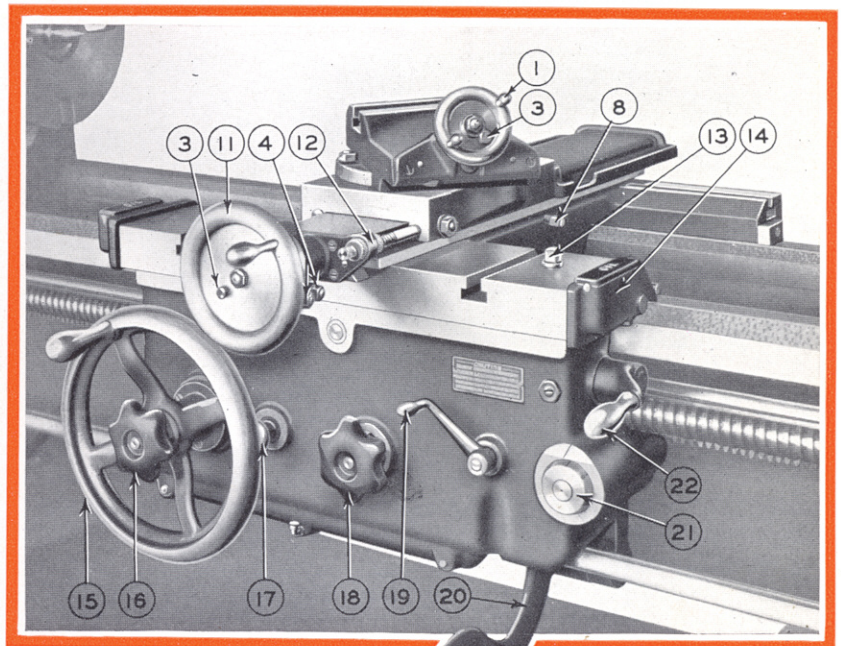
*No skinned knuckles when you use the compound rest handwheel. It is elevated to provide plenty of clearance*





## Key to illustrations on these two pages

- 1 Compound slide handwheel elevated at an angle for knuckle clearance over cross feed handwheel
- 2 Large micrometer dials plainly graduated to read directly to thousandths on diameter
- 3 Lock screws to hold micrometer dials in any position
- 4 Quick withdrawing attachment for thread cutting
- 5 Coarse feed screw for quick withdrawing of tool during thread cutting
- 6 Large, accurate spur gears deliver power for cross feed
- 7 Cross feed screw and nut
- 8 Taper slide binder
- 9 Deep "bridge" construction of carriage which insures rigidity
- 10 Connection for taper attachment
- 11 Cross feed handwheel. Can be locked in position by tightening both binders (4)
- 12 Conventional style threading stop
- 13 Carriage binder
- 14 Felt wipers and oilers on all slides keep these scraped surfaces clean and lubricated
- 15 Longitudinal handwheel for moving the carriage along the ways by hand
- 16 Longitudinal power feed knob. Tightening this knob engages the feed
- 17 Longitudinal handwheel release leaves large handwheel stationary while carriage moves under power
- 18 Cross power feed knob — tightening this knob engages the cross feed
- 19 Lead screw nut lever — shown in disengaged position
- 20 Apron control of the main drive permits engaging or disengaging power to the spindle at any position of the carriage
- 21 Built-in thread chasing dial facilitates finding start of thread, and makes possible cutting some multiple threads
- 22 Carriage feed reverse lever which operates the single tooth clutches in the headstock (see Page 10)



*The carriage and apron showing the bunched controls which make operation so easy*

*All apron bearings are oiled from one central reservoir*

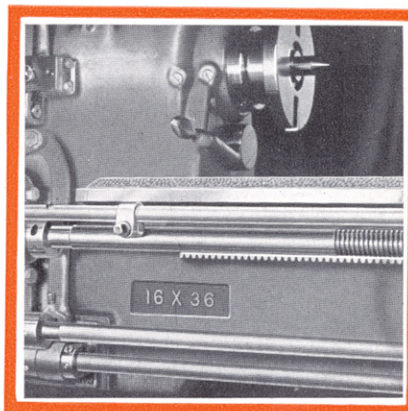
and reverse rod, etc. Again every consideration for the operator has been taken in placing all levers and controls within comfortable reach. This fact coupled with several distinctive Pratt & Whitney features help to make the Model B Lathe most simple to operate.

The apron, a rear view of which appears on page 14, contains an all spur gear drive to the rack pinion and the cross feed screw. No bevel gears are used. Ball bearings keep the drive smooth and quiet.

The illustration above shows the various controls as they are grouped on the front of the apron. The control rod (20) operates the main friction clutch from any position of the carriage. This is a great convenience to operators, and saves many steps. An interlocking device prevents the half nuts from being engaged on the lead screw unless the longitudinal traverse friction is fully disengaged, or vice versa.

