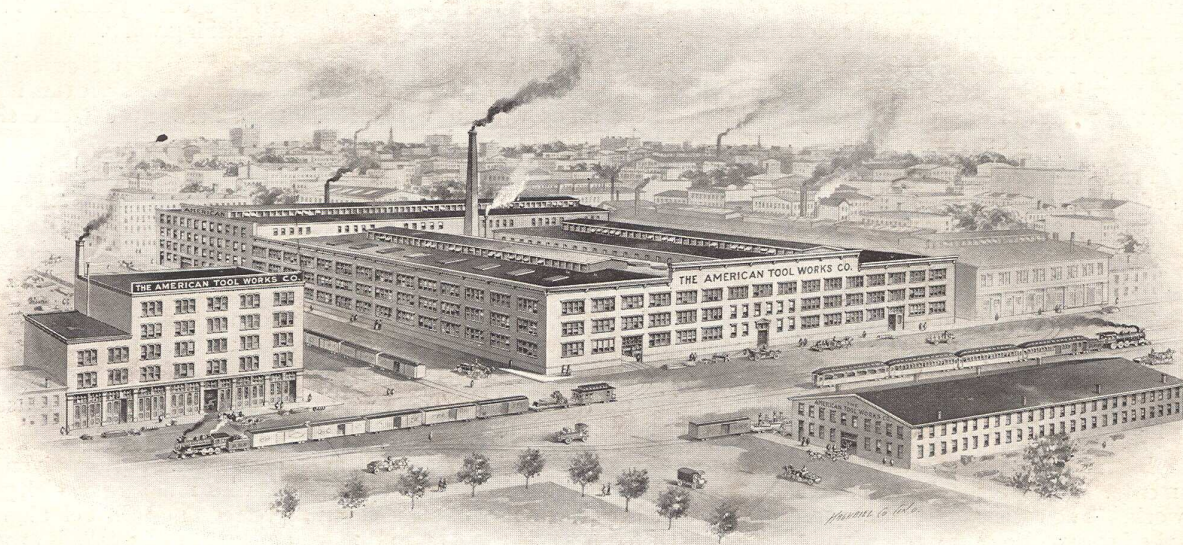


Efficiency Bulletin

FACTS for the
Superintendent
Foreman
Machine Operator

MARCH 1912.

BULLETIN No. 15.



Plant of The American Tool Works Co., devoted exclusively to the manufacture of "American" Lathes, Planers, Shapers and Radial Drills.

Our Works are always open to visitors and we cordially invite you to call on us whenever you come to our city.

We are located close to the "Hotel District" being within a short walk of the same.

THE AMERICAN TOOL WORKS CO.

COR. SIXTH AND EGGLESTON AVE.

CINCINNATI, U. S. A.

FACTS ABOUT ENGINE LATHES.

We employ 500 men in our Works in the building of Lathes, Planers, Shapers and Radial Drills, all of which are brought through in large lots, in distinct departments, under the supervision of expert specialists.

We have more than 100 lathes in operation daily, in addition to much other equipment.

Each month, we produce for shipment between 75 and 100 Lathes, the number depending upon the sizes of the machines.

It is evident, therefore, that we are thoroughly familiar with lathe construction and usage, and what we state herein has been learned from long experience and careful study.

No one type of Lathe Head is equally adapted to all conditions of lathe work. We build "American" Lathes with headstocks exactly suited to every turning requirement and each should be thoroughly understood. They may be classified as follows:

POWERFUL—The **4-Step Cone, Single Back Geared** lathe is designed to handle the regular run of work where extreme power is not required. It is the most generally used, but is rapidly being supplanted by the following type.

MORE POWERFUL—The **3 Step Cone, Double Back Geared** type will handle a much heavier class of work than the single geared, because of greater belt power due to the extra wide face of the cone pulley. This, together with the extra gear ratio accommodates a much wider range for roughing and finishing work.

MOST POWERFUL—The **"Patented" Geared Head type** is designed for all classes of work and especially for the very heaviest roughing requirements. The "American" Patented Geared Head Lathe has proven itself the most powerful of any yet designed, which fact, combined with its wide field of usefulness and extreme simplicity, makes it a most desirable tool for rapid manufacturing purposes.

From the accompanying illustrations, it is readily apparent that "American" Lathes are scientifically designed and properly proportioned. One factor of great importance, however, which no illustration can show, is the **accuracy** and **superior workmanship** of these tools.

ACCURACY is one of the most important factors in machine tool construction, but one of the most difficult to attain.

To obtain a high degree of accuracy in machine tools, conditions contingent upon their manufacture must be favorable. A well equipped shop is necessary, tools of the highest efficiency must be used and expert workmen, long trained in the service, employed. Without the above, accuracy is impossible.

All of these conditions prevail in our Works and the Machine Tools we produce have absolutely no superiors for the economical production of highly accurate work.

Extreme care is exercised in the construction of "American" Lathes, and special attention is given to alignments. After a machine reaches the assembling floor, it is aligned by experts, who make a specialty of this work. The carriage is first squared up with the bed, then the spindle is carefully tested and tailstock aligned with the headstock. Very sensitive indicators are used for this work and no machine leaves our works if any of its alignments are more than .001 of an inch from being absolutely perfect. This degree of accuracy is fully guaranteed.

The selection of machine tools for shop equipment is a serious proposition and a man charged with this responsibility should give the subject very careful study.

One of the most costly mistakes a manufacturer can make is to install improper or inferior tools. Unfortunately, machine tool purchasers frequently permit themselves to be influenced by the price of a machine regardless of its quality. This is indeed a serious mistake and one which will be regretted as long as the tool lasts. To buy a cheap machine tool is false economy and such a purchase will prove to be a very costly investment in the end.

The necessity of economical production is becoming more apparent every day. Advances are being made in the methods of manufacture, competition is steadily increasing, and unless its methods are strictly "up to date" in every respect, a business cannot possibly hold its own against progressive competitors.

Economical production is the very foundation of a profitable business and the greatest factor upon which it depends is shop equipment. If this is not modern, if poor tools are used, the shop is at a great disadvantage.

The Lathe is undoubtedly the most extensively used machine tool, and we, therefore, wish to call your attention to those of our manufacture, different types of which are shown herewith.

Our Lathes are recognized by experienced users as the most productive on the market today and we are confident that after knowing them you will share this same opinion.

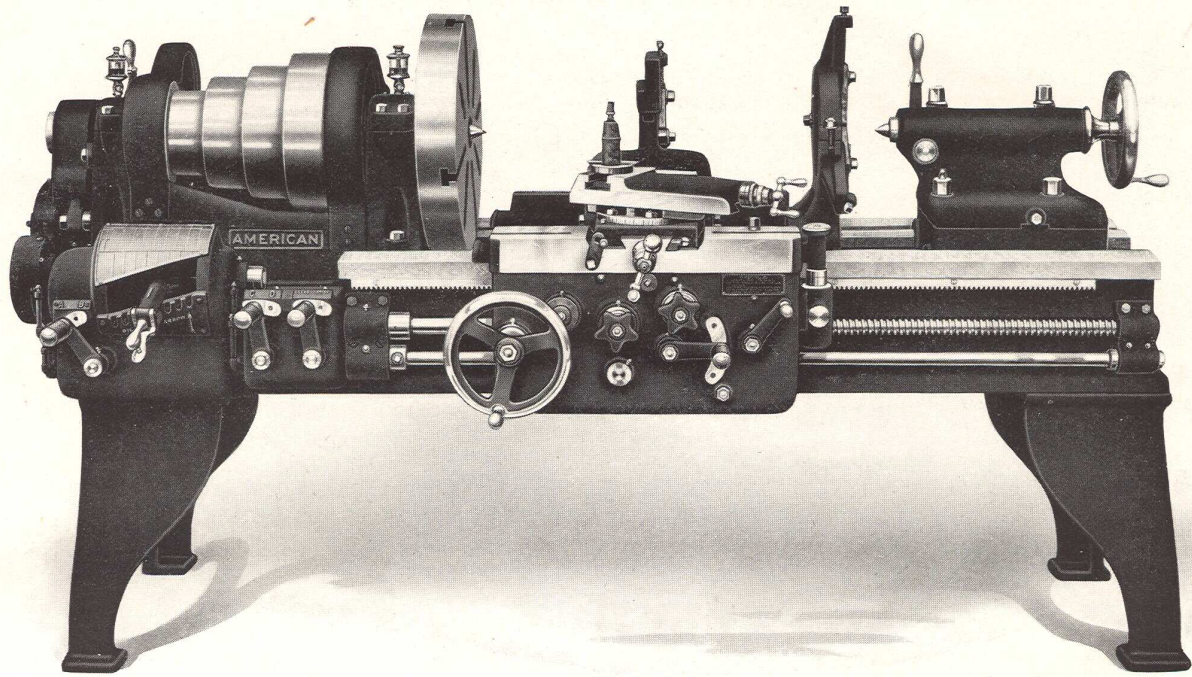
All that we ask is your careful investigation of "American" High Duty Lathes before placing your next order. We are confident that such an investigation will be mutually beneficial.

LATHES
14" to 42"

PLANERS
22" to 72"

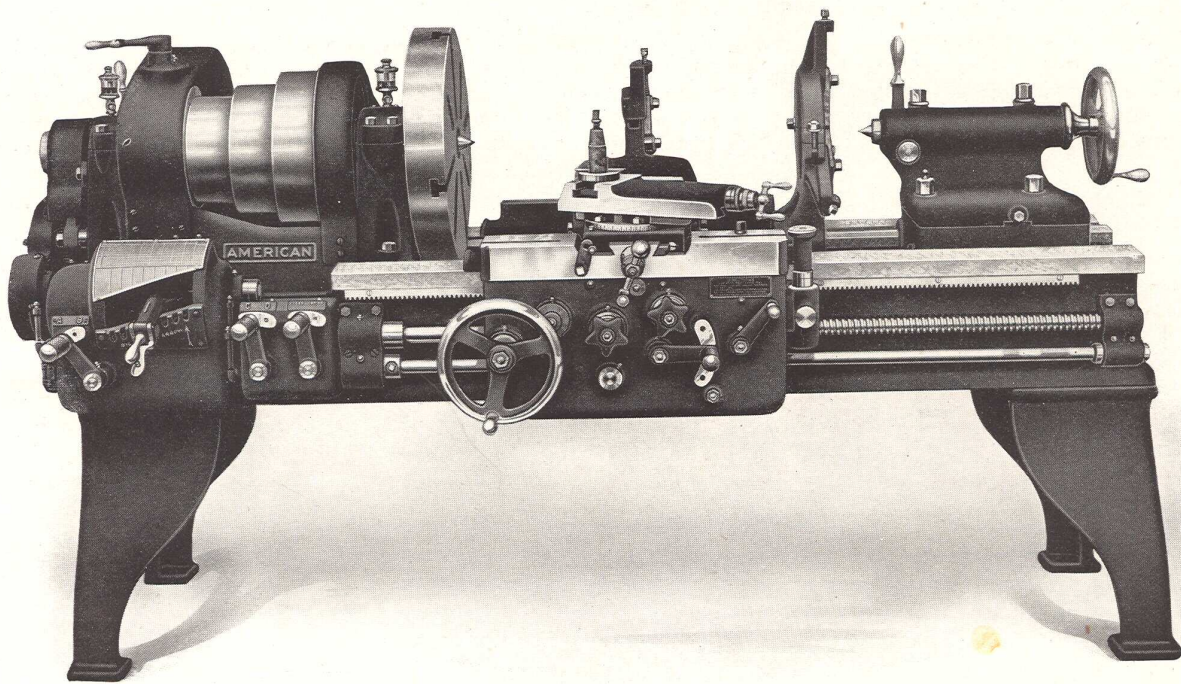
SHAPERS
15" to 24"

RADIAL DRILLS
2' to 7'



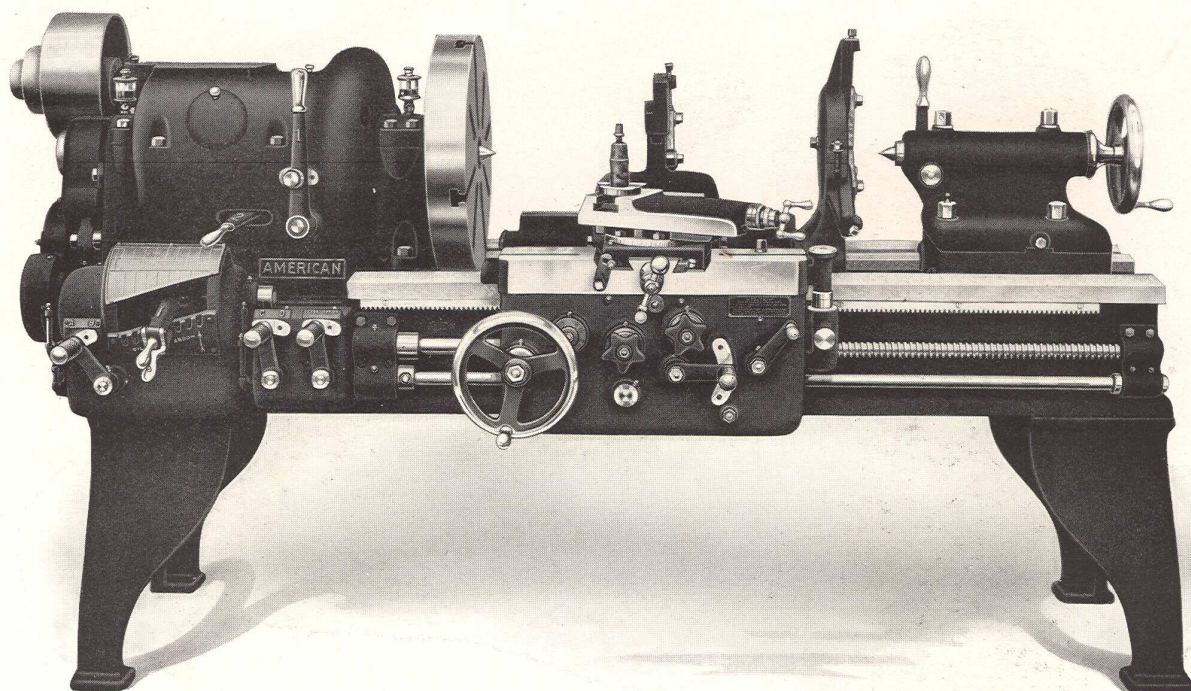
14, 16 and 18-inch "American" High Duty Lathe.

4 Step Cone, Single Back Geared Head.



14, 16 and 18-inch "American" High Duty Lathe.

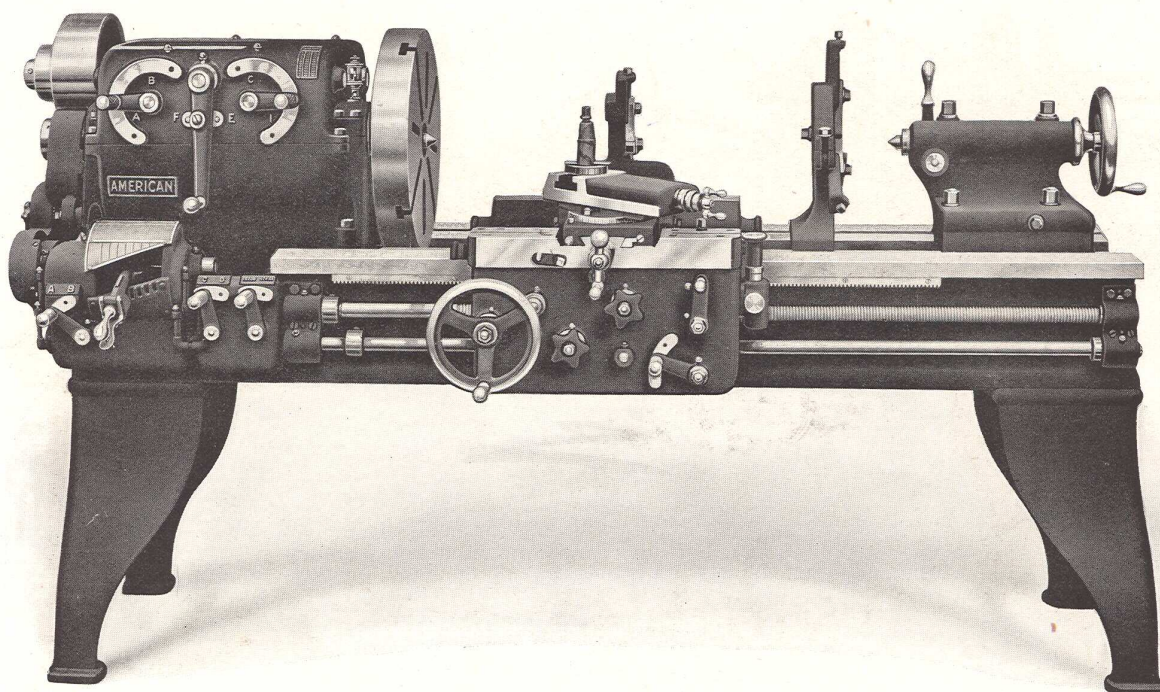
3 Step Cone, Double Back Geared Head.



14, 16 and 18-inch "American" High Duty Lathe.

