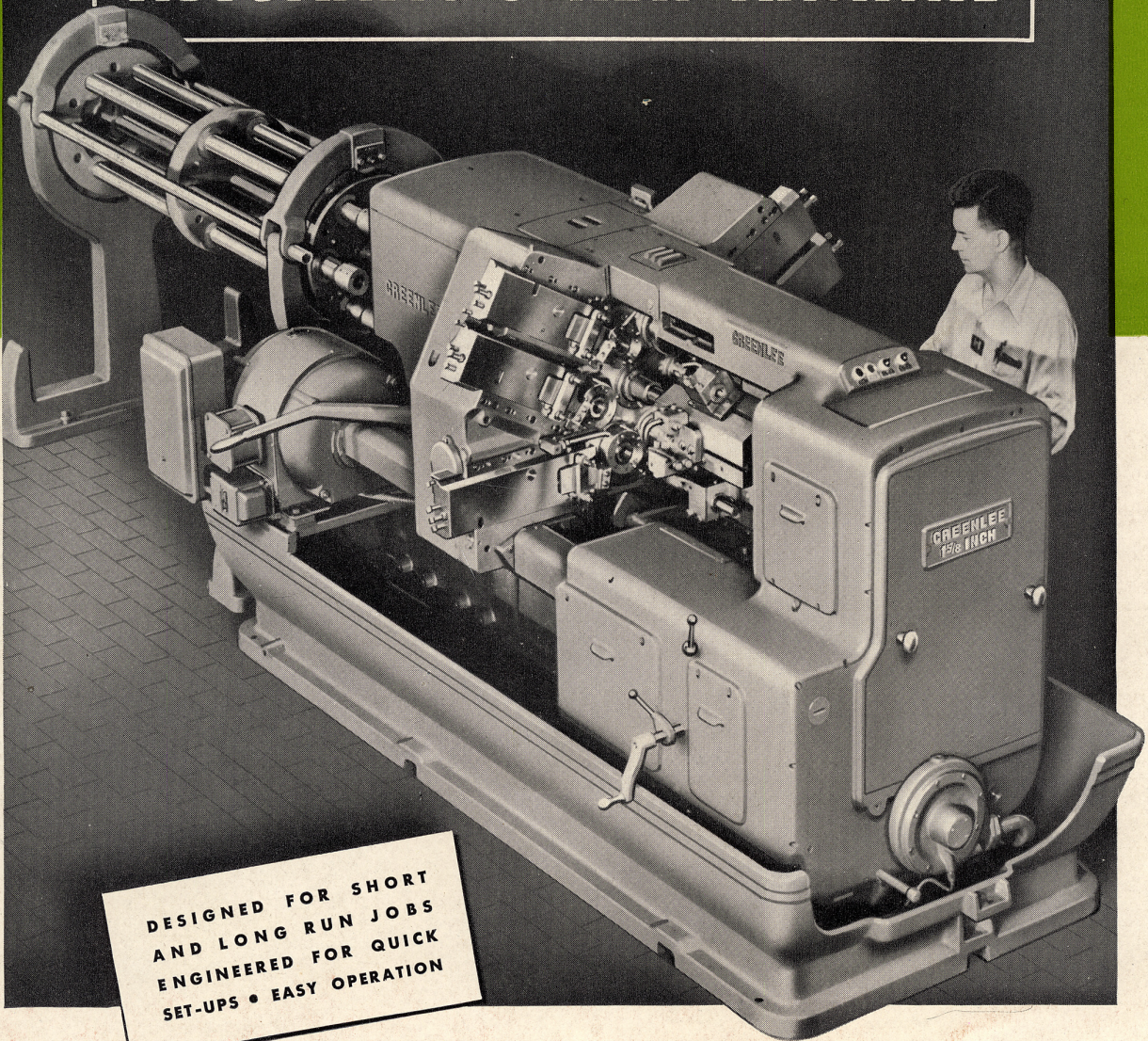


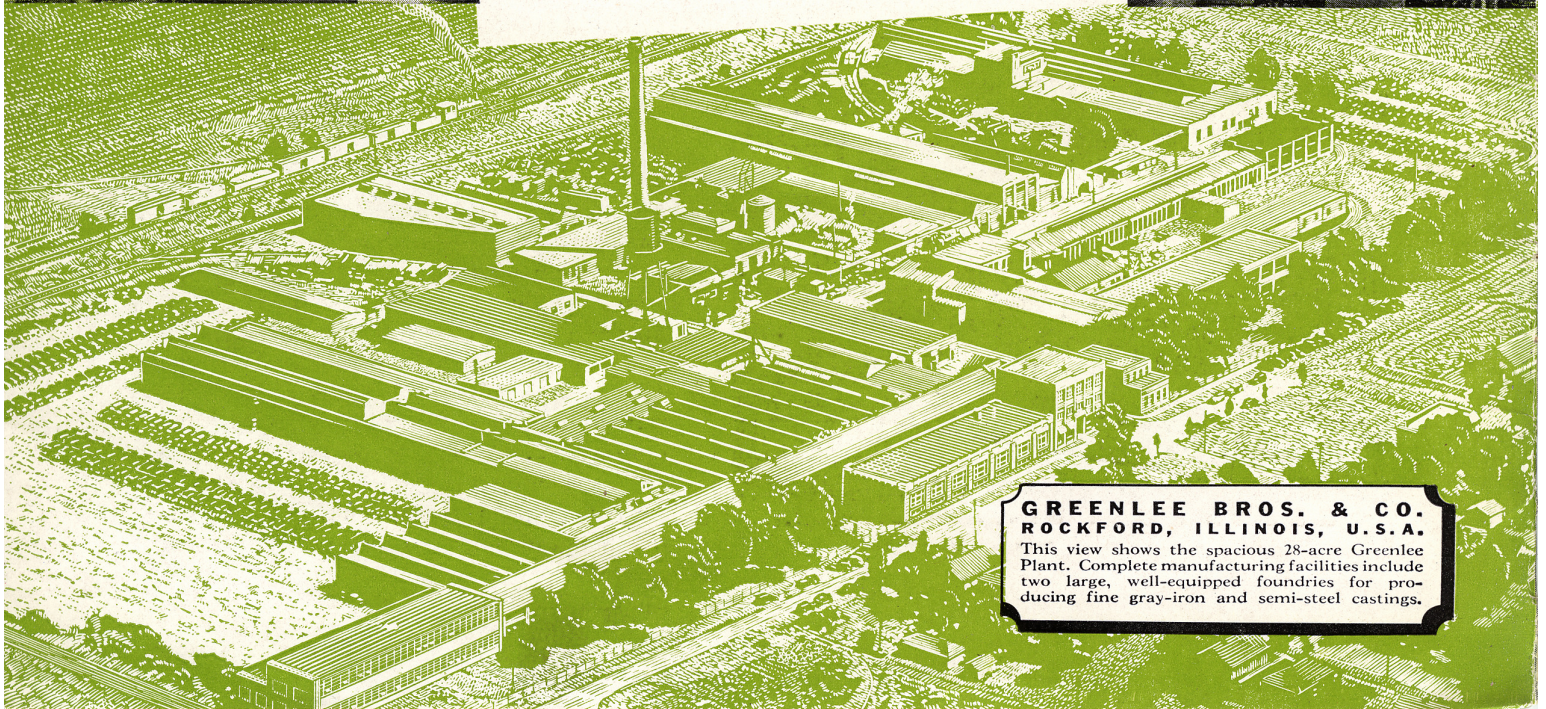