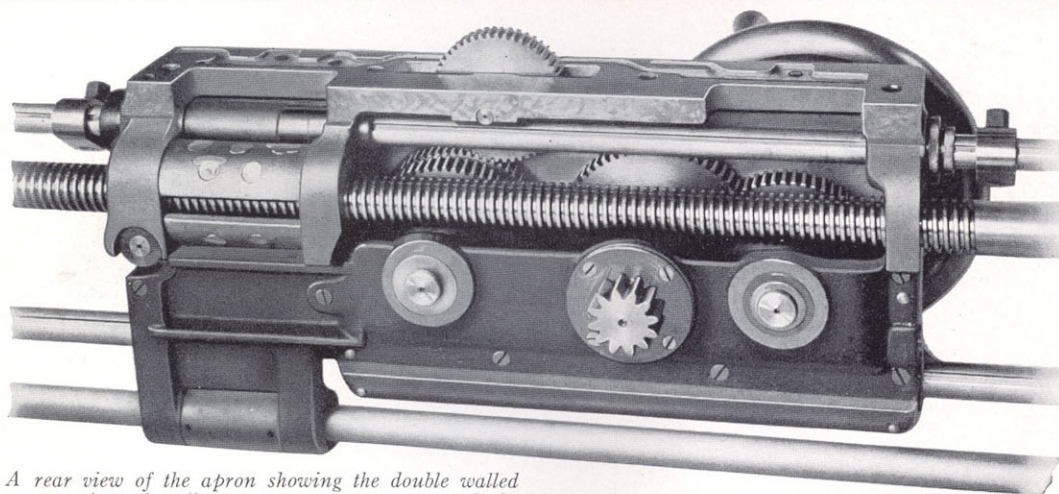
### Lead Screw Thrust Washers

The thrust washers which hold the lead screw in position are worthy of special mention. They are finished by the same lapping process as are P&W Hoke Precision Gage Blocks. This extreme accuracy is necessary to guard against any lead screw



*Four rods cross the front of a Model B Lathe. The upper one is the stop and reverse rod which carries the stop dogs. It is placed directly over and in front of the lead screw to protect the latter. The third one is the feed rod and the fourth is the apron control rod. The rack which traverses the carriage also shows in this picture*





*A rear view of the apron showing the double walled construction, the all spur gear arrangement and the oil distributing system on top*

camming action or drunken threads. Particular care is taken that the fine accuracy of the lead screw shall not be impaired in any way.

#### **Lead Screw is Specially Cut**

Model B Lathe lead screws are cut on special machines developed particularly for the purpose in our plant. Our experience in precision threading covers seventy years, and during that time we have developed a method of producing threads with consistently accurate results. P&W lead screws are well known for their accuracy.

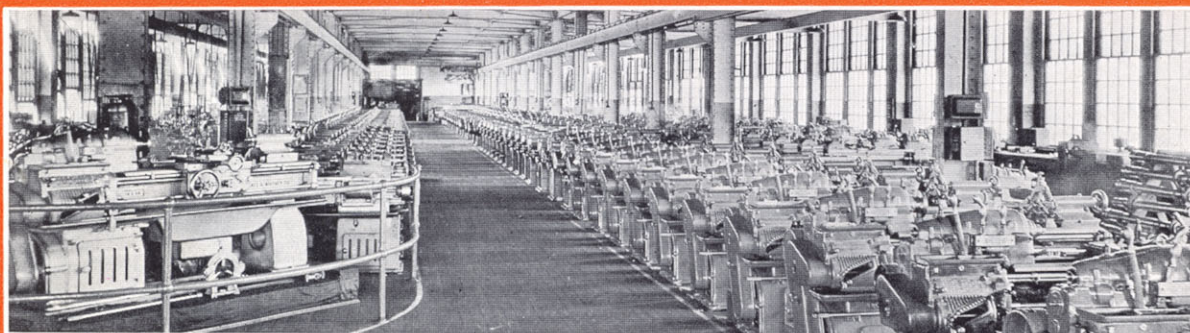
Every lead screw is checked carefully and an accurate record made of its characteristics. Here again our experience as precision gage makers is invaluable. We have the facilities and skilled craftsmen to check threads to limits far

finer than usual.

A Model B Lathe lead screw is of an order of accuracy sufficient for toolroom precision work. We can supply lathes equipped with ultra precision lead screws to order for special precision requirements such as gage making. In such cases customers should give us full particulars as to the exact nature of the work to be done.