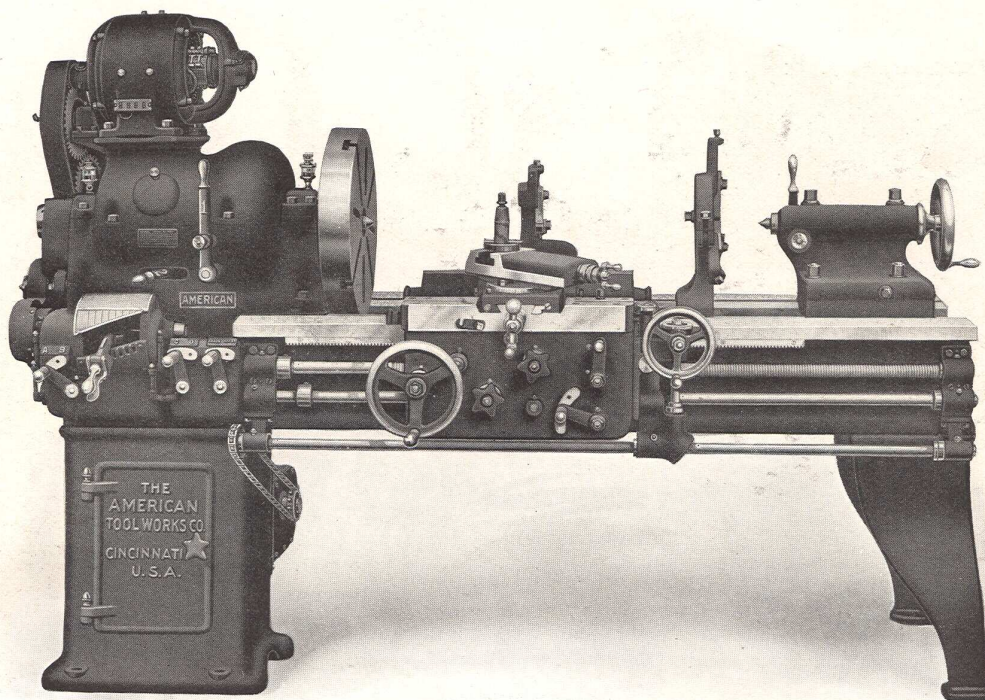
Belt Driven thru Patented 4-Speed Geared Head.

Speed Changes made instantaneously. Readily converted into motor drive.



14, 16 and 18-inch "American" High Duty Lathe.

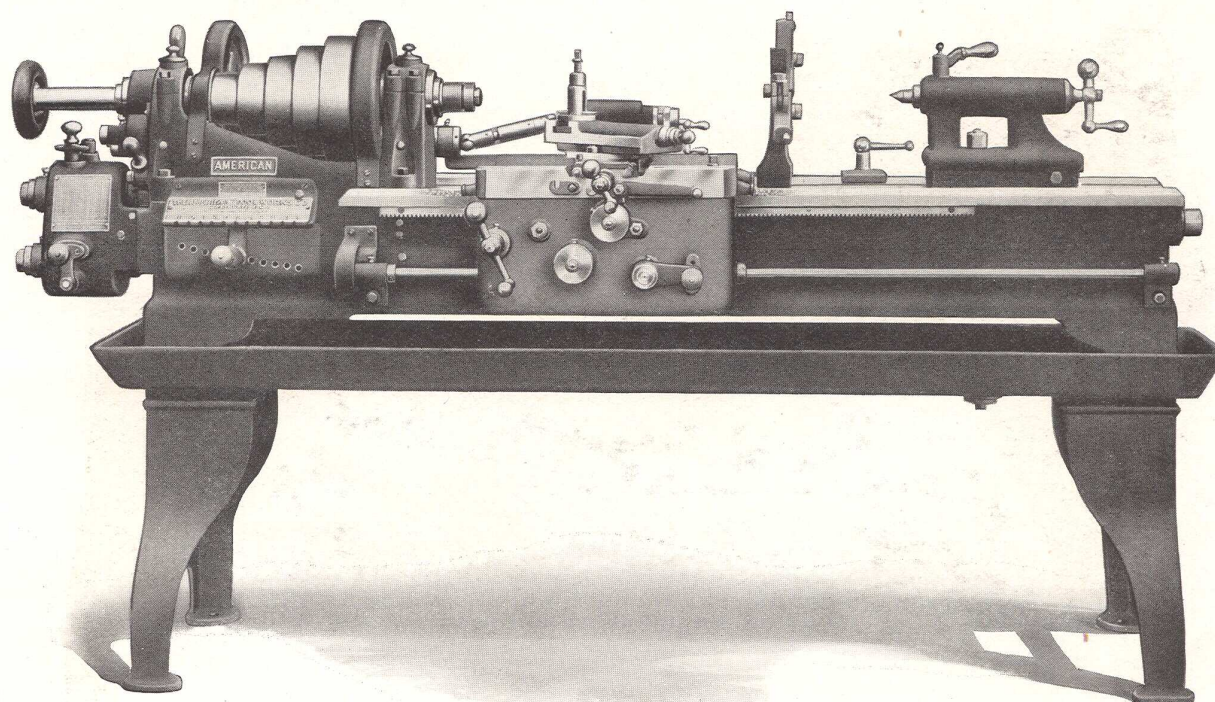
Belt Driven thru Patented 8-Speed Geared Head.



14, 16 and 18-inch "American" Motor Driven Lathe.

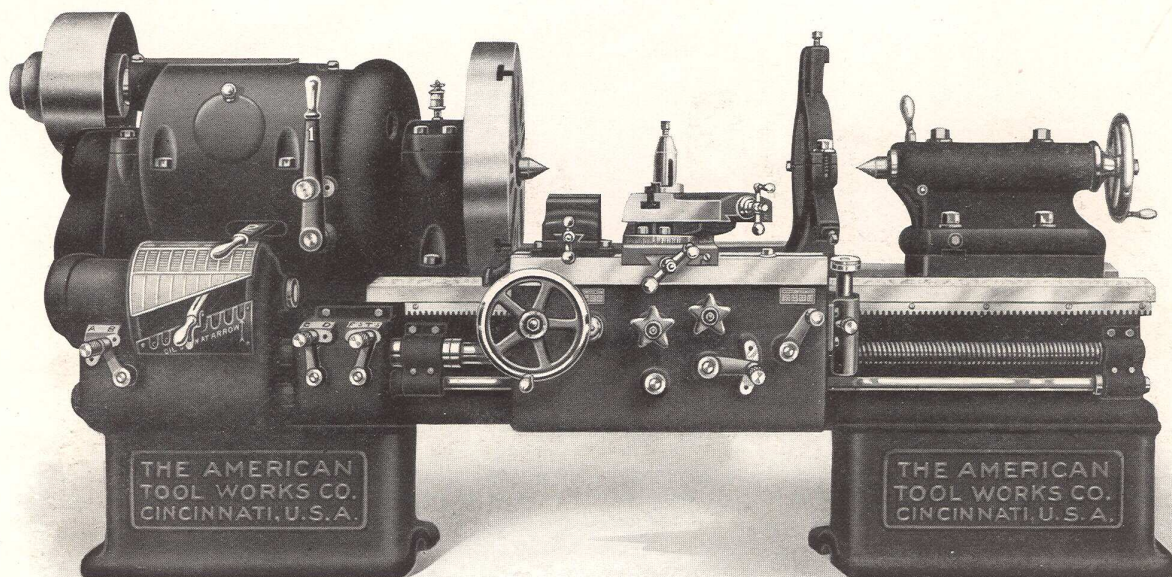
MOTOR DRIVEN THRU "PATENTED" 4-SPEED GEARED HEAD.

Motor and head free from vibration. Only three spur gears from armature shaft to drive shaft in head.



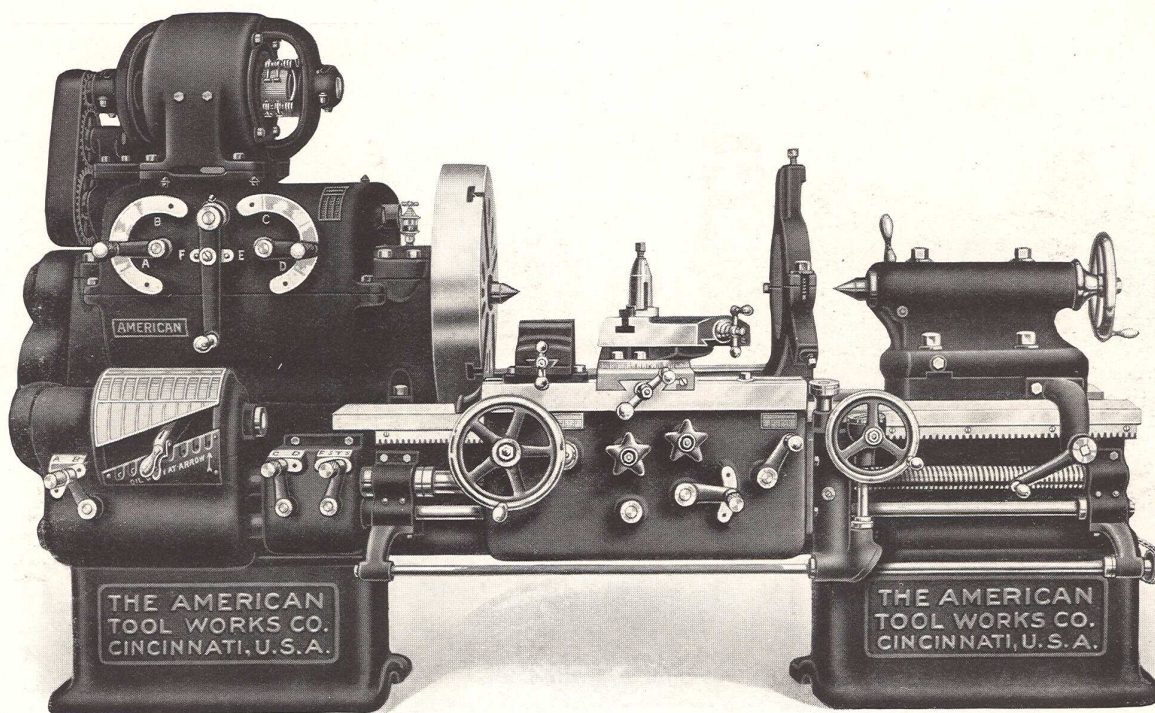
14-inch and 16-inch "American" Tool Room Lathe.

Equipped with Draw-in Collet, Chuck, Taper and Relieving Attachments, Compound Rest, Pan and Quick Change Feeding and Thread Cutting Mechanism. A complete Tool Room Lathe combining the highest degree of accuracy and convenience of operation.



20 and 24-inch Medium Pattern "American" High Duty Lathe.

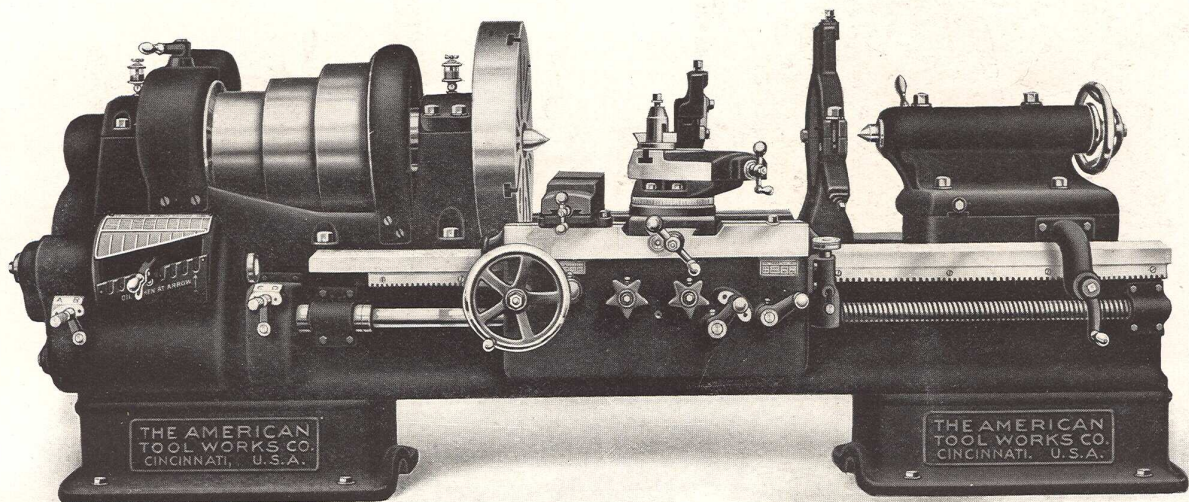
Belt Driven thru Patented 4-Speed Geared Head.



24-inch Heavy Pattern and 27-inch "American" High Duty Lathe.

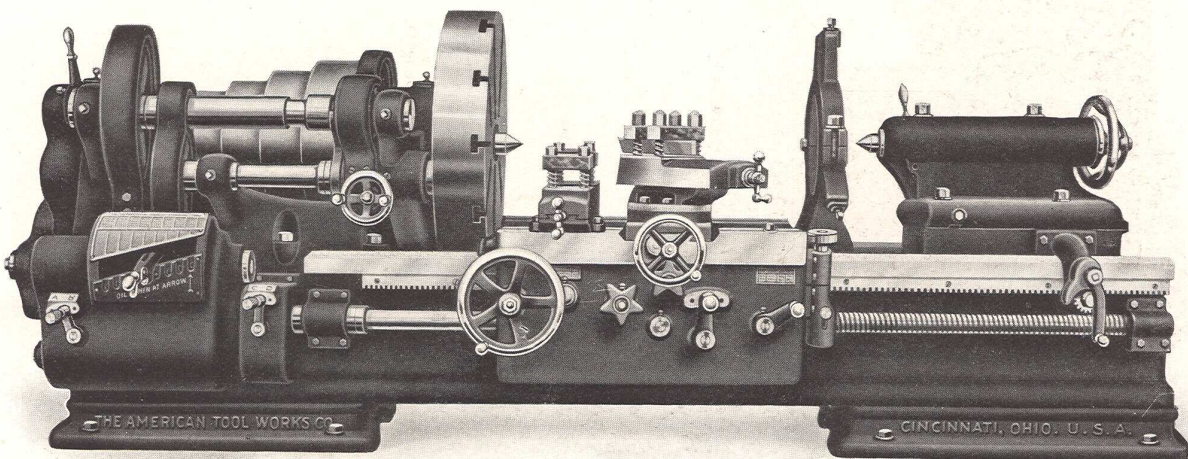
Motor Driven thru Patented 8-Speed Geared Head.

A Constant Speed Motor is used.



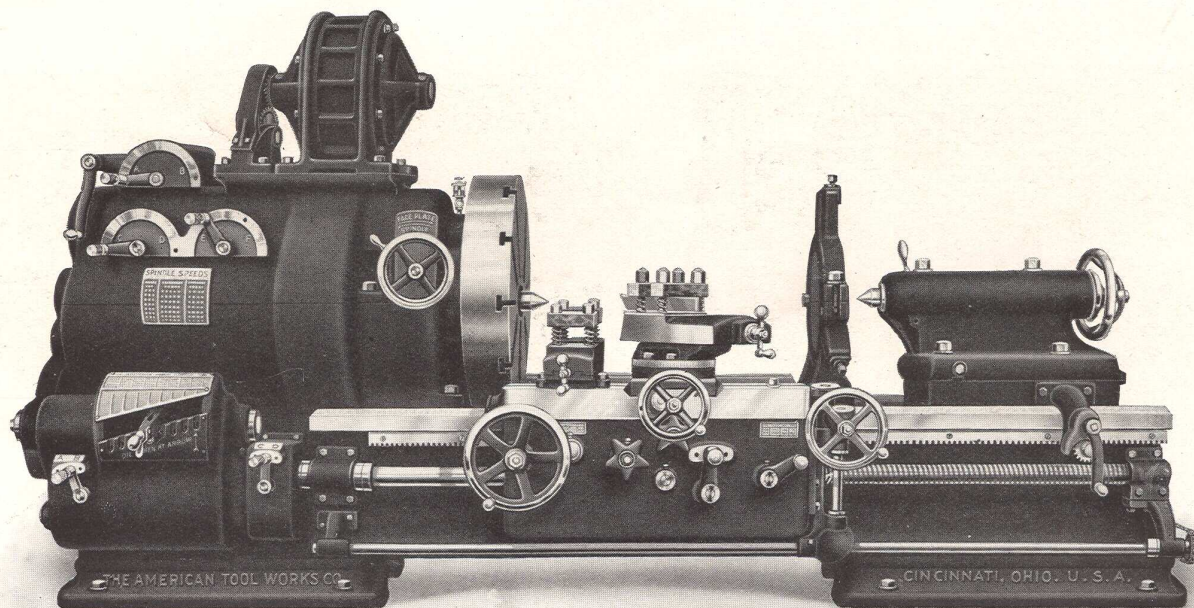
30 and 36-inch M. P. "American" High Duty Lathe.

Three Step Cone Double Back Geared Headstock.



36 and 42-inch "American" High Duty Lathe.