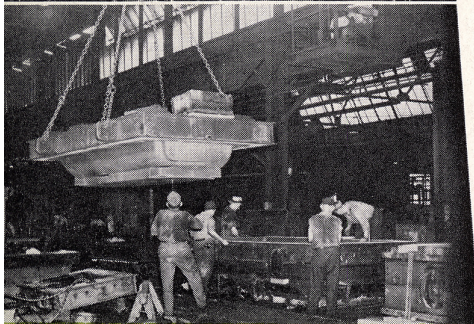
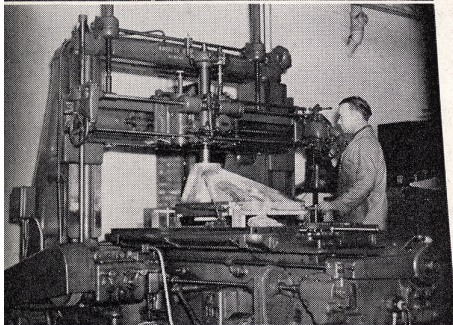
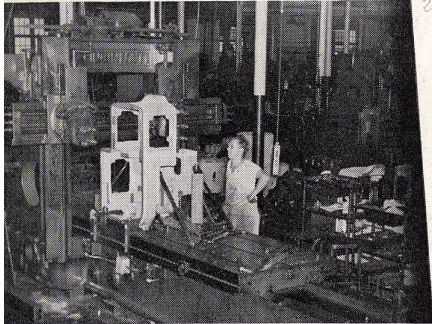