#### **Footstock is Extra Heavy**

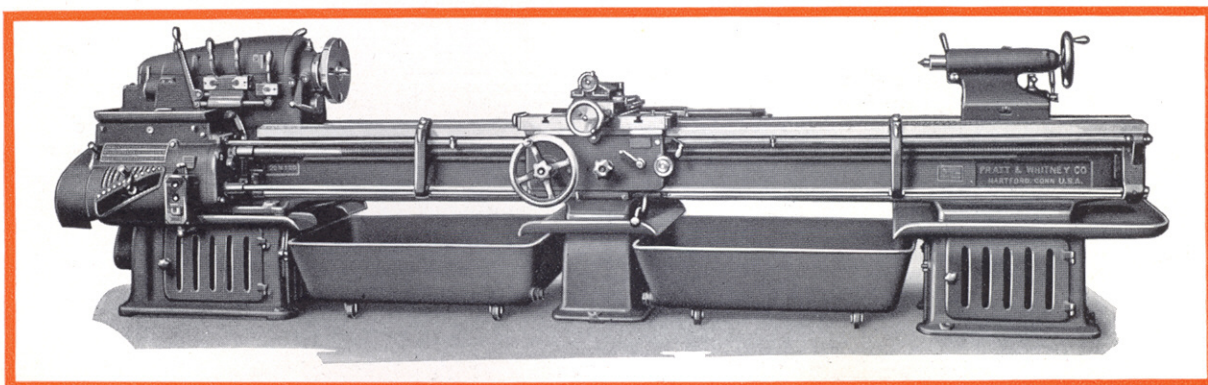
The footstock is mounted on separate ways from the carriage. The main casting is very heavy and is designed for extreme rigidity. The spindle is large, and is closely fitted. It is equipped with a tang slot, and its upper surface is graduated in sixteenths of an inch for drilling or boring to depth.



*The Model B Lathe assembly floor. There were over 150 lathes on the floor when this picture was taken. We would like to have you see how this floor always is kept "at attention". We are proud of it. There is no better way to know Model B Lathe accuracy and quality than to*

*see it for yourself. Visit us at Hartford and let us show you the various stages of manufacture. It will be possible for you to operate a lathe yourself and know it first hand. Doing this, you will appreciate its many conveniences and ease of operation. You are cordially invited*





*One of the many extra length lathes we have built, 20" x 120". Note the lead screw and feed rod supports, center leg and double oil pan*

The spindle clamp is in the form of a long wedge which binds the spindle over a considerable part of its length rather than in one point. This exclusive P&W feature does away with the necessity of using a split footstock.

Heavy binders are provided for locking the footstock in position on the bed. The 20-inch lathe has two such binders and the other sizes have one. All footstocks have the conventional cross adjustment.

#### **Lubrication has been worked out in Great Detail**

The lubrication of a Model B Lathe has been developed to the point where it is almost fool proof. The entire spindle speed gear train including the main friction clutch is kept in a continuous rain of oil. A reservoir in the bottom of the headstock into which the clutch and lower gearing dip provides oil by the splash system. In addition a small pump inside the headstock (shown on page 10) lifts this same oil to the top where a spreader rains it down over the entire gear train and all its bearings. This splashing

shower of oil insures complete and positive lubrication. The reservoir is filled thru a plug on the clutch housing, and a glass gage shows the proper level.

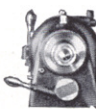
Two oil cups feed the main spindle bearings separately from the rest of the lathe. The oiling of these bearings has been worked out carefully so that a proper oil film is maintained without danger of breaking down. Scientifically designed oil grooves distribute the oil evenly to all parts of the bearings, while special seals keep the oil in and exclude dirt and grit.

Wherever possible centralized oiling has been used, and as a result there are comparatively few oil cups to be filled. For example the gear train which leads down to the gear box has its bearings oiled from one reservoir at the left end of the spindle. The entire gear box is oiled thru only two cups. The apron is lubricated from one reservoir filled in one place. Thruout the lathe lubrication is easy, positive, and thorough.

## **METRIC MODEL "B" LATHES**

**O**UR manufacturing and assembly departments are as well equipped to produce an accurate metric Model B Lathe as they are a standard English machine. Each and every lathe must come up to P&W standards before it is passed as satisfactory and worthy of the Pratt & Whitney name which is cast in the bed.

Metric lathes are exactly the same as the others except that the graduations on the various dials are in the metric system, and a metric lead screw is substituted (13 and 16-inch lathes have 6 m.m. lead screw — 20 inch lathe has 3 m.m. lead screw) together with extra change gears. With this equipment the 13 and 16 inch

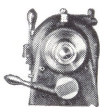


lathes will cut all standard metric leads from .3 m.m. to 16 m.m. inclusive, while the 20 inch lathe will cut all standard metric leads from .50 m.m. to 39 m.m. inclusive. In addition it is possible to cut a majority of the new French Navy Standard leads.

The appearance of the metric index plate on the gear box is similar to that of the English plate except that it does not read in order of magnitude.

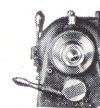
The same direct method of reading above and opposite the two selecting levers is used however.





# SPECIFICATIONS

## REGULAR EQUIPMENT



### Range.

Center distance, maximum	
Swing over bed	
Swing over carriage	
Steady rest capacity	
Follow rest capacity	
Tool post takes tool	

13 Inch
30", <del>38"</del> 48"
13 1/2"
7 3/4"
4 1/2"
2 1/4"
1/2" x 1"

16 Inch
39", <del>48"</del>
16 1/2"
9 5/8"
6"
3"
5/8" x 1 1/4"

20 Inch
48", <del>58"</del>
21 1/4"
12 1/4"
8"
3 1/2"
3/4" x 1 1/2"

### Headstock Spindle.

Special steel; bearings cylindrical	
Front bearing	
Rear bearing	
Boxes; bronze, taper outside, adjustable for wear	
Hole through spindle	
Taper hole in spindle	
Taper hole in center adapter	
Spindle thread	

27/16" x 3 15/16"
1 7/8" x 3 1/2"

27/8" x 4 3/4"
2 5/16" x 4"

3 3/4" x 5 3/8"
2 7/8" x 4 5/8"

1 5/16"
No. 13 Jarno
No. 3 Morse
3" diam.,
{ 3 1/2 P.I., U.S.S.