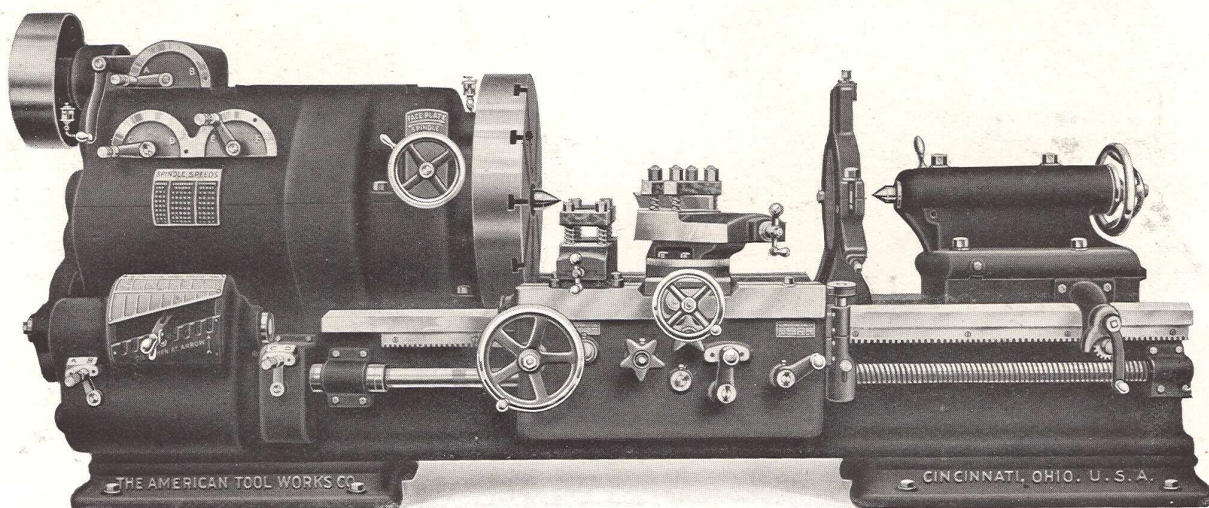
With Four Step Cone Triple Geared Headstock.



36 and 42-inch "American" High Duty Lathe.

Motor Driven thru "Patented" 16-Speed Head.

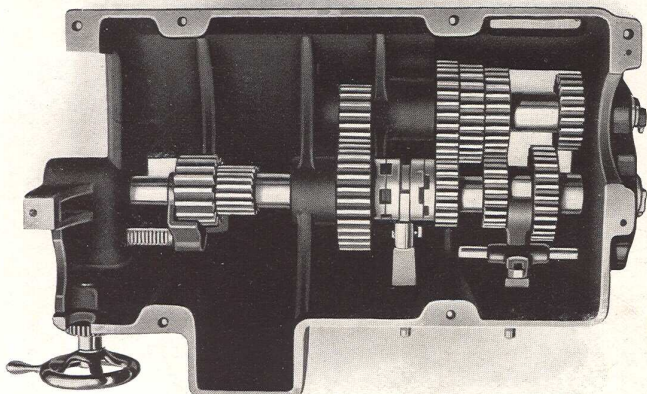
A Constant High Speed Motor is used.



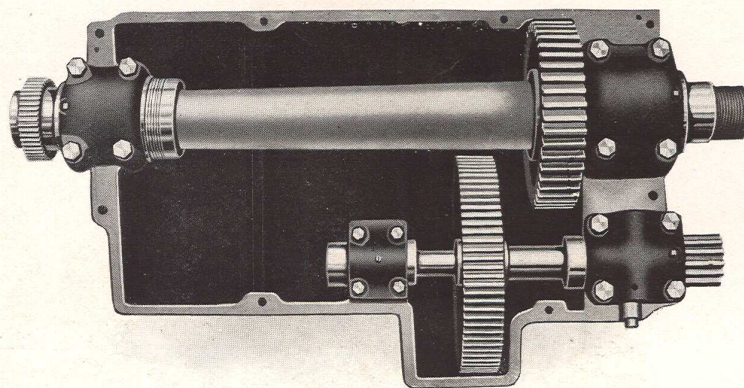
36 and 42-inch "American" High Duty Lathe.

"Patented" Geared Head, Type "B" for Belt Drive.

16 Spindle Speeds—only 17 Gears. 8 Speeds thru Face Plate Drive. Screw cutting mechanism, direct reading and unlimited in range.



Upper half of headstock.



Lower half of headstock.

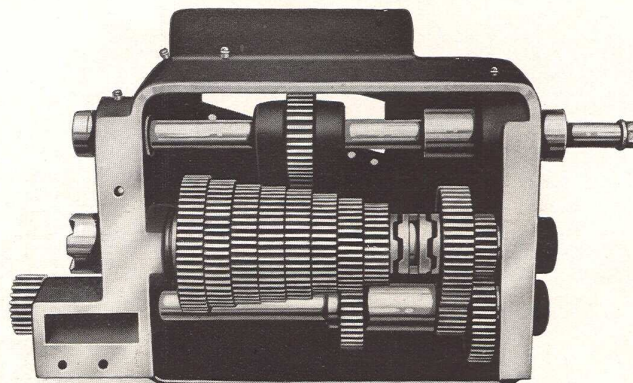
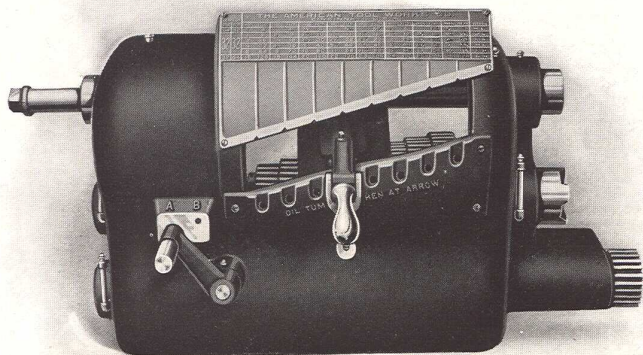
Interior of 36 and 42-inch "Patented" Geared Head.

Sixteen (16) spindle speeds are obtained thru this head by the use of only seventeen (17) gears and one positive taper jaw clutch which is easily engaged.

The teeth of the slip gears are machine rounded and readily slide into mesh. 50% of the spindle speeds are obtained thru the face plate drive. This relieves the spindle of a large amount of heavy work, which otherwise would have to be accomplished thru the spindle gear drive.

All loose gears and members have been eliminated from the spindle; the only gear mounted thereon being the spindle driving gear, which is set right against the front bearing. The spindle is therefore relieved from any severe torsional strains, thus greatly prolonging its life and alignment, and also eliminating the possibility of "chatter".

All bearings throughout the head are bored out from the solid and lined with Phosphor Bronze. An efficient oiling system has been developed, which insures the proper distribution of oil at all times. Speeds can be changed instantly.



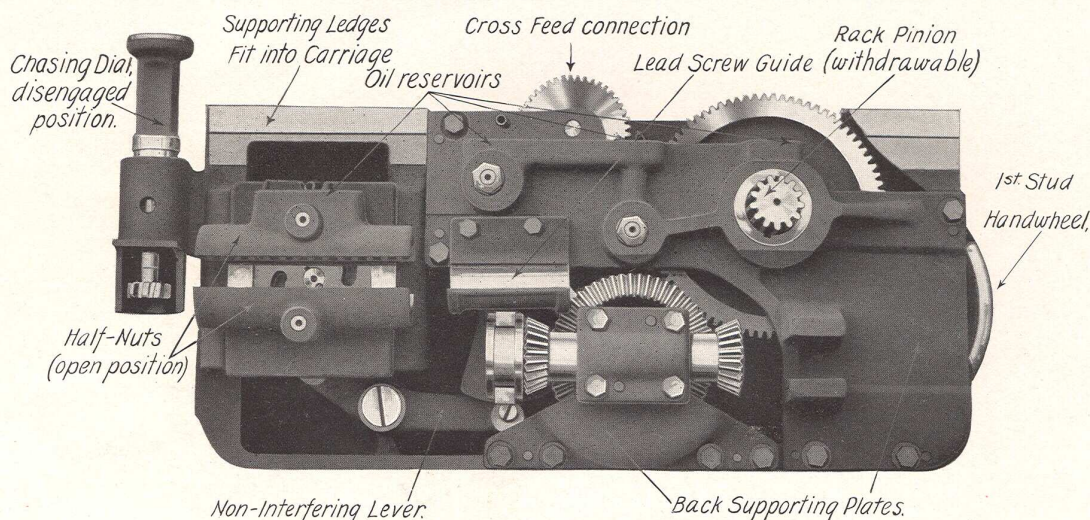
Feeding and Screw Cutting Mechanism of "American" 36 and 42-inch High Duty Lathes.

This mechanism provides 48 thread and feed changes, the threads ranging from $\frac{1}{2}$ to 28 threads per inch, including 11- $\frac{1}{2}$ pipe threads, and the feeds from 4 to 224 cuts per inch. 32 changes ranging from 1 to 14 threads per inch are obtained thru the speed-box in addition to which, a compound quadrant gear is provided on the end of bed, which furnishes 16 additional changes. The quadrant gear also provides a means of obtaining thru loose change gears any odd or metric threads which might be required from time to time.

The changes in the box are all obtained thru a cone and tumbler gear and two sliding clutches of the selective type. ALL MEMBERS OF THIS BOX ARE STEEL. The cone and tumbler gears are cut with Brown & Sharpe 20 degree involute cutters, which form a tooth pointed at the top and wide at the base. This has proven to be the best possible tooth form to use in a tumbler gear mechanism as the gears can be meshed while running without shock or damage.

Another feature of great merit in this Quick Change Gear Mechanism is that which eliminates the necessity of speeding up the mechanism at any time for any of the different feeds or threads. The coarse threads are all obtained thru the cone and no member in the box does at any time run faster than the initial driving gear:

CHANGES CAN BE MADE INSTANTLY WITHOUT SLOWING DOWN THE MACHINE.



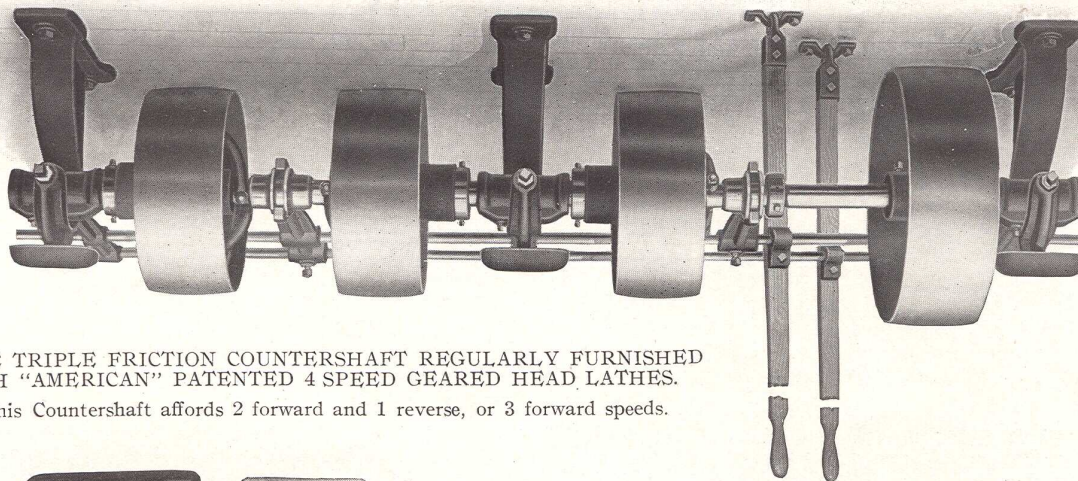
All Studs are Supported in the New 24-inch "American" High Duty Lathe Apron.

All of the New High Duty Lathe Aprons are of the Double Plate type which affords an outer support for the studs.

NOTE THE OILING SYSTEM OF THIS APRON.

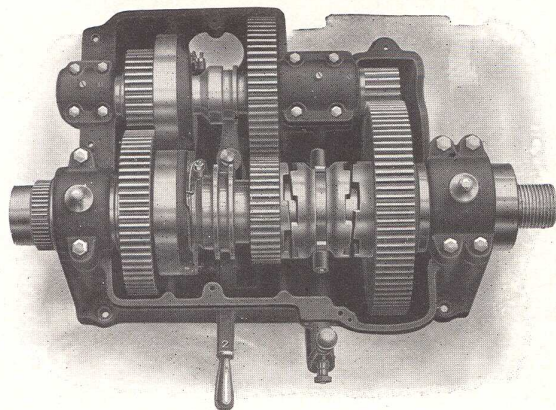
The oil is introduced from the outside of the apron and is led by means of oil pipes to the reservoirs which are formed in the back plate and which retain a large supply of the lubricant. From here the oil is led thru ducts to the different bearings. Over the opening of each oil duct is placed a piece of felt which both filters the oil and regulates its flow. This permits a continuous lubrication, and prevents the oil from being wasted from flooding and running out of the bearings.

All pinions in these aprons are cut with special cutters from Bar Steel; all gears are made from Steel Castings; and all studs are case hardened and ground to size.



SIMPLE TRIPLE FRICTION COUNTERSHAFT REGULARLY FURNISHED WITH "AMERICAN" PATENTED 4 SPEED GEARED HEAD LATHES.

This Countershaft affords 2 forward and 1 reverse, or 3 forward speeds.



No. 2. No. 1.

Interior of "American" Patented 4-Speed Geared Head.

"AMERICAN" PATENTED 4 SPEED GEARED HEAD LATHES are extremely simple in design and very powerful.

This Head with Countershaft gives 12 forward speeds.

There are only 6 gears in the head to produce the mechanical speed changes, which are instantly obtained by operating levers No. 1 and No. 2.

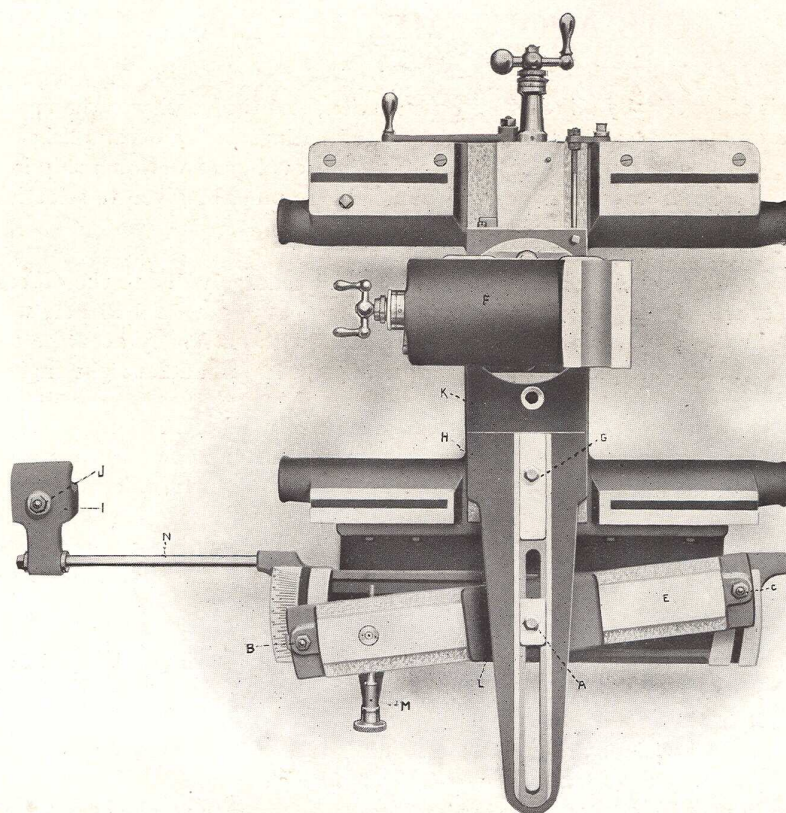
The low speeds are controlled by lever No. 1 which operates 2 powerful Hardened Steel Taper Jaw Clutches.

The high speeds are controlled by lever No. 2, which operates 2 very powerful frictions of our "Patented" Double Band Type, which are capable of transmitting more power than any other friction of similar dimensions.

All Speed Changes thru GEARS are made in the Head:

There is no belt pull on the spindle, or on the driving shaft.

The driving pulley is of large diameter, wide face and runs on a massive bronze bushed steel sleeve, which relieves the spindle of all belt pull. The hub forms a retainer for the lubricant which is fed to the shaft thru felt wipers.



“American” Taper Attachment.

For Lathes 14 in. to 42 in. inclusive.

The “American” Taper Attachment, shown above, is both in design and operation extremely simple, the construction being such as to avoid the spring and inconvenience usually found in such attachments. All parts are amply heavy and numerous sliding joints are avoided, thus insuring extreme rigidity and accuracy of tapers produced therefrom.

Bolted to, and traveling with the carriage, it may be instantly thrown into operation or as quickly disengaged at any point along the lathe bed, by means of the binder nut (J) on the clamping dog.

When attached for Taper Work the sliding shoe is directly connected with bottom slide of tool rest by a heavy cast iron yoke, making its operation instantaneous, at the same time doing away with all lost motion, weakness and inaccuracy found in taper attachments directly connected to the cross feed screw.

Cross Feed Nut is always connected with the tool rest, therefore it can not fall to one side and out of position.

Nut for Engaging the Sliding Shoe is arranged to slide in the Yoke connected to the tool rest, and is attached to or released from the yoke, as the case may be, by tightening or loosening a single screw.

Accurate Graduations are provided for quickly setting to any desired taper within its range, each graduation indicating $\frac{1}{8}$ " taper per foot. In addition there is provided a convenient hand screw with graduated collar, which is used for extremely accurate setting.

When Taper Attachment is ordered BEFORE the lathe leaves our works, all work necessary to its application is finished, so that the lathe and attachment reach the customer ready for use, no additional fitting being necessary.