1 11/16"
No. 16 Jarno
No. 4 Morse
3 1/2" diam.,
3 1/4 P.I., U.S.S.

1 11/16"
No. 16 Jarno
No. 4 Morse
4 1/4" diam.,
2 7/8 P.I., U.S.S.

### Tailstock Spindle.

Diameter	
Maximum travel	
Taper hole	

1 3/4"
5 1/2"
{ No. 3 Morse with
Tang Slot
{ Graduated for
5" by sixteenths

2"
7"
No. 4 Morse with
Tang Slot
Graduated for
6" by sixteenths

2 1/2"
8"
No. 4 Morse with
Tang Slot
Graduated for
8" by sixteenths

### Spindle Speeds.

Low range, back gears in, (4), r.p.m.	
Low range, back gears out, (4), r.p.m.	
High range, back gears in, (4) r.p.m.	
High range, back gears out, (4), r.p.m.	
Ratio driving pulley to slowest spindle speed	
Ratio of high range to low range spindle speed	
Back gear ratio	
Driving pulley, speed, r.p.m.	
Driving pulley, dimensions	
Driving belt, width	

18 to 75
----------

13 to 60
----------

8 to 17
---------

126 to 525
33 1/3 to 1

110 to 525
45 to 1

62 to 134
23 to 50
177 to 383
75 to 1
2.86 to 1
7.7 to 1
600
12" x 4 1/2"
4"

### Feeds, with Quick Change Mechanism (36).

Carriage longitudinal, per rev. of spindle	
Carriage cross feeds, per rev. of spindle	
Micrometer dials graduated in half thousandths	

.0012" to .0665"
.0012" to .0665"

.0012" to .0665"
.0012" to .0665"

.0030" to .1667"
.0030" to .1667"

### Threading.

With quick change mechanism, 36 threads	
With translating gears (see additional equipment) all French and International standard pitches may be cut.	
13" Lathe lead screw 6 P.I., single Acme, 1 1/4" diam. R.H.	
20" Lathe lead screw 2 P.I., single Acme, 1 3/4" diam. R.H.	

1 1/2 to 80 pitch
-------------------

1 1/2 to 80 pitch
-------------------

1 to 56 pitch
---------------

### Floor Space.

Length	
Width in all cases (including taper attachment)	
Height	

7' 3 5/8", 8' 9 5/8"
----------------------

8' 8", 10' 8",
12' 8"
41 1/2"
50 1/2"

10' 5", 12' 5",
14' 5"
43 3/4"
54 1/4"

### Regular Equipment for all Three Sizes.

The lathe is regularly furnished with geared head, arranged for motor drive, with motor base, motor pulley, flat endless or multiple vee belt\*, belt guard, conduit and wiring; lead screw reverse mechanism with automatic stop in both directions of carriage travel; compound rest; quick withdrawing cross feed; steady rest; one large faceplate,

one small faceplate; oil pan; centers; knockout rod; set of wrenches.

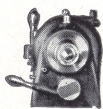
\*Multiple vee belt always is furnished for the 20" Lathe. Machine arranged with single pulley drive in place of motor drive furnished to order only.

*Weight of machine, reg. equipment, approx. net lbs.	
Crating material, (domestic) approx. lbs.	
Boxing material, (foreign) approx. lbs.	
Box, approx. cu. ft.	

13x30	13x48	16x36	16x60	16x84	20x48	20x72	20x96
2700	3100	3950	4250	4700	6200	6950	7600
750	800	900	1100	1350	1200	1400	1700
1100	1250	1400	1800	2100	2000	2300	2600
131	158	205	212	241	265	340	375

\*Weight includes Oil Pan and Motor Drive parts, without motor.

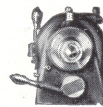




# SPECIFICATIONS

## ADDITIONAL EQUIPMENT

CARRIED IN STOCK — TO ORDER ONLY



### Motor Drive.

Either an A.C. or D.C. constant speed motor with push button control is recommended, the motor driving through a friction clutch running in oil. Our motor recommendations are as follows:

13" Lathe:	3	H.P.,	1200 r.p.m.
16" Lathe:	5	H.P.,	1200 r.p.m.
20" Lathe:	7½	H.P.,	1200 r.p.m. for A.C. and 1800 r.p.m. for D.C.

### Taper Attachment.

Will turn tapers up to 20° included angle (4" per ft.). Attachment is a new design and may be set from front of machine.