When Taper Attachment is ordered AFTER the lathe leaves our works, it can be readily applied by the user, as all our lathe carriages are drilled to jigs, properly tapped ready to receive the taper attachment, with a slight amount of fitting. Complete information relative to such fitting is furnished by us.

FACTS ABOUT METAL PLANERS.

Planing is the basis of practically all machine construction, and the quality of the finished product usually depends upon the accuracy of its planed surfaces. Accurate planing can be accomplished only on accurately built Planers, for this type of machine more nearly reproduces the quality of workmanship inherent in itself than any other machine tool. It is evident, therefore, that unusual care must be given to selecting a machine of this kind.

There is really a vast difference in planing machines, which is largely due to the different classes of workmanship in their construction. It is a simple matter to build a heavy, powerful Planer, which will plane off a great quantity of metal, but to combine these essential features with extremely accurate alignments, is an altogether different proposition, because planer alignments are of great length and at right angles to each other.

There is also a decided difference in the class of work produced by different planers. A piece of work planed up on an accurately built machine will be smooth and accurate while one planed up by an inaccurately built planer will show gear marks, chatter marks and various imperfections. Consequently, when work produced by a planer of the latter type reaches the erecting floor, a great deal of scraping and fitting is necessary, while on the other hand the work produced by the former type of planer is all ready for assembling, with the exception of the small amount of scraping necessary to remove the loose metal. It is self evident, therefore, that much time and money can be saved by accurate planing.

"American" Planers are built in sizes from 22" to 60" between the housings. They are erected in a separate department which contains a complete assortment of jigs, straight edges, micrometers, leveling bars, and all other equipment that is essential to the production of highly accurate work. All flat bearing surfaces are tested with surface plates and all shafts and bushings are ground to size. The Vees are scraped wherever necessary to form a perfectly true bearing surface for the platen, after which the finishing cut is taken over the platen in its permanent position on the bed. Every possible care and precaution is taken to produce machines of the very highest quality and as evidence of the result, we fully guarantee that our Planers will plane perfectly square and parallel up to their maximum capacity, within .001 part of an inch.

Aluminum Alloy Driving Pulleys are now being supplied on all sizes of "American" Planers. The Aluminum pulley, by virtue of its lower specific gravity, will develop just about one-third of the momentum that a cast iron pulley of the same dimensions will. Due to this characteristic, the application of the Aluminum Pulley has practically eliminated all over-run of the tables on "American" Planers. In addition the Aluminum Pulley has another decided advantage over the cast iron pulley, in that it permits the belts to be used approximately 2 inches longer, which greatly prolongs their usefulness.

"American" Planers are built in three types; namely, single speed, double speed and quadruple speed. The single speed type affords one cutting speed and a constant return speed. This style of drive is especially desirable in shops having a large amount of uniform work, and there is still a great demand for this style. The double speed Planer, by means of a special two-speed countershaft, furnishes two cutting speeds and a constant return to platen. The quadruple speed planer, which is the more universally used of the two multi-speed types, affords four cutting speeds and a constant return speed. The speeds of the latter are obtained thru our "Patented" 4 step Cone Speed Variator, consisting primarily of a pair of opposed 4-step cones, mounted on top of the housings and driven by a wide endless belt. This undoubtedly forms the most satisfactory Multi-Speed Drive that has yet been devised, for not only is it free from the annoyances caused by fast running gears, clutches, etc., but the work produced is free from the imperfections incident to many other Multi-Speed Drives. There is a steadily increasing demand for this type of Planer for it possesses undeniable advantages for shops having a great variety of work and only a few Planers to handle it.

Planers that are not built with the same care that characterizes the building of "American" Planers, are expensive machines to buy at any price. Write us for specifications before installing your next planer.

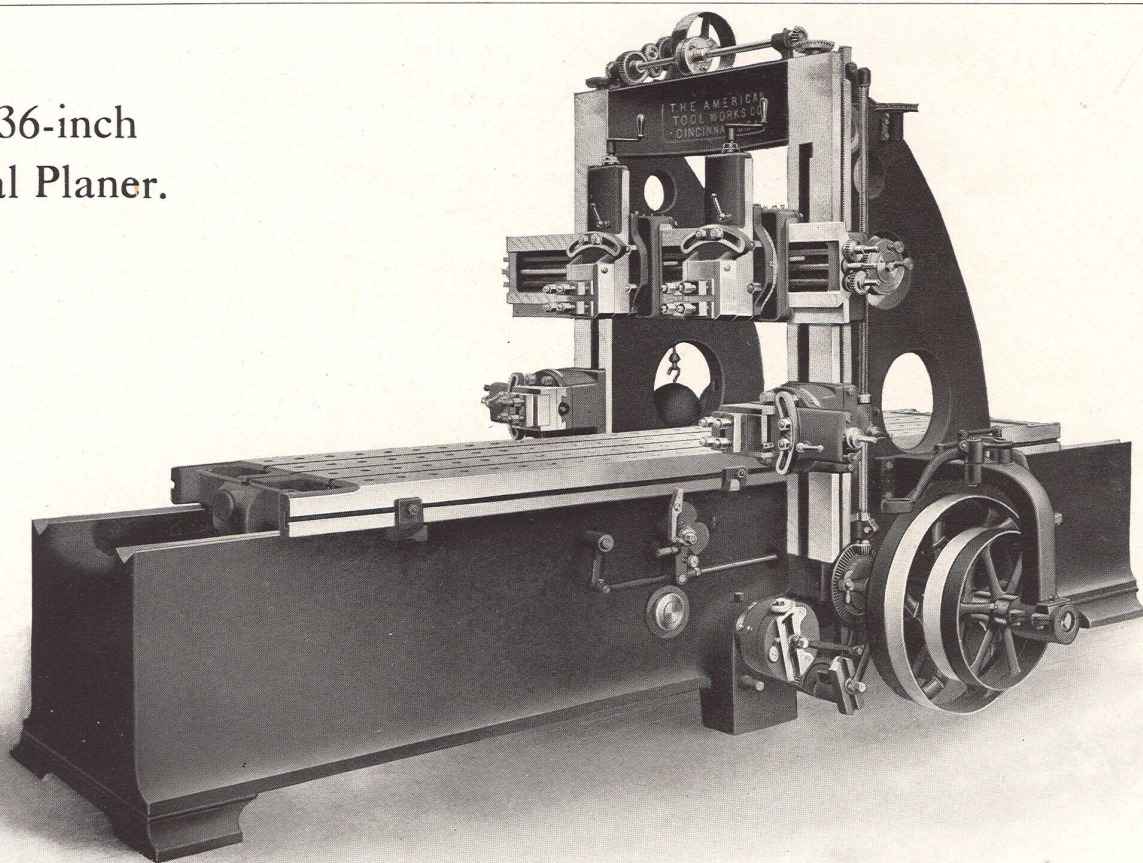
LATHES
14" to 42"

PLANERS
22" to 27"

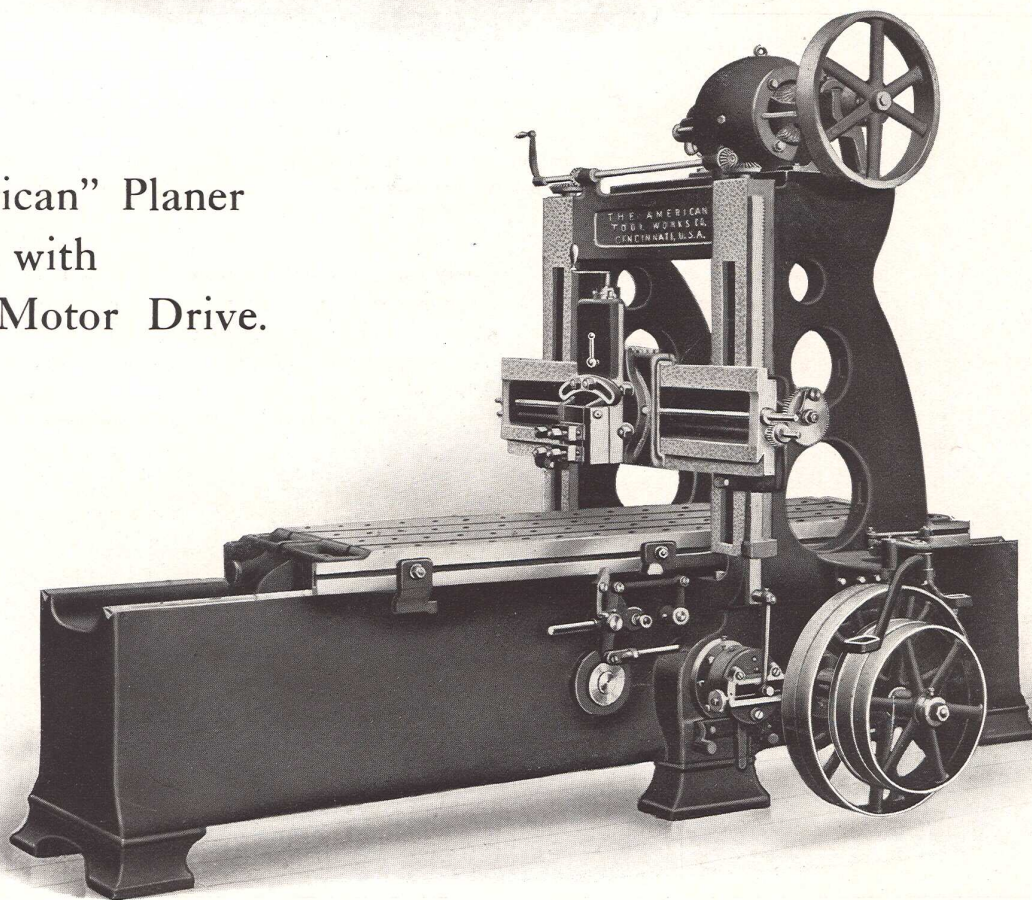
SHAPERS
15" to 30"

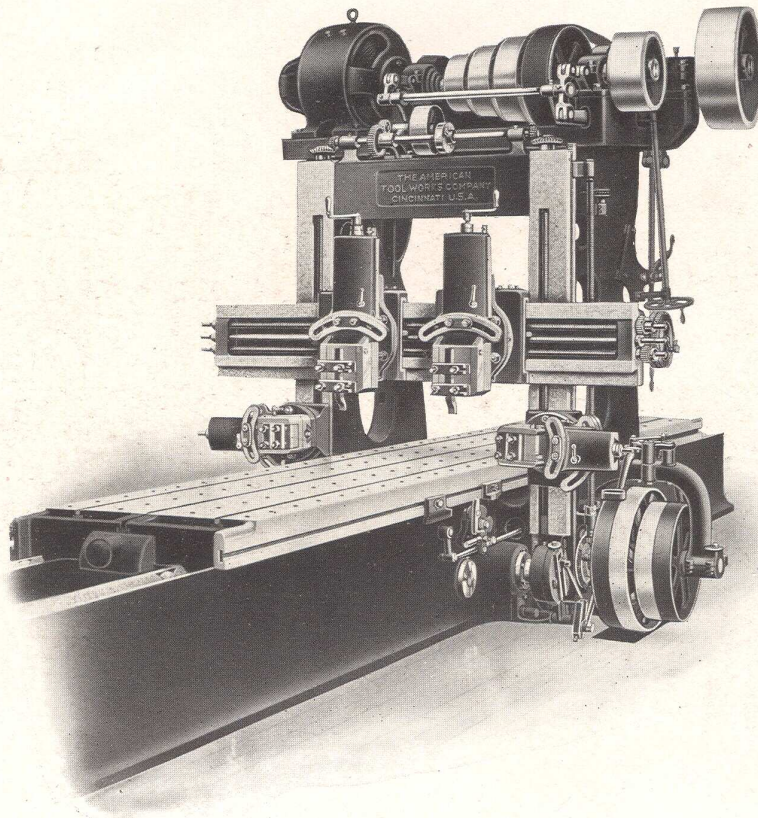
RADIAL DRILLS
2' to 7'

36 x 36-inch
Metal Planer.

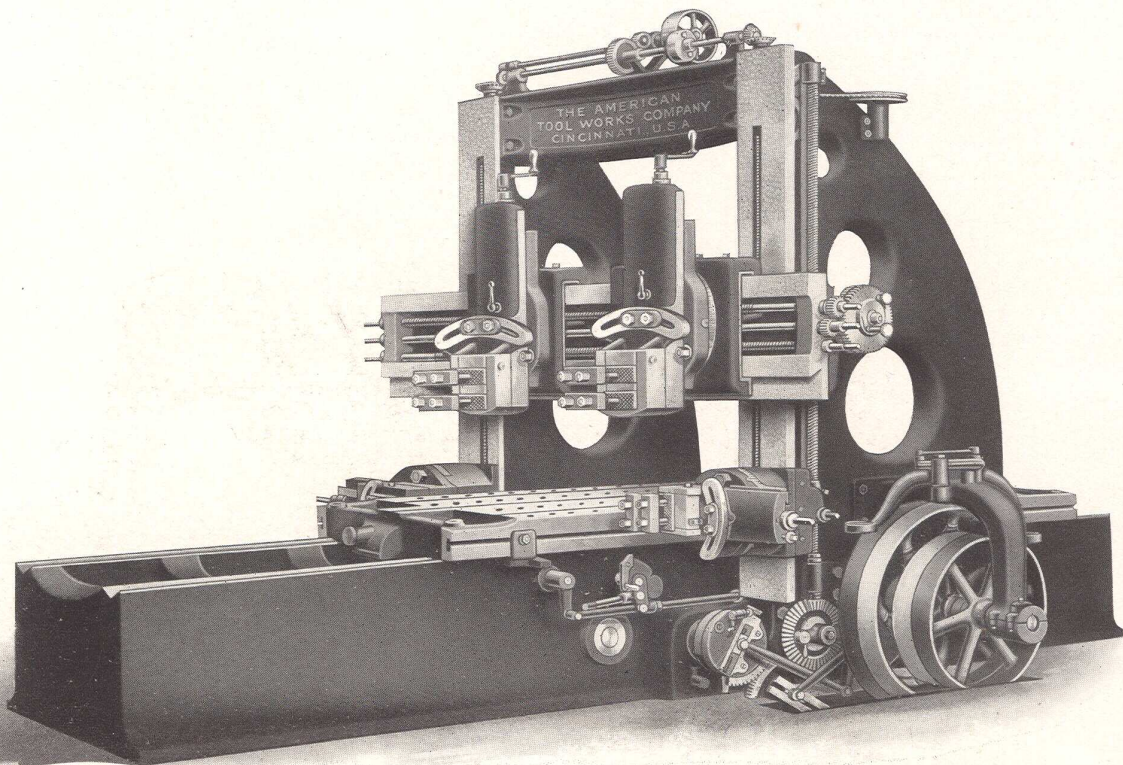


"American" Planer
with
Direct Motor Drive.

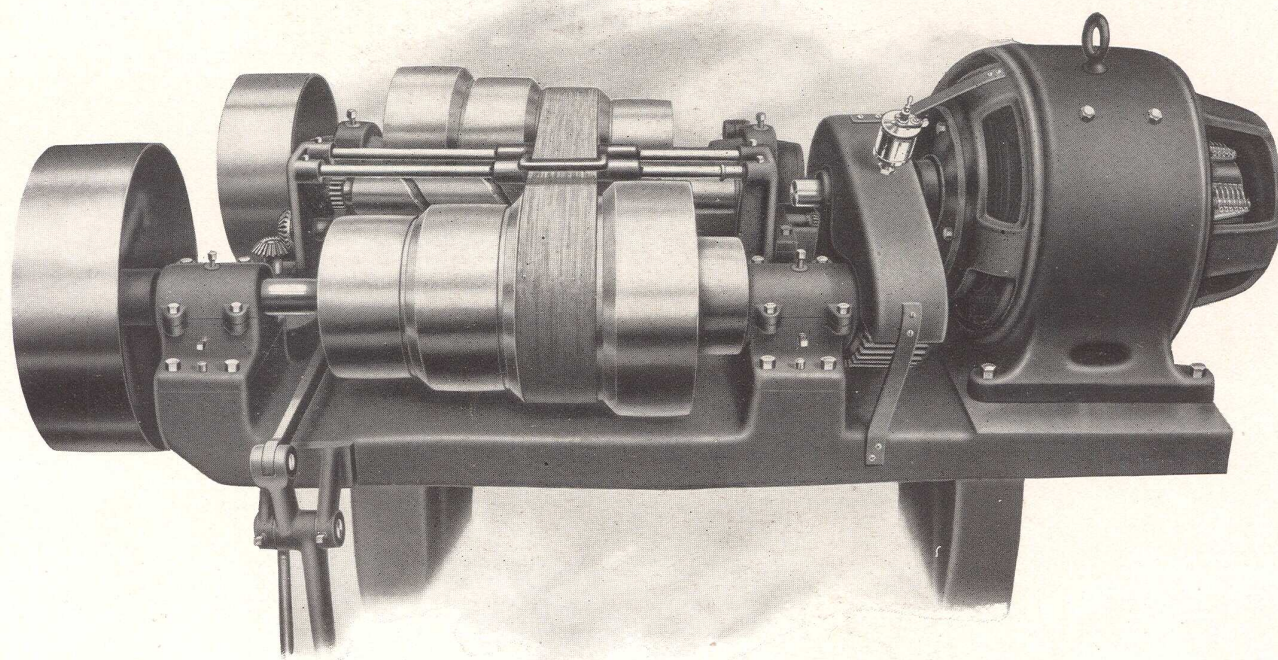




"American" Multi-Speed Planer.
 Motor Driven thru "Patented" 4-step Cone Speed Variator.