13" Lathe — will turn tapers 15" long in any position on the bed.

16" Lathe — will turn tapers 22" long in any position on the bed.

20" Lathe — will turn tapers 22" long in any position on the bed.

### Step Chuck and Closer Attachment.

Consists of:

Two-step chucks 7/8" to 3¼" capacity.

One-step chuck 7/8" to 6½" capacity.

One-step chuck 4½" capacity, with four adjustable jaws.

One closer for 4 jaw and 6½" capacity step chucks.

One closer for 3¼" capacity step chucks.

One spindle bushing for all step chucks.

\*One draw-in sleeve (same as furnished with collet attachment).

Chucks are steel blanks ready to be machined out to customer's requirements. Closers are of cast iron.

### Collet Rack.

For collets, expansion arbors and bushings.

### Micrometer Carriage Stop.

For accurately governing longitudinal carriage movement.

### Follow Rest.

To mount on carriage.

### Oversize Steady Rest.

Same design as rest furnished in regular equipment.

13" Lathe — capacity 6¾"

16" Lathe — capacity 9"

20" Lathe — capacity 12"

### Pump and Piping.

For cutting oils or compounds. Oil pan is part of regular equipment.

### Plain Tool Rest.

For 13" and 16" Lathes only. For use with standard tool post.

### Elevating Tool Rest, Plain.

Permits raising or lowering tool without change of setting. Indexes to four positions.

13" Lathe — tool space ½" x 1"

16" Lathe — tool space 5/8" x 1¼"

### Multiple Indexing Face Plate.

13" and 16" Lathes only. For cutting multiple threads.

### Carriage Spacing Attachment.

For greater accuracy in turning exact lengths, facing off, etc.

### Collet Attachment.

For 13" Lathe only. \*Consists of draw-in sleeve; collet adapter; 9 collets 3/8" to 7/8" by 16ths. Metric: 9 collets 8-9-10-12-14-16-18-20-22 m/m.

### Collet Attachment.

For 16" and 20" Lathes. \*Consists of draw-in sleeve; collet adapter; 15 collets 3/8" to 1¼" by 16ths. Metric: 15 collets 8-9-10-11-12-14-16-18-20-22-24-26-28-30-32 m/m.

### Collet Chucks

Spindle nose type. Maximum Capacity 1¼".

### Translating Gears, English to Metric or Metric to English.

Set of gears and charts in suitable cabinet.

### Expansion Arbors and Bushings.

Consists of 3 arbors and 17 bushings as follows:

One No. 1 Arbor with 4 bushings 3/4"-13/16"-7/8"-15/16".

One No. 2 Arbor with 8 bushings 1" to 1 1/16" by 16ths.

One No. 3 Arbor with 5 bushings 1 1/2" to 2" by 8ths.

\*One draw-in sleeve (same as furnished with collet attachment).

### Metric Bushings (17).

5 Bushings (for No. 1 Arbor) 19-20-22-24 and 26 m/m.

6 Bushings (for No. 2 Arbor) 28-30-32-34-36 and 38 m/m.

6 Bushings (for No. 3 Arbor) 40-42-44-46-48 and 50 m/m.

### Relieving Attachment.

*Radial Relieving.* — Furnished with cams and set of change gears giving all regular changes from 2 to 12 reliefs per revolution of spindle. (2 to 28 reliefs with Speed Reducer.)

Use of Speed Reducer recommended.

*Spiral Relieving.* — Additional gears required for extra numbers of reliefs and for helical teeth.

*Side Relieving.* — 13" and 16" Lathes only. A separate attachment which can be used in conjunction with the radial relieving attachment if desired.

### Chuck Plates.

Can be furnished fitted to spindle, ready to receive chucks according to customer's specifications.

### Drill Chucks.

For use in tailstock; furnished to customer's specifications.

### Speed Reducer.

A face plate which contains planetary gearing giving a 6 to 1 reduction of spindle speed is available. This attachment permits cutting very coarse pitches and is very useful for a variety of special work.

It can also be used as an indexing face plate. Ask for Circular No. 364.

Unless otherwise designated equipment is available for all three sizes of lathes.

The following pages contain brief descriptions of these attachments. Our engineering force always is available to work out special attachments to meet customer's requirements.

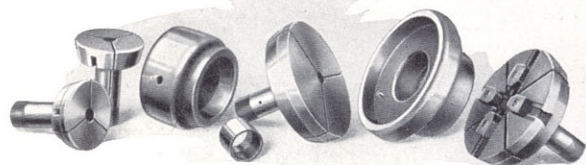
\*Same sleeve common to all such attachments.



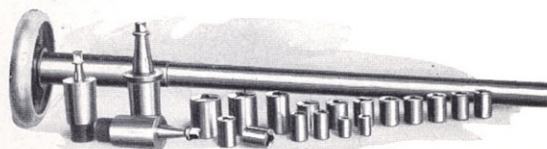


# MODEL "B" LATHE ADDITIONAL EQUIPMENT

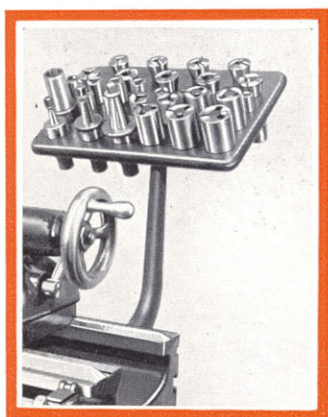
CARRIED IN STOCK — TO ORDER ONLY



*Step Chucks and Closers*



*Expansion Arbors and Bushings*



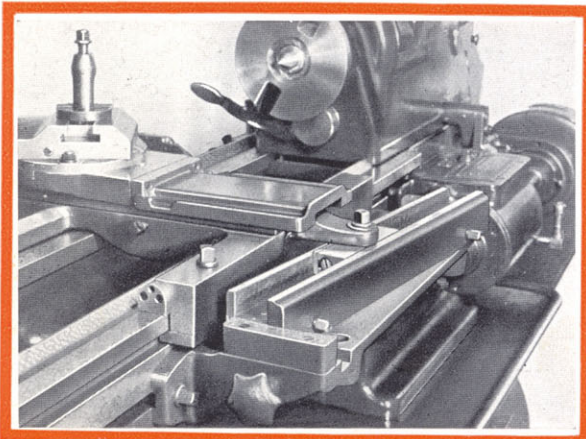
*Collet Rack*

## Collet Attachment

**T**HIS attachment consists of a draw-in sleeve with hand-wheel, hardened and ground collet adapter, and set of collets. Collets are of tool steel, and are available in English or Metric sizes. They are held to close limits to insure accuracy.

## Taper Attachment

**T**HIS attachment is bolted securely to the rear of the lathe bed. Setting of the attachment can be accomplished easily from the front of the lathe as the graduations are in plain sight on the taper attachment bracket. The right hand end of the bracket is graduated in degrees, while the left hand end shows inches per foot. The illustration below shows the taper attachment mounted in position. It is so rigid that tapers may be cut in either direction without the tool digging in.



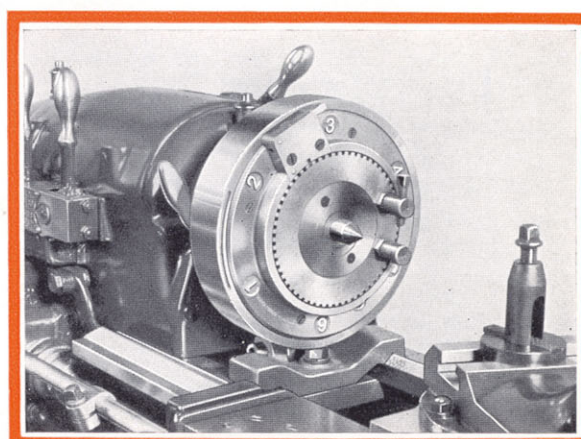
## Speed Reducer

**T**HE Speed Reducer, illustrated below, was developed originally for use in relieving operations of all kinds, this style of work requiring very slow spindle rotation to produce the best results. With this attachment speeds as low as two revolutions per minute are possible. Further uses of the Speed Reducer are precision thread chasing and the cutting of extremely long leads. These operations would be difficult and the final results questionable were it not for the 6 to 1 speed reduction obtainable by using this attachment.

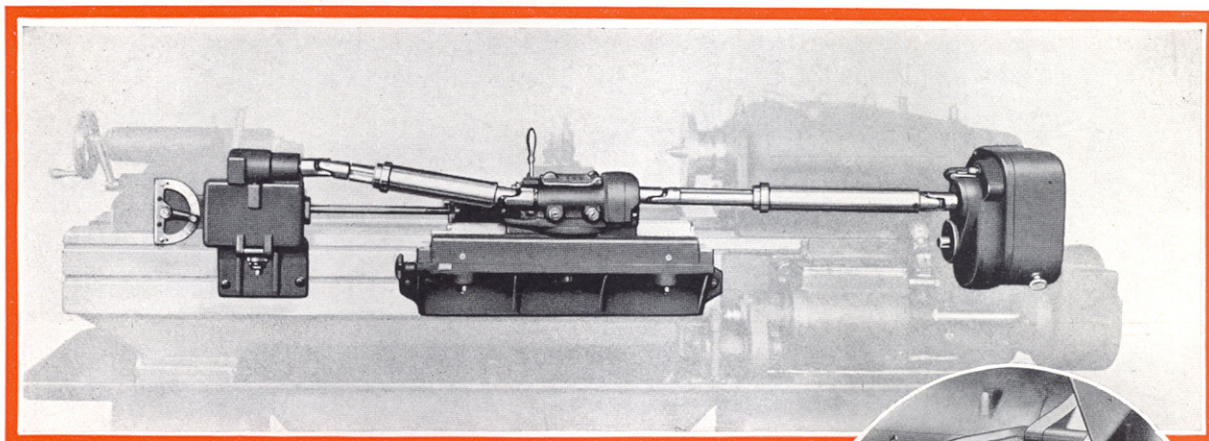
The high degree of accuracy in all P&W Lathes is not impaired by using the Speed Reducer, as it is designed for mounting on the spindle nose of the lathe. The lathe headstock center mounted in the spindle nose is used with this attachment. Thus the accuracy obtained when using the Speed Reducer is the accuracy of the lathe itself.