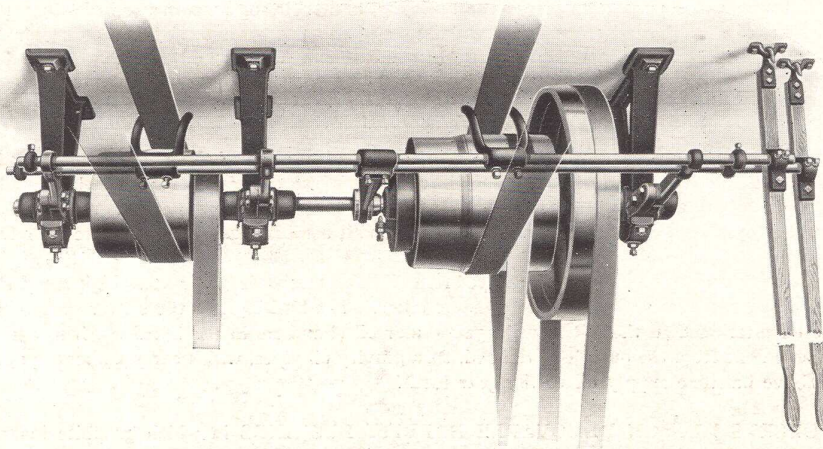
60 x 60-inch Metal Planer.



“American” Patented 4-Step Cone, Planer Speed Variator.-

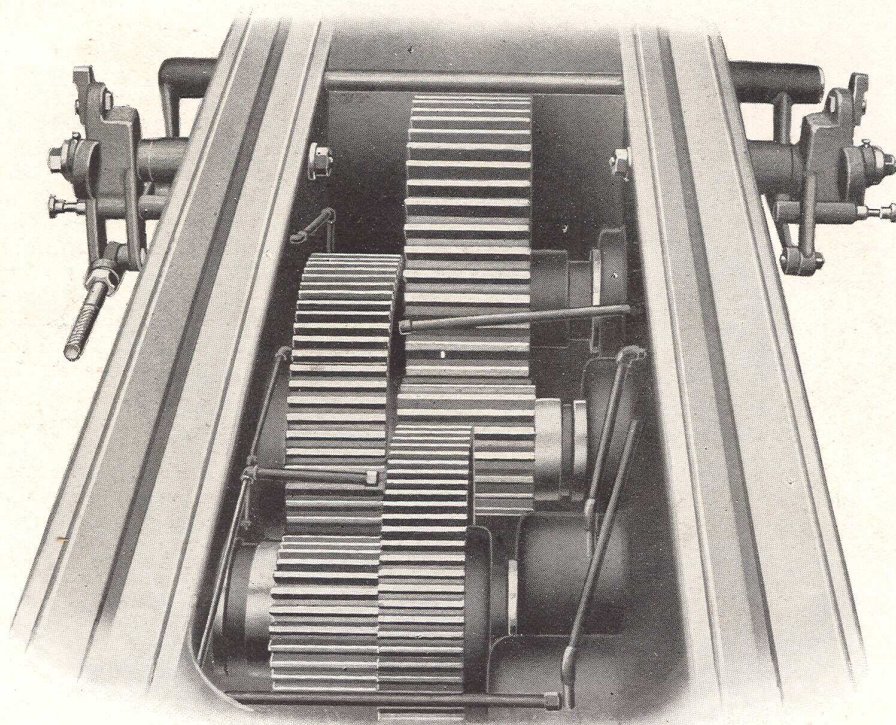
This improved type of Variator provides 4 distinct rates of cutting speed with a constant return speed, the rates of variation being at a ratio of $2\frac{1}{2}$ to 1. This device is extremely simple in its construction, there being but two cone pulleys and an endless belt involved in its operation. Very efficient means are provided for loosening and shifting the belt from step to step, and provision is also made for quickly obtaining the necessary tension for operating the planer under the usual working conditions. **Any one of the 4 speeds can be obtained in a few seconds time without stopping the machine.** This is accomplished by a conveniently placed handwheel, one revolution of which shifts the belt from one step to the next.

The arrangement is such that the BELT IS SHIFTED ENTIRELY OFF THE HIGH STEP OF ONE CONE BEFORE IT IS SHIFTED TO THE MATING STEP OF THE OPPOSING CONE. This feature, in addition to the loosening of the belt permits rapid shifting with perfect ease and safety. The rises from step to step of the cones are beveled so as to offer no resistance to the passage of the belt. The cones are built up from separate pulleys and are GIVEN A RUNNING BALANCE on a special balancing machine.



Special 2-Speed Countershaft for “American” Planers.

Two (2) Cutting Speeds and a constant return speed are obtained thru the above Countershaft, either of the cutting speeds being easily obtainable thru the manipulation of the two levers. This countershaft is unusually substantial, as it consists of very few parts and possesses excellent lubricating facilities.



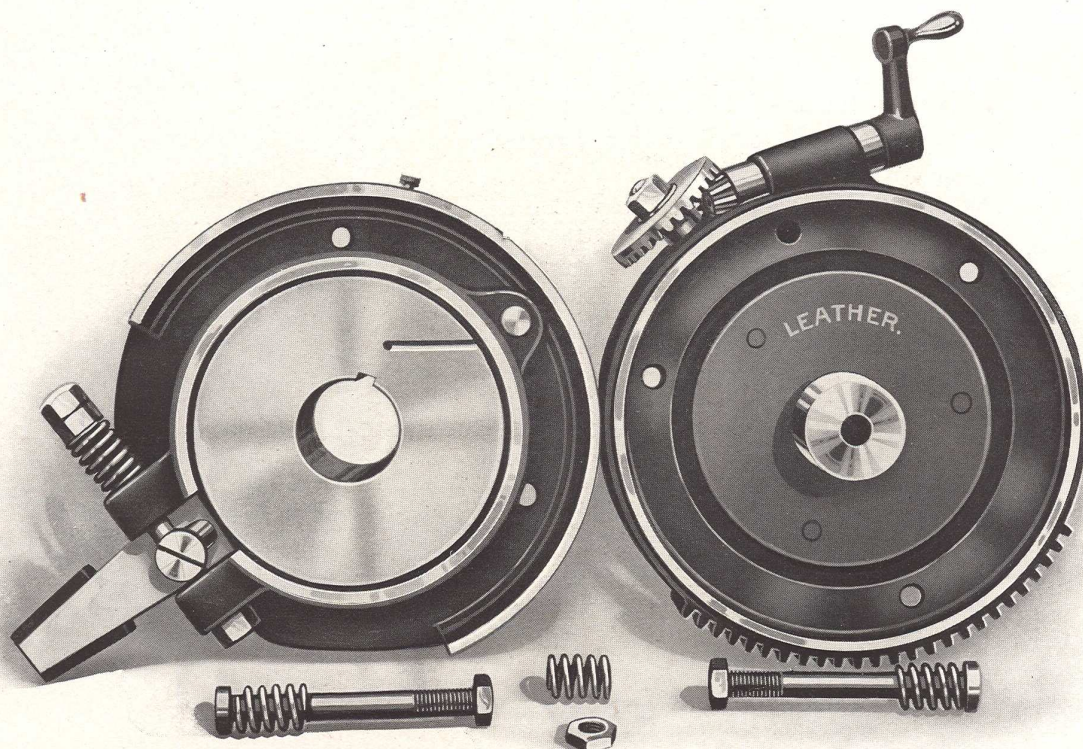
Arrangement of Driving Mechanism in the Bed of "American" 36, 42, 48 and 60-inch Planer.

The driving mechanism of "American" Planers is very powerful and is substantially constructed. The Gear ratios and belt widths are considerably in excess of those furnished on many planers, thus providing, with a given table speed, correspondingly greater belt power. THE DRIVING SHAFTS all run in long solid bushings which are accurately ground and fitted bodily into holes bored and reamed in the bed. This method of construction brings the bushings, and their supports in the bed, close up to the driving gears where the greatest strains are concentrated. There is no overhang between the gears and the bearings. This design affords a construction which is far superior to that frequently used in other makes of planers, in which the bushings are bolted to the outside of the bed by means of flanges—the bearings extending inward thru holes cored in the bed. The section of the bed where the shafts are mounted is strongly reinforced by heavy ribs.

All material entering into the construction of "AMERICAN" PLANERS is of the very best obtainable. The driving shafts are of hammered crucible steel and are accurately ground. The driving pinions are made of high carbon steel forgings and the larger gears from steel castings. They are all cut from the solid with special cutters made for the particular number of teeth in each gear. This method of cutting gears insures a quiet, smooth running drive with a minimum of wear in the gear train.

A very efficient system of lubrication has been developed for oiling this mechanism. The two high speed shafts are bronze bushed, the pulley shaft bearings being supplied with "ring" or dynamo oilers. The bushings for the slower speed shafts are slotted out, and felt wipers inserted, the oil filtering thru the felt from large annular oil chambers in the bushings, insuring a proper distribution of the lubricant. The oiling is done from the outside of the bed, thru gravity oil pipes, which carry a liberal quantity of oil. The capped oil pipes shown in the above halftone supply oil to the gear teeth.

THE LOOSE PULLEYS RUN ON REMOVABLE BABBITT BUSHINGS in which graphite inserts are moulded. These bushings are fitted with felt strips which retain the slight amount of oil necessary; a few drops once a week being all that is required. This style of bushing provides effectually against the flying oil (so ruinous to belts) which is characteristic of the usual bronze bushing which is recessed to carry loose oil.

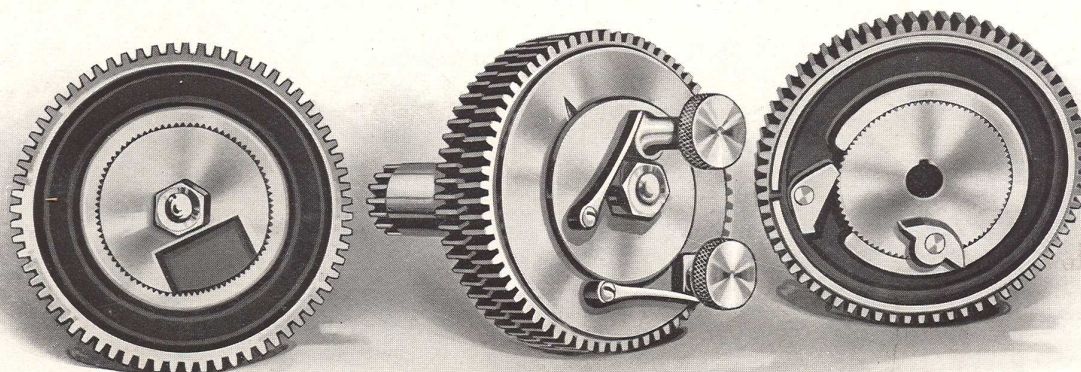


Details of Feed Friction used on all "American" Planers above the 28-inch Size.

The adjusting gear and pinion are used only on 42-in. Planers and up.

Segment gear operates feed to side head.

This friction is of an improved type and is very efficient. It is of the combined adjustable band and disc pattern, which provides a much larger frictional area than the plain band type. It will readily pull all heads at the coarsest feed provided. When a left hand side head is supplied an independent friction is furnished for operating it.



Feeding mechanism is extremely simple and efficient. It is so arranged that the automatic feed of one head is entirely independent of the other, as to the direction.

For Example: This construction used with two heads on cross rail, makes it possible to use a rail head for such work as cannot be reached by a side head, as either head may be fed across the rail in either direction, while the other head is being fed up or down.

The above feature is of particular value when no side head is furnished, as it will greatly facilitate the planing of work (with two rail heads) which would otherwise require an additional operation.

FACTS ABOUT CRANK SHAPERS.

Shapers are most advantageously adapted to tool room work, die making and to planing up short work which would otherwise have to be done on a planer or milling machine. For work of this nature, the shaper is far in advance of either the planer or the milling machine, as it is capable of machining this class of work with much greater rapidity than will either of the other two machines mentioned. The class of work handled on a shaper usually requires extreme accuracy and as accurate work can be produced only by accurately built machines, it is evident that unusual care must be given to the construction of these tools.

The department in which "American" Shapers are built, is devoted exclusively to their manufacture, and contains all of the manufacturing refinements necessary to the production of accurate work. All flat bearings are scraped to Brown & Sharpe Surface Plates and all cylindrical bearings are ground to size. The utmost care is observed in assembling these machines, and every Shaper, when completed, is thoroughly tested and a record retained of its alignments, none of which are permitted to exceed .001 part of an inch in error.

"American" Crank Shapers are built in the following sizes: 15", 16", 20" and 24", all of which, above the 15" size, are Back Geared.

In addition to their excellent workmanship, our shapers embody many features of value, such as **Full Length Taper Gibs** for all flat bearings, **Patented Feeding Mechanism**, **Patented Link Connection between the Ram and Rocker arm**, **Improved Table Support** and **Automatic Safety Device for Saddle**.

One of the most interesting features of "American" Shapers, and one which is absolutely essential to the life and accuracy of any Shaper, is the use of Full Length Taper Gibs for taking up the wear. These gibs are arranged for end screw adjustment, by means of which a perfect full length bearing can be constantly maintained and the rate of wear kept down to a minimum. The importance of this feature cannot be over-estimated, for the rate of depreciation of a machine tool is directly proportionate to the rate of wear in its bearings.

The Full Length Taper Gib undoubtedly affords a more efficient and convenient method of taking up wear than is provided with flat gibs, which require the use of a series of set screws for adjustment. Full length metal to metal contact is impossible with the latter type of gib. Moreover, it is also very difficult to make the necessary adjustment.

With our Full Length Taper Gib construction the degree of accuracy inherent in "American" Shapers positively can be retained thruout the life of the machine, and a full length metal to metal contact is assured at all times.

The Patented feeding mechanism of "American" Shapers, provides a construction of unusual merit, and it is, without doubt, the most substantial and convenient Shaper Feed Mechanism ever devised. It is of the well-known Planer Type and furnishes twenty-five rates of feed, ranging from .008" to .025". **ANY DESIRED FEED IS EASILY OBTAINABLE WHILE THE MACHINE IS IN OPERATION.** The feed changes are made by means of a star hand knob on the feed rocker arm which is indexed, the feed in use being in plain view at all times.

This feed change mechanism is placed in the most convenient position possible, and is **ALWAYS WITHIN EASY REACH OF THE OPERATOR.** The adjustment necessary to operate this feed mechanism is entirely limited to the one required in setting the feed on the rocker arm. The feed is uniform as set, regardless of the position of the rail; the construction being **SUCH AS TO RENDER UNNECESSARY ANY ADJUSTMENT** due to a change in the height of the rail. The feed is engaged, disengaged or reversed while machine is in operation, through the knob on the large feed gear at end of rail.

An automatic safety device is provided, the connection between the feed mechanism and cross feed screw being made by means of a fibre adjustable friction. This forms a "Fool Proof" feature, which will protect the feed works from damage should the tool accidentally be fed into the cut, or the apron be fed into either end of the cross rail. This fibre friction can be adjusted to pull the heaviest cut without slippage and is not subject to atmospheric conditions, temperature, or the action of oil, as when leather is used.

The Patented Link Connection between the Ram and Rocker Arm is an improvement which can be found only on the "American" Shapers. This connection is made thru a double link which is so constructed as to pull down on the ram during the cutting stroke, thus tending to overcome the upward thrust of the cutting tool. The Rocker Arm is rigidly connected to the pivot shaft at the bottom of the column which supports all the weight of the arm and other parts. Consequently, the ram is not required to carry any "dead weight" and a much smoother action is therefore possible, as the tendency to vibrate is practically eliminated.

This construction is far superior to that used on other makes of Shapers on which the rocker is attached directly to the ram, the link connection being at the bottom of the rocker arm at the fulcrum point where rigidity is most essential. With this construction the rocker arm also tends to lift the ram during the first half of the stroke, and, moreover, necessitates the ram carrying the "dead weight" of all the parts at all times, which creates more wear on the ram bearings besides consuming more power. This latter design will also cause the work to show all the vibration which takes place in the rocker arm.

The Table Support is a simple and substantial arrangement which is bolted to the Shaper Base on a surface which is planed for this purpose. This support differs from most other designs in that it bears by means of a roller on a planed surface on the underside of the table where it is free from dirt and chips. Moreover, the support is always directly under the cutting tool.

We want you to investigate our shapers before placing your next order. Write us at once.