This attachment also acts as an indexing face plate. There are notches which make possible the cutting of multiple threads. Due to the 6 to 1 reduction it also is possible to cut double, triple and sextuple starts directly without using the indexing notches. This is done by engaging the lead screw nut as the correct number on the face plate passes the index mark.

We recommend that the Speed Reducer always be used during relieving operations. They are designed to be used together as described opposite.







The relieving attachment gear box is shown at the extreme right, the radial attachment is in the center attached to the carriage and taper attachment, and the side attachment is at the left. The telescoped drive shafts transmit power, while cams control the motion. The insert shows the gear box with cover open showing the change gears. Every Model B Lathe is drilled and tapped to receive relieving attachments at any time. The side relieving attachment is not available for the 20" lathe.

### Radial, Spiral and Side Relieving Attachments

**T**HE relieving attachments designed and developed by Pratt & Whitney are the result of years of careful study. These attachments for radial, spiral and side relieving now provide a simple means of relieving all sorts of straight or spiral fluted work at a minimum cost. Mounted at the rear of the machine, these attachments do not interfere with any of the usual lathe functions. They can be disengaged easily and quickly when not required.

A gear box bolted to the rear of the lathe headstock brings the power to the telescoped drive shaft of the radial relieving attachment. To disengage the power it is only necessary to loosen a nut and an eccentric collar to move the driving gear out of engagement. Suitable gears and cams are provided together with charts and tables giving the proper setting for numbers of flutes, etc.

The relieving motion is obtained by means of a cam and roller, with a spring to return the cross slide. This mechanism is mounted on the rear of the cross slide and is supported by the taper attachment. A friction device on the end of the drive shaft insures the smooth operation needed for relieving work. This attachment produces a simple movement of the cross slide at right angles to the bed.

For spiral relieving the equipment consists of the radial relieving equipment plus certain gears to give the complete range of spirals.

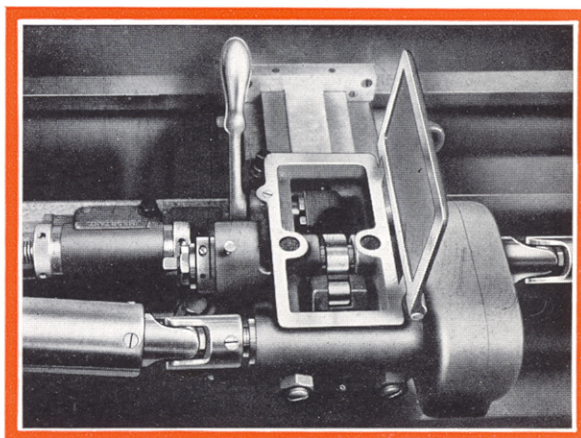
The side relieving attachment may be used separately or in conjunction with the radial relieving attachment. This side relieving attachment was developed to give the cutting tool a longitudinal movement to produce side relief. The attachment is clamped to the rear of the bed as illustrated. It is connected to the lathe carriage by means of a rod with an adjusting thread which passes thru a bracket bolted to the rear of the carriage. This rod transfers the cam motion to the carriage, moving it back and forth along the ways.

*Detail of the radial attachment with its cover raised to show the cam. The lever throws the cam follower in and out of engagement.*

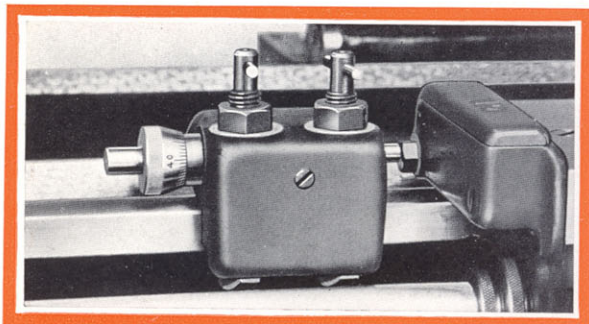
The sidewise motion is produced by a camshaft and cam, and the drive is thru a telescoped drive shaft. The side relieving attachment takes its power from the radial relieving attachment drive if the latter attachment is in use, or directly from the gear box thru a long shaft if the side relieving attachment is being used alone.

These attachments are available either singly or in combination as desired. When used in combination the Speed Reducer must be used.

Relieving operations should be carried on at much slower speeds than regular turning in order to obtain the best results and to give the reciprocating parts time to function properly. For this reason, the relieving attachments for Pratt & Whitney Model B Lathes have been designed so that they can be used in conjunction with the Speed Reducer illustrated and described on the opposite page. This is accomplished by two differently speeded drives in the relieving attachment gear box, one for use with the Speed Reducer and the other for relieving without it.