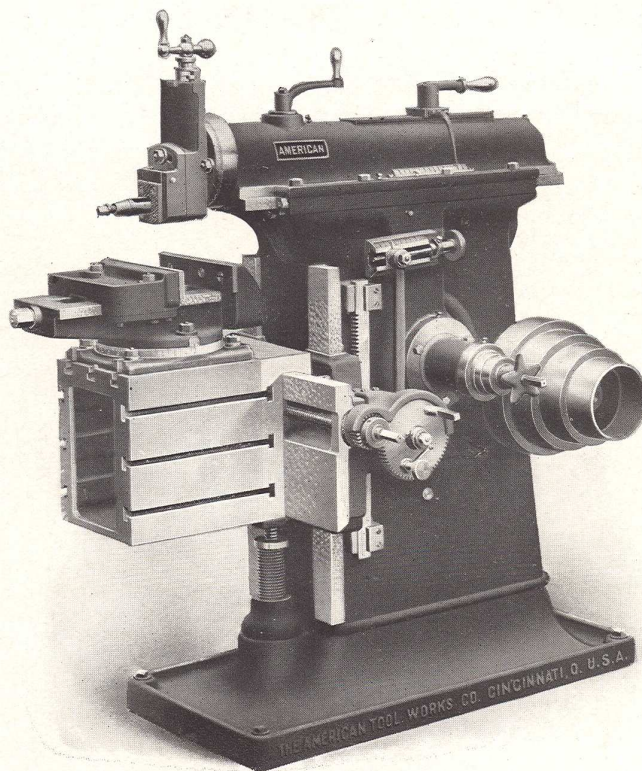
"American" Shapers are strictly high class machines in every respect and we are confident that they will satisfactorily fulfill your requirements.

LATHES
14" to 42"

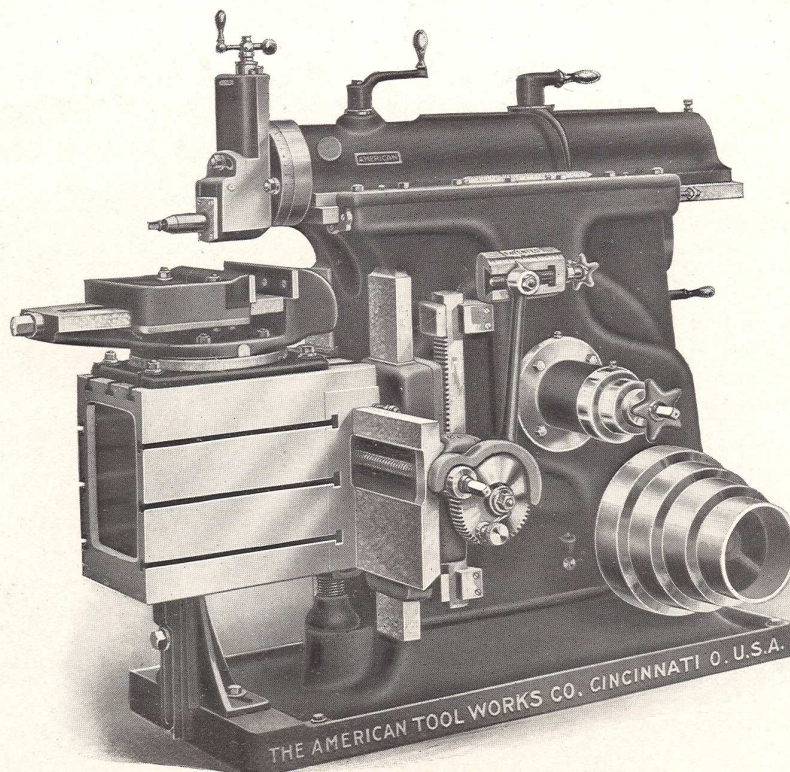
PLANERS
22" to 72"

SHAPERS
15" to 24"

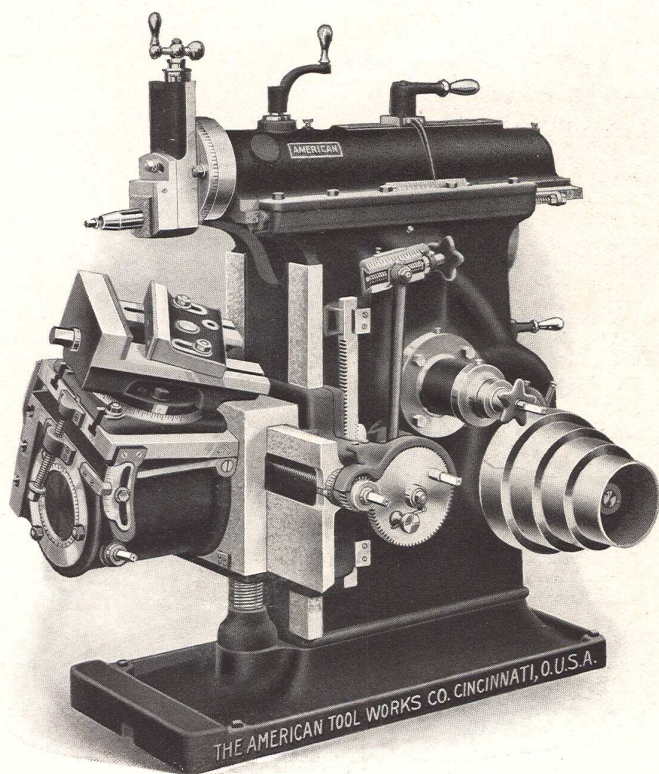
RADIAL DRILLS
2' to 7'



“American” 15-inch Single Geared Crank Shaper.

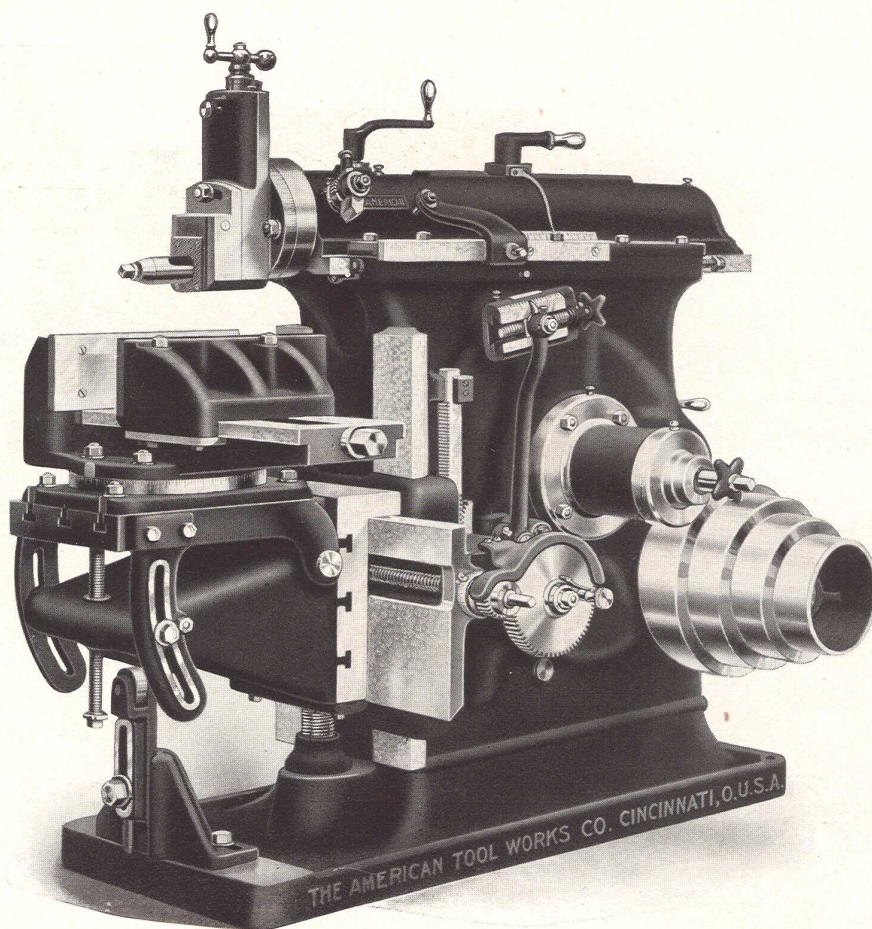


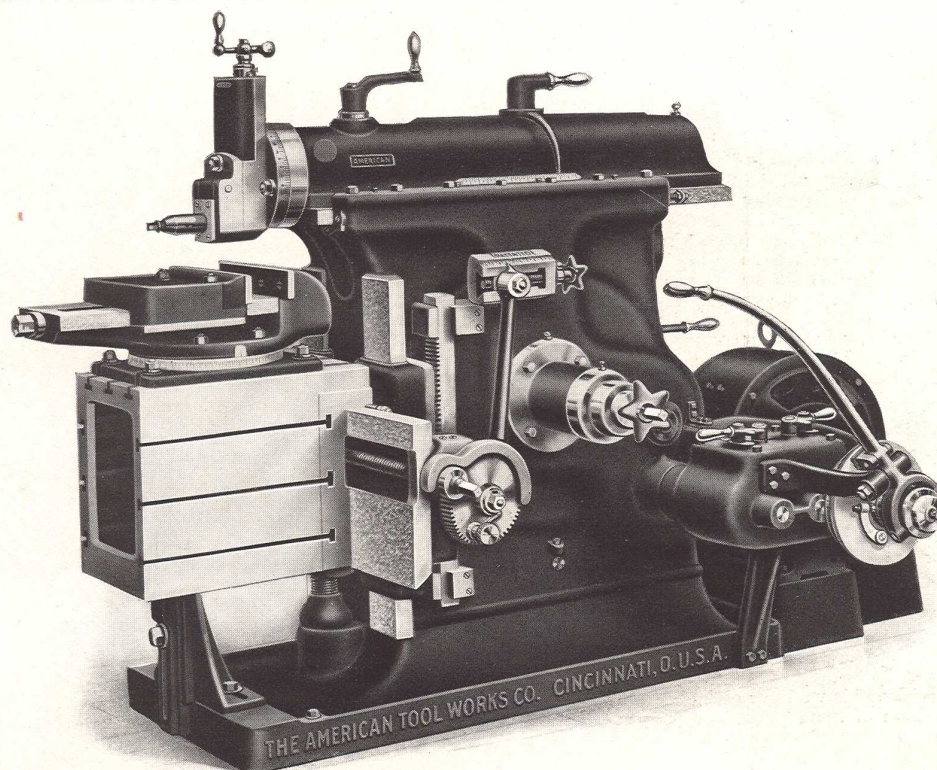
“American” 16, 20 and 24-inch Back Geared Crank Shaper.



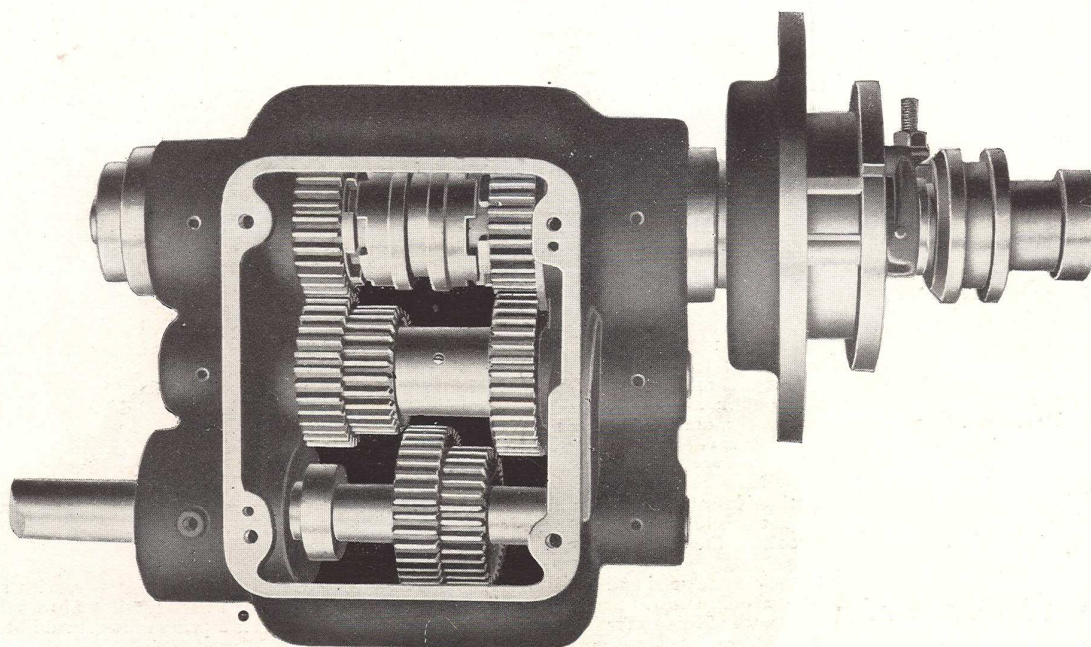
“American”
Crank Shaper
with
Universal Table
and Vise.

“American”
Crank Shaper
with
Mold Maker’s
Table,
Vise and
Power Down Feed
to Head.





"American" Crank Shaper, Motor Driven thru 4-speed Box.



4-speed Box furnished with either Belt or Motor Drive.

The above half-tone shows the simple construction of the 4-speed box as applied to "American" Shapers, there being only 7 gears and one double face clutch used in this mechanism. Power is transmitted to the box thru a friction by means of which the machine can be started and stopped independently of the motor or countershaft. A constant speed motor is used as 8 cutting speeds are supplied to the ram thru the 4-speed box in combination with the back gear. A friction brake is provided by means of which the ram can be stopped instantly without stopping the motor or driving pulley. Excellent lubricating facilities are provided.

All speed changes can be made instantly while the machine is running.

FACTS ABOUT RADIAL DRILLS.

Drilling resolves itself into the Cost per Hole:

The subject of drilling is one which has received comparatively little attention, although every machine shop uses a Drill of some sort. The drilling of a hole, is in itself, a very simple matter, but, if you will stop to roughly estimate the number of holes actually drilled in your shop each year, the fact that your drilling is an important operation, will be self-evident. All machine tool operations come under the head of removing metal, and whether it is drilled out, planed or turned off, it is of the same importance. Some time ago, we estimated the number of holes drilled in our shop each year and found to our amazement that the number approximated 1,000,000. This alone was sufficient to convince us that drilling is as important, in proportion to the time consumed, as any other mechanical operation, and therefore if the Drilling Department is not properly equipped, the cost of drilling holes is increased. Time saved on a drilling operation has the same proportionate value as that on any other operation. Therefore it will pay you to keep your Drilling Equipment up to the highest possible point of efficiency.

In view of this fact, we would recommend to your careful consideration, the following with reference to our line of High Speed Radial Drilling Machines. These machines are built in 2'-2½'-3'-3½'-4'-5'-6'-7' Plain Radial Sizes and 4'-5'-6' and 7' Full Universal Radial Sizes. The Smaller Radials, up to and including 3½' machines, are single back geared, while the larger machines are triple geared. We also build a line of 2'-3' and 4' Ball Bearing, High Speed "Sensitive" Radials, all of which are illustrated on the following pages.

The Radial is fast supplanting the large Upright Drill, for reasons which are self evident. In every respect the Radial is more convenient and will turn out work with greater rapidity than is possible with the Upright. For example: our 2' Radial will accommodate even a heavier class of work than the 30" Upright Drill and is far more convenient to operate. With the Upright, the work must be moved every time a hole is to be drilled, while on the radial this is unnecessary as the work can be clamped to the table and the head moved or the arms swung into the correct position for drilling. Another important fact is that our Radials are regularly furnished with tapping attachment, while on the Upright, this is a feature furnished only at extra cost. In regard to price, our Radials compare very favorably with Upright Drills of sufficient size to handle a similar class of work.

"American" Radial Drills are built in a Department devoted exclusively to their production, which contains all of the manufacturing facilities conducive to highly accurate work, including a complete equipment of jigs, surface plates, templates, etc. We produce each month for shipment between 30 and 40 Radials, the number depending upon the sizes of the machines.

In "American" Radials we have embodied many features of great practical value, such as high initial driving power, direct transmission, elimination of loose gears, low periphery speeds of gears, bronze journals, and a highly developed and efficient oiling system.

The successful combination of these features has enabled us to produce machines that are unequalled in all respects for their:—

POWER

CONVENIENCE

SIMPLICITY

"American" Radials afford greater back gear ratios than any other standard make of Radial Drill. The 4'-5'-6' and 7' Plain and Full Universal Radials are triple geared and afford one direct, one reduced and one double-reduced speed. The tapping attachment on the Plain Radials is carried on the head and forms the connection between the arm shaft and triple gear mechanism. On the Full Universal Radial, the tapping attachment is located near the arm girdle. In both cases, it is operated from the front of the head by means of a lever conveniently located for the operator. The frictions used in this mechanism, on the plain Radial, are of our "Patented" Double Band Type and afford approximately 160% of the frictional area of the average single band clutch, while on the Universal Drills a hardened and ground Nicol steel band clutch is used.

These frictions are so located that power is transmitted thru them before the speed is reduced thru the triple gear mechanism; consequently, the frictions run at much higher speeds than is possible on such Radials as have either a smaller back gear ratio, or where the speed reductions are made before the power has been transmitted thru the tapping attachment. The double band friction is one of the exclusive features of "American" Radials and a detailed illustration is shown on one of the pages following.

In convenience of operation, "American" Radials are unequalled. Every feature is carefully worked out to enable the operator to manipulate the machine with the greatest convenience and with the least exertion. The column sleeve rotates on hardened and ground steel conical rollers, making the swinging of the arm extremely easy, which is a point the operator will certainly appreciate.

The tapping attachment lever, which starts, stops and reverses the spindle, and which is therefore used oftener than any other controlling member of the machine, is also located most conveniently for the operator. The feeding mechanism is very simply constructed, and provides eight rates of feed on the triple geared machines and four rates on the smaller sizes. Any of the feeds can be quickly obtained by merely turning the feed dial until the desired feed, indicated thereon, comes opposite a fixed pointer. The depth gauge always can be set from zero and the automatic stop will accurately trip the feed at any predetermined depth within the range of the spindle traverse. All levers, hand knobs, and controlling members, are conveniently located. This is a very valuable feature, as it not only saves time in manipulation, but saves the strength of the operator; all effort required for the various adjustments being reduced to a minimum.

Simplicity of construction is a distinctive attribute of "American" Radials. In designing these machines, great care was taken to eliminate every possible lever and gear not absolutely needed, and, as a consequence, our Radials have no superfluous parts to consume power and to increase the maintenance cost of the machine.

The most conclusive evidence of their extreme simplicity is found in the fact that our triple geared Radials, with speed-box drive, afford 24 spindle speeds by the use of only two (2) levers and thirteen (13) gears in the speed change mechanism. Too much emphasis cannot be placed upon the importance of this factor in Radial Drill construction, and this is a point which should be carefully investigated before placing an order for additional equipment.

Our Radial Drills are recognized by experienced users as the most productive machines of their kind on the market to-day.

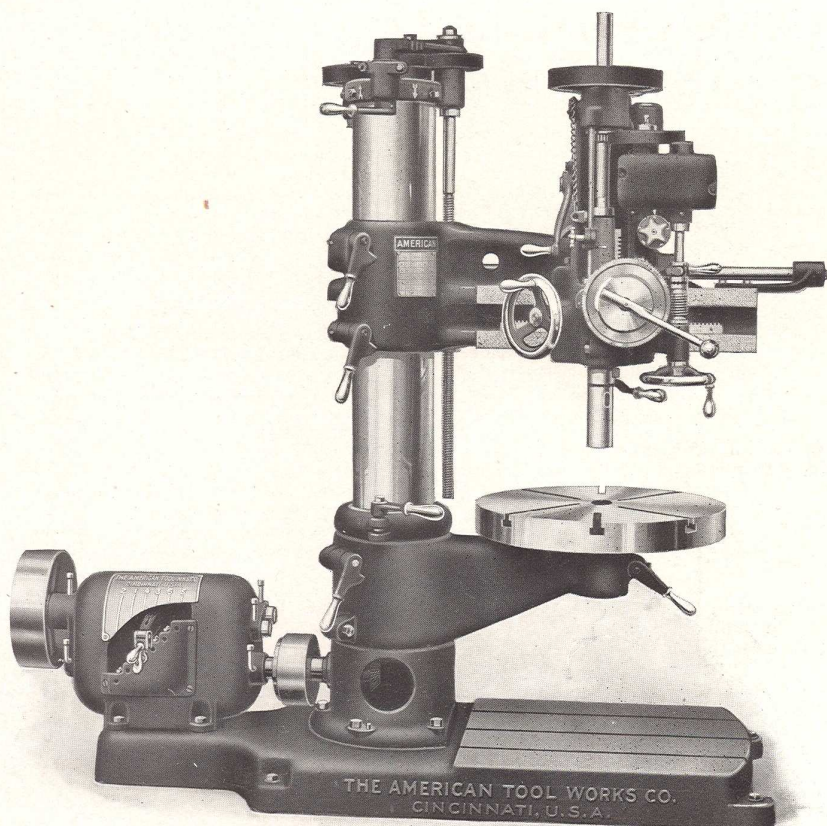
Before placing your next Radial Drill order, we want you to investigate our machines, as we are confident they will give you the same satisfaction that they have given hundreds of other manufacturers. Investigation costs you nothing. Write us for particulars.

LATHES
14" to 42"

PLANERS
22" to 72"

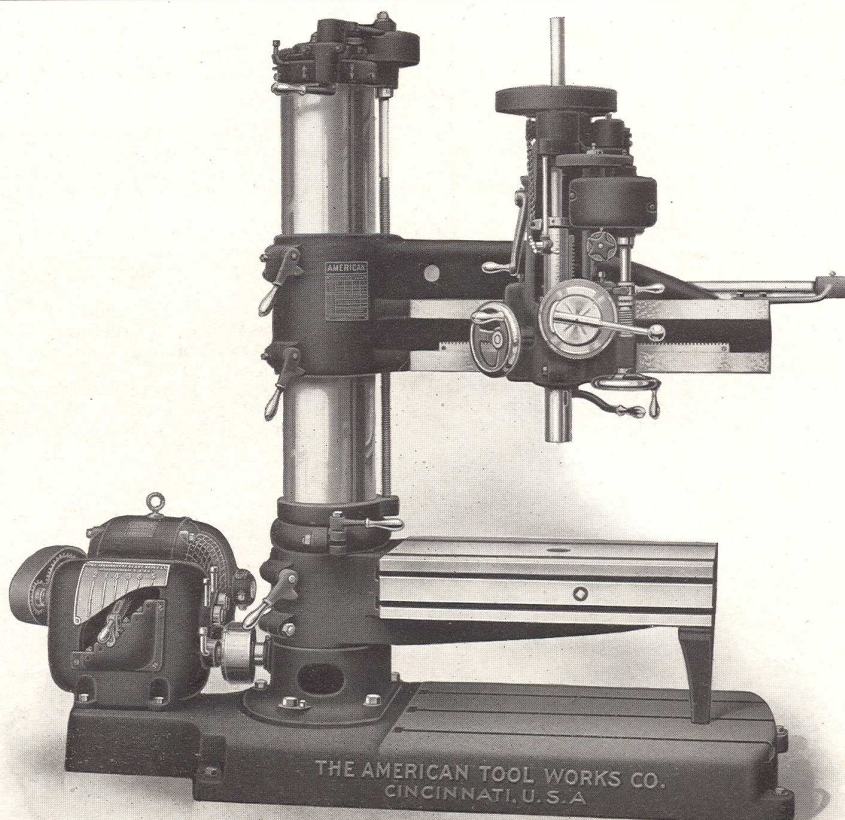
SHAPERS
15" to 24"

RADIAL DRILLS
2' to 7'

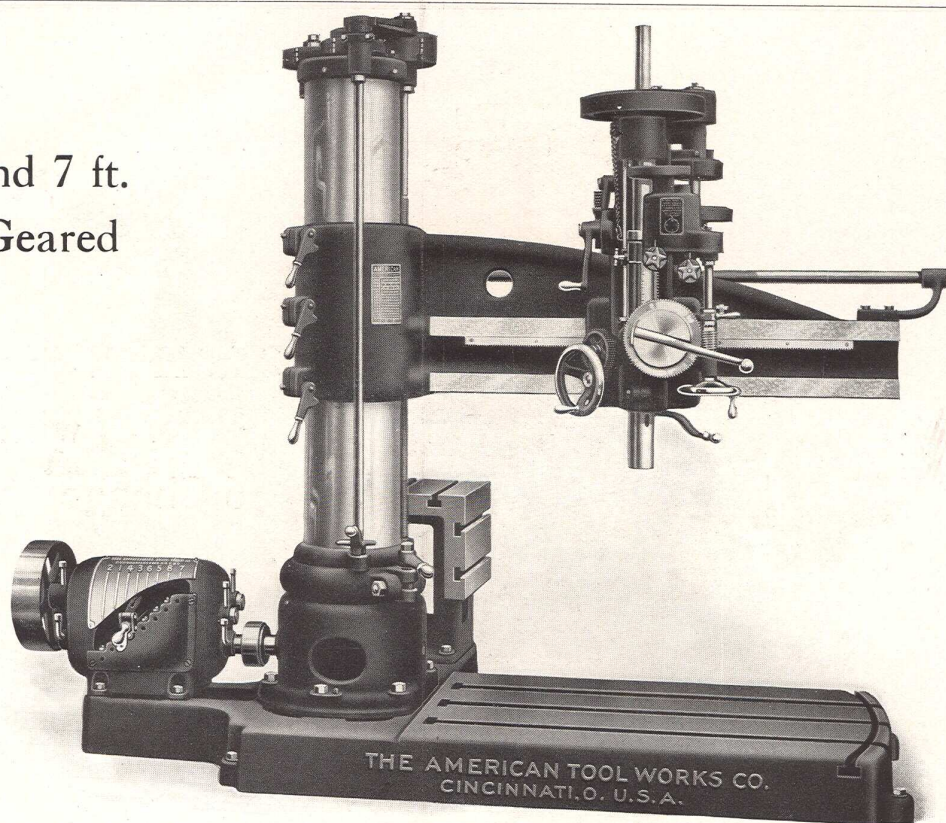


2 ft. High Speed Radial
with
6 Change Speed Box.

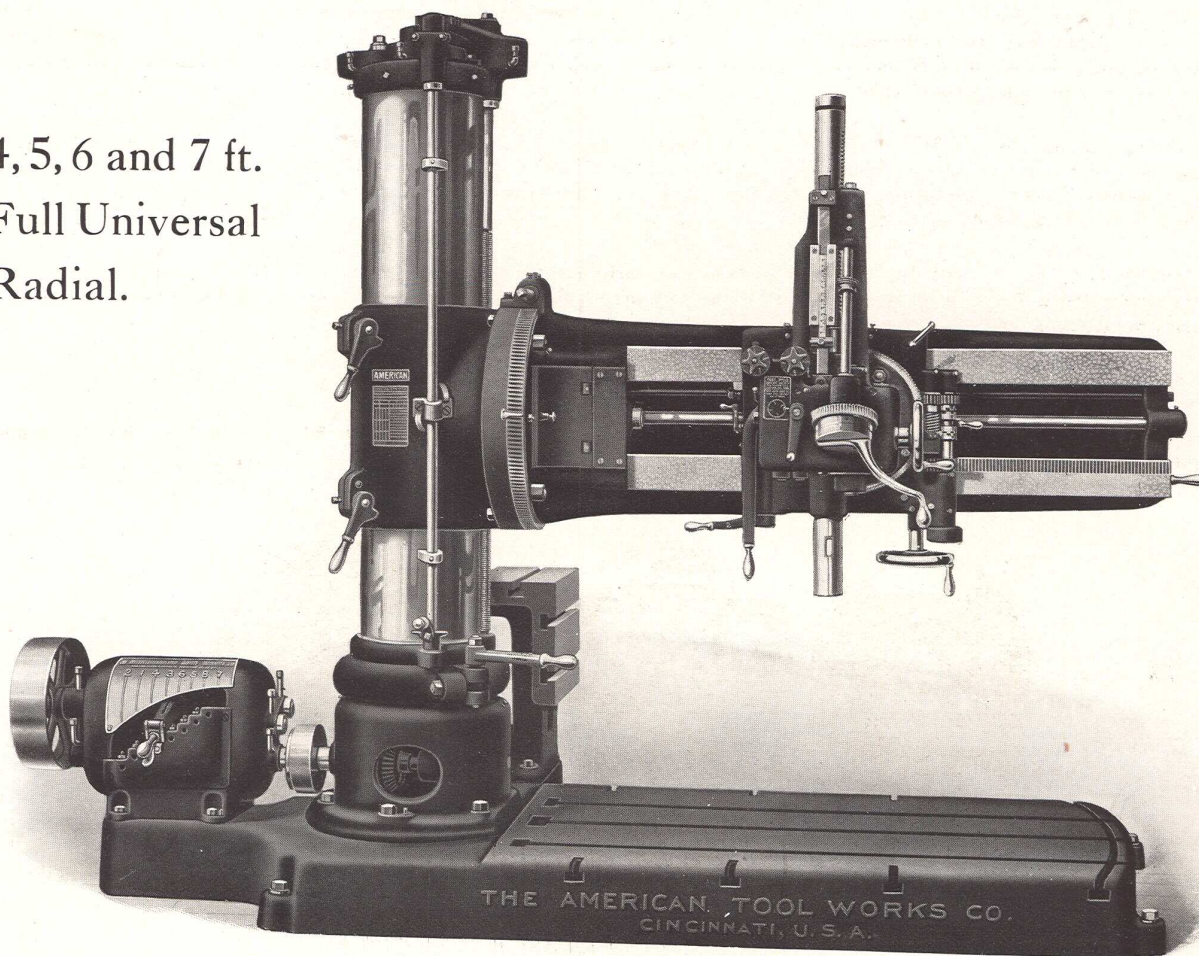
$2\frac{1}{2}$, 3 and $3\frac{1}{2}$ -ft. High
Speed Radial with
6 Change Speed Box
arranged for Motor
Drive.

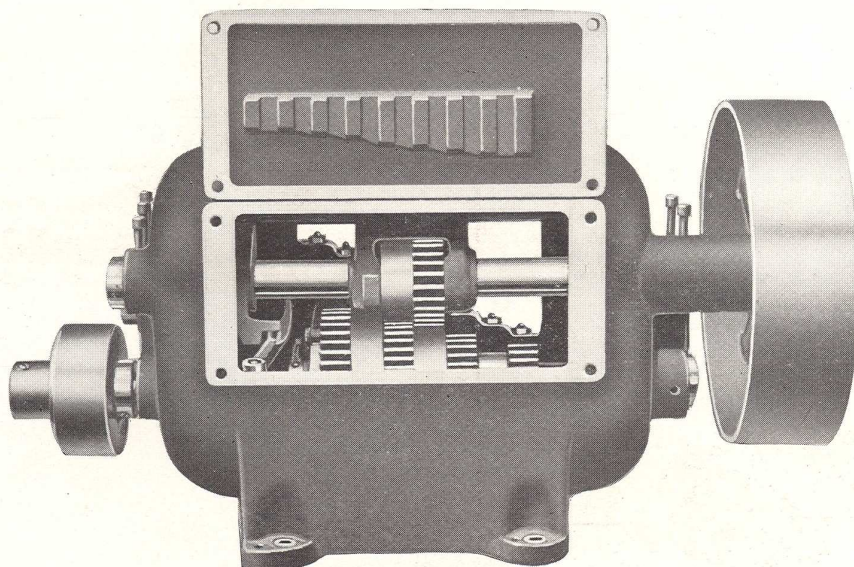


4, 5, 6 and 7 ft.
Triple Geared
Radial.



4, 5, 6 and 7 ft.
Full Universal
Radial.





8-Speed Box for 4, 5, 6 and 7-foot Plain and Full Universal Radials.

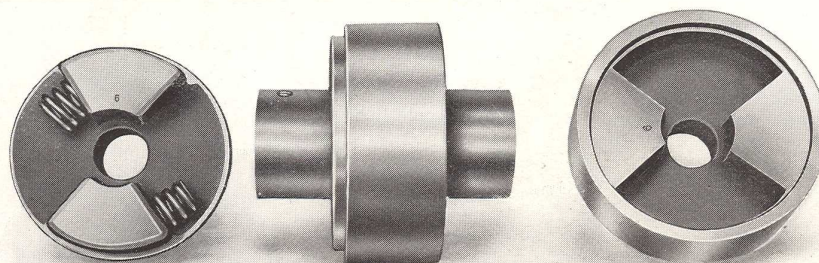
The speed box mechanism is of very simple construction. The speed changes are obtained through a compound tumbler gear, which in connection with four gears on the cone provides 8 speeds changes by means of only 7 gears. These changes, in connection with the triple geared head mechanism provide 24 spindle speeds. The speeds may be easily changed without shock to the driving mechanism as the cone gears are kept rotating while changing speeds by means of an auxiliary drive between the pulley and cone shafts which is automatically engaged and disengaged by the raising and lowering of the tumbler lever when changing from one speed to another. This auxiliary drive is certain in its action and operates through a friction clutch which may be adjusted as required. The auxiliary drive is used only in making speed changes.

The tumbler lever is located in its various positions by a notched plate which prevents the gears from being improperly engaged and also prevents the shifting of the tumbler lever until the auxiliary drive is thrown into operation. After the tumbler lever is located it is securely locked in its position by a latch and locking pin, thus preventing destructive vibration and rapid wear of the gears with the subsequent noise and loss of efficiency.

All driving gears are made from a **special grade of steel carbonized and hardened** and are cut with Brown & Sharpe 20 degree involute cutters which form a pointed tooth. This is the only proper and satisfactory tooth to use in a tumbler gear mechanism as it permits the engaging of the gears without shock or clashing.

A spring coupling in the line of drive absorbs all shocks and strains and thus insures long life to the driving mechanism.

This style of box is readily interchangeable with the 4 step cone pulley regularly furnished, and an "American" Radial equipped with this drive can be easily converted into a motor driven machine at any time.



Details of the Spring Shock Absorber which is located in the line of drive between the gear box and the initial driving gears in the column. This mechanism minimizes the possibility of breaking the gears from sudden shocks or strains.

ALL AGREEMENTS MADE SUBJECT TO STRIKES, FIRES AND OTHER CAUSES OF DELAY BEYOND OUR CONTROL.
WE WILL NOT BE RESPONSIBLE FOR ANY CONTRACT NOT SIGNED BY AN OFFICER OF THE COMPANY.

WE ARE NOT IN THE PUMP TRUST

DEAN BROTHERS
STEAM PUMP WORKS
INDIANAPOLIS, IND.

JET AND SURFACE CONDENSERS
VERTICAL ECONOMIC VACUUM PUMPS
STEAM POWER AND ELECTRIC PUMPS
DUPLEX PUMPS SIMPLE PUMPS



July 10, 1911.

American Tool Works Co.,
Cincinnati, Ohio.

Gentlemen:-

We have made a thorough test of your six foot radial drill and wish to express our satisfaction. It exceeds your guarantee. We herewith enclose photo of the drill at work. In the foreground are the borings from five hours work. The drill in use is a three inch twist drill in solid steel no relief drill is used.