### Micrometer Carriage Stop

**T**HE micrometer carriage stop can be changed over for use on either side of the lathe carriage. This feature makes the attachment useful for thread cutting, turning exact lengths, facing off pieces to a definite thickness, boring to depth, etc. It is graduated in thousandths of an inch.

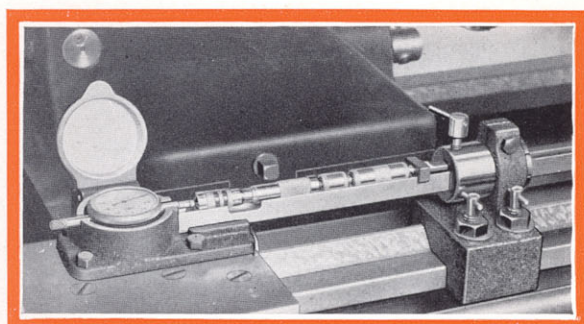
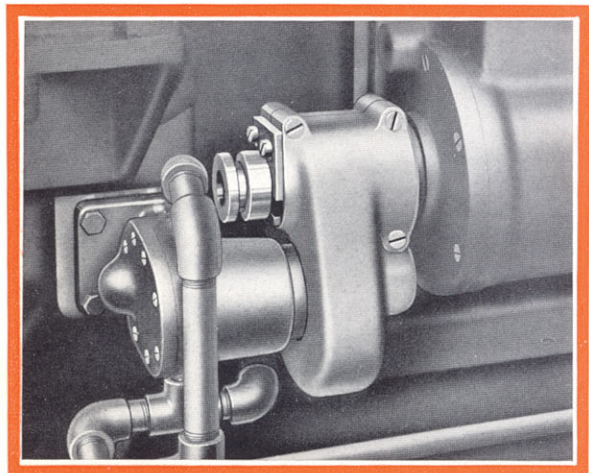
### Multiple Indexing Face Plate



**T**HIS face plate is recommended for cutting multiple threads, or wherever accurate indexing is essential. Sixty divisions make it possible to cut almost any multiple thread quickly and with great indexing accuracy. This attachment is not needed when the Speed Reducer is available.

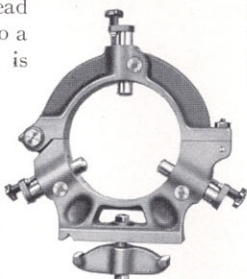
### Pump and Piping

**M**ACHINE can be equipped with a rotary geared pump and complete piping for using cutting oils or compounds. A finished pad for mounting the pump is located directly below the taper attachment slide. This pad is drilled and tapped on every lathe before shipment so that a pump can be installed at any time by the customer. The driving gear shaft of the pump is directly connected to the main drive from the friction clutch. The pump driving gear can be shifted out of mesh when coolant is not needed.



### Carriage Spacing Attachment

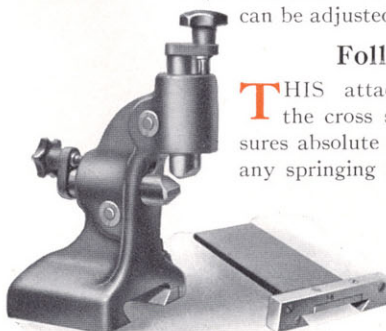
**F**OR greater accuracy in turning exact lengths, facing off, etc., we recommend this attachment. An indicator gage, an inside micrometer and end measures give a direct reading without depending on "feel" as in the case of ordinary stops. This spacing attachment has a 7" range of adjustment without resetting.



### Oversize Steady Rest

**I**T is exactly the same except for size as the standard steady rest which is part of the regular equipment. It clamps solidly to the ways of the lathe bed, and is very rigid and can be adjusted quickly.

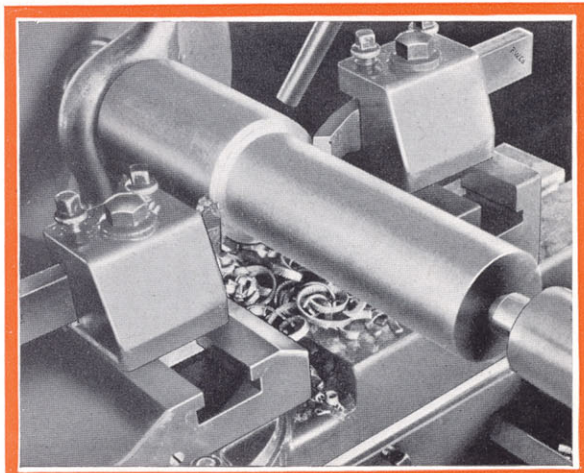
### Follow Rest



**T**HIS attachment is gibbed to the cross slide dovetail. This insures absolute rigidity, and eliminates any springing action that may occur when taking a heavy cut. A movable cover guard is supplied with it to keep the cross feed screw free of chips.

### Double Tool Rest

**L**ATHES can be equipped with a special cross slide to accommodate two tool posts on opposite sides of the center. A double cut can be made as shown in the illustration below.





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