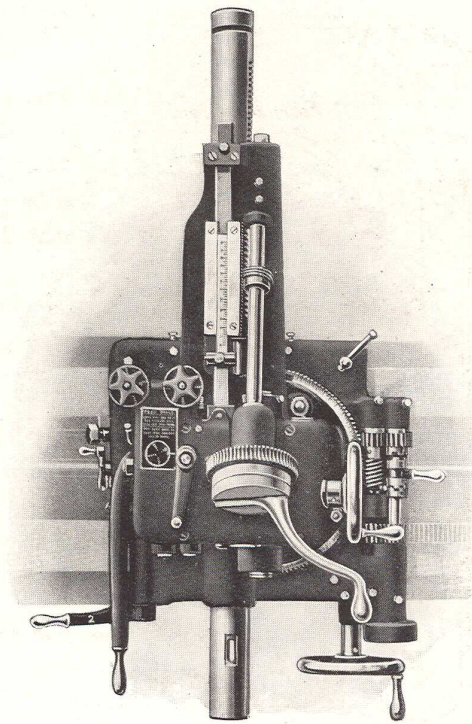
Yours truly,

DEAN BROS. STEAM PUMP WKS.

By *John C. Dean*

JCD/CEA



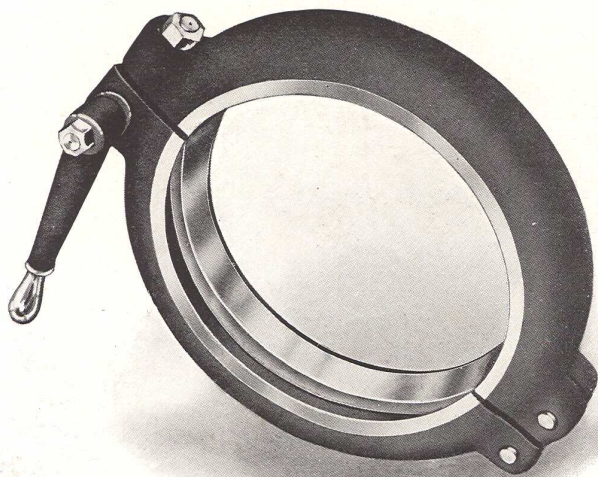


Full Universal Radial Drill Head.

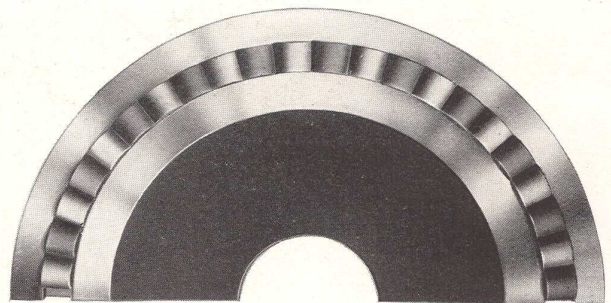
THE HEAD CAN BE ROTATED IN A COMPLETE CIRCLE by means of a worm and worm wheel swiveling device, which is operated by the hand wheel shown at the lower right hand side of the saddle. This hand wheel affords a much quicker and more convenient means of swiveling the head, than that provided on other drills, some of which require the use of a socket wrench. This hand wheel is also used to traverse the head along the arm—a clutch being provided, which permits engaging either the saddle moving or head swiveling device. This clutch can also be set central, thus safeguarding against accidental disturbance of the head when set for angular drilling.

STEEL GEARS ARE USED THRUOUT the machine, with exception of the spindle gear, which is phosphor bronze.

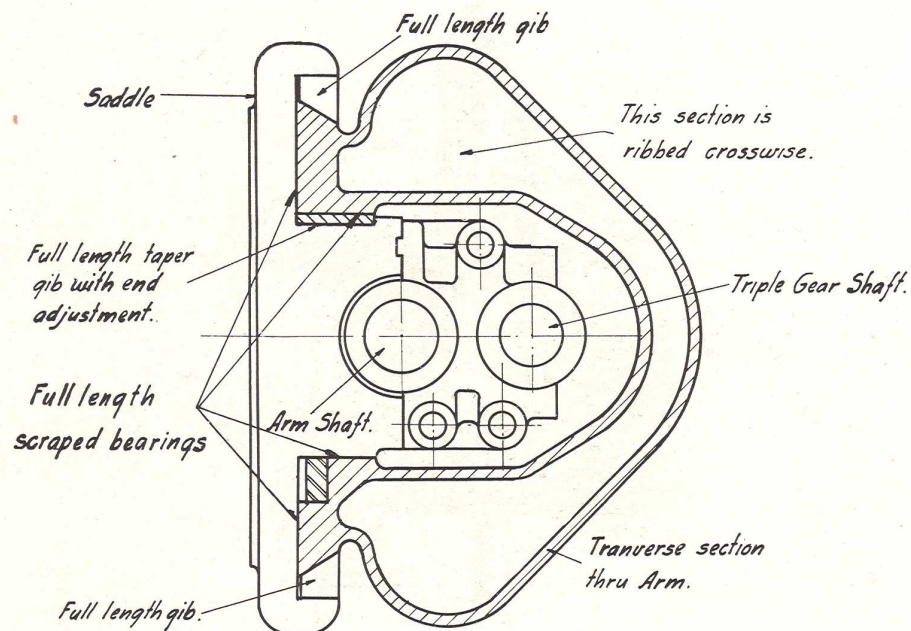
ALL BEARINGS are bored from the solid on Precision Boring Machines, and are BUSHED WITH PHOSPHOR BRONZE. The oiling arrangement is very efficient and is original to "American" Radials, the bushings being fitted with felt oil wipers, which filter and also properly distribute the oil. The lubricant is brought to the bearings thru gravity oil pipes which carry a large quantity of oil.



The Patented "V" CLAMPING RING for clamping the column and column sleeve on "American" Radials is carefully scraped to a bearing and can be moved around the column to suit the position of the operator.



This illustration shows the gauge for testing the rollers and also the arrangement of the conical roller bearings upon which the column sleeve rotates. These cones are hardened steel and are spaced by rollers of smaller diameter, thus eliminating the tendency to "drag."

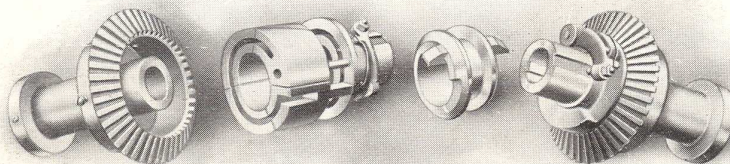


Full Universal Radial.

Reinforced Double Section Arm Construction.

This new type of Universal Radial Arm is made in the form of upper and lower tube sections which are firmly bound together in the back for their entire length by a double wall of metal and further reinforced by heavy transverse ribbing. The Saddle has exceptionally large bearings on the ways and can be firmly locked at any point along the arm by a clamping device which binds together the arm sections and the saddle into a compact unit; thus all strains are equally distributed to every part of the arm.

This unquestionably forms the most rigid construction possible for resisting torsional and bending strains, and we therefore positively guarantee, the Arm of the "American" Full Universal Radial to be equally as Rigid as that of any Plain Radial of a corresponding size.



Details of the "Patented" Double Band Frictions used in the Tapping Attachment of "American" Triple Geared Radials.

We call especial attention to the construction and action of the Double Band Friction which consists of a combined internal expanding and external contracting band. These bands are carefully ground on a fixture which holds them in their normal expanded position. This method insures that the clutch ring will conform exactly to the ground contact surfaces of the gear, thus insuring a perfect metal to metal contact when the friction is engaged.

THE "AMERICAN" TRIPLE GEARED 4^{FT} RADIAL

EASILY HANDLES THIS SEVERE
JOB OF PIPE TAPPING.

18 R.P.M. - 9 ACTUAL H.P. AT TAP.

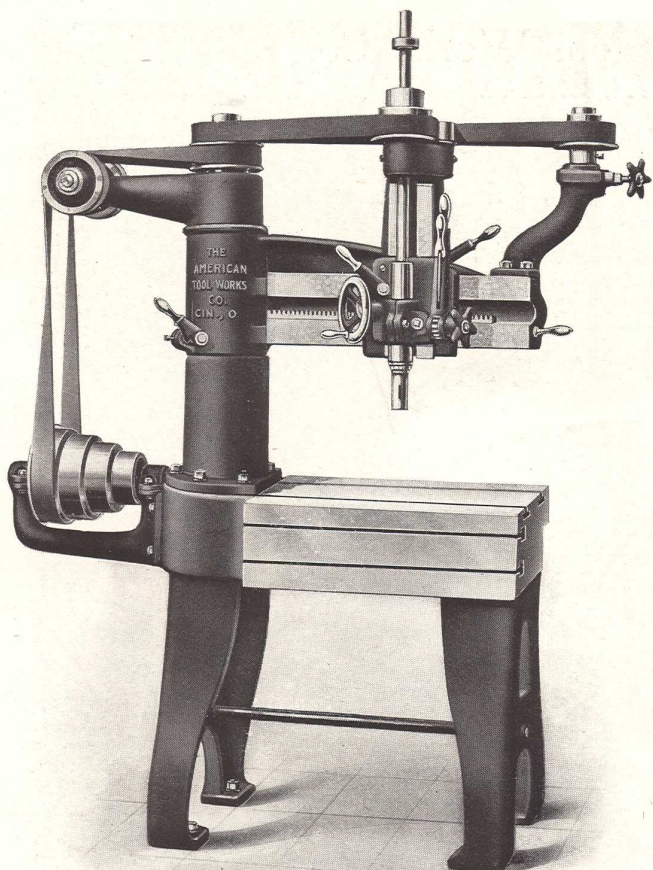
6 IN.

PIPE TAP

CUTTING SPEED 30.8^{FT} PER MIN. - FEED 2¹/₄" PER MIN.

WRITE FOR "INSIDE INFORMATION" ON DRILLING & TAPPING
WITH 2'-2¹/₂'-3'-3¹/₂'-4'-5'-6'-7' SIZES.

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



Drills 12— $\frac{3}{4}$ " holes thru $\frac{1}{2}$ " cast iron plate in 1 minute.

COMBINES
the
High Productive Capacity
of the
RADIAL
with the
Unquestionable
Efficiency
of the
SENSITIVE.

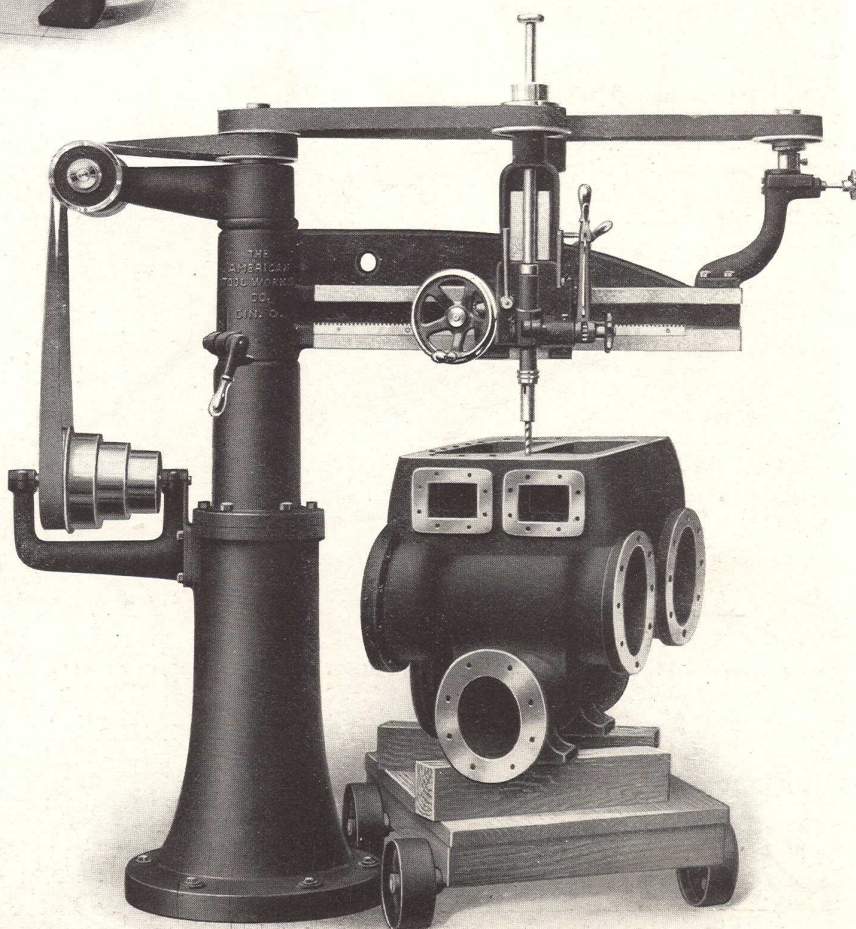
"American" Sensitive Radials are
Ball Bearing Thruout.

Drills 20— $\frac{1}{2}$ " holes thru
 $\frac{1}{2}$ " cast iron plate in 1
minute.

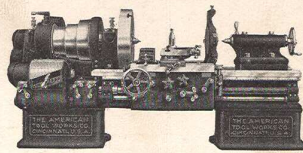
SPINDLE
has
Direct Belt Drive
—No Gears—
giving
6 - SPEEDS
suited to
High Speed Drills up
to $\frac{3}{4}$ " Dia.
to run
300 to 900 R. P. M.

"American" High Speed
"Sensitive" Radial Drill

Built with Table in 2 and 3 ft. Sizes, and
with Pedestal Base up to 4 ft.

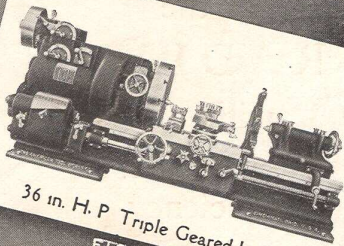


The American Tool Works Co.
CINCINNATI, U. S. A.

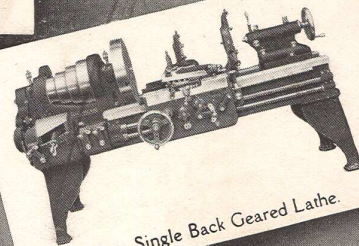


24 in. Double Back Geared Lathe.

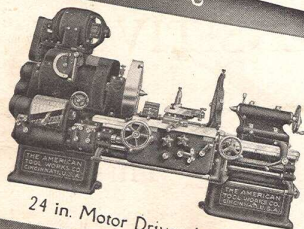
FIG. 31-C



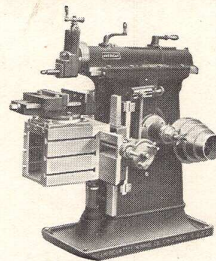
36 in. H. P. Triple Geared Lathe.
FIG. 70-G



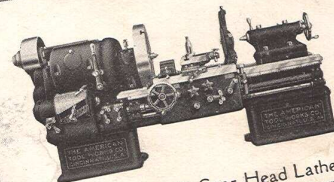
18 in. Single Back Geared Lathe.
FIG. 12



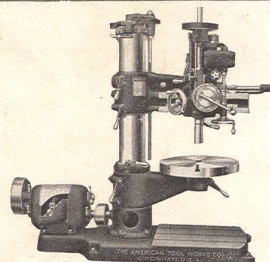
24 in. Motor Driven Lathe.
FIG. 37-A



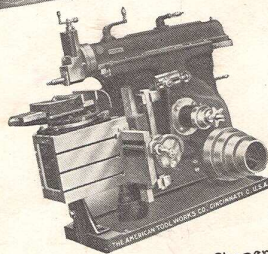
15 in. Single Geared Shaper.
FIG. 203



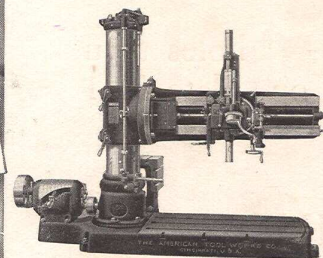
20 in. "Patented" Gear Head Lathe.
FIG. 23



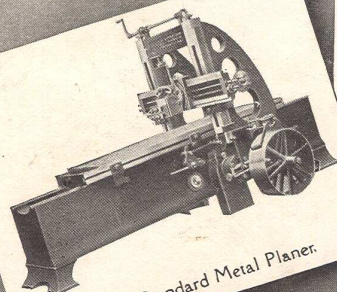
2 ft. Back Geared High Speed Radial Drill.
FIG. 340



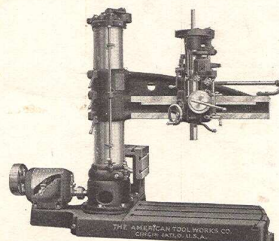
24 in. Back Geared Shaper.
FIG. 224



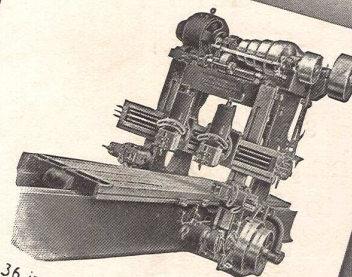
5 ft. Full Universal Radial Drill.
FIG. 360 B



24 in. Standard Metal Planer.
FIG. 157



4 ft. Triple Geared High Speed Radial Drill.
FIG. 357



36 in. H. P. Planer M. D. Thru 4-Speed Cone Variator.
FIG. 181 F

ACCURACY
POWER-RIGIDITY.

HIGH QUALITY MACHINE TOOLS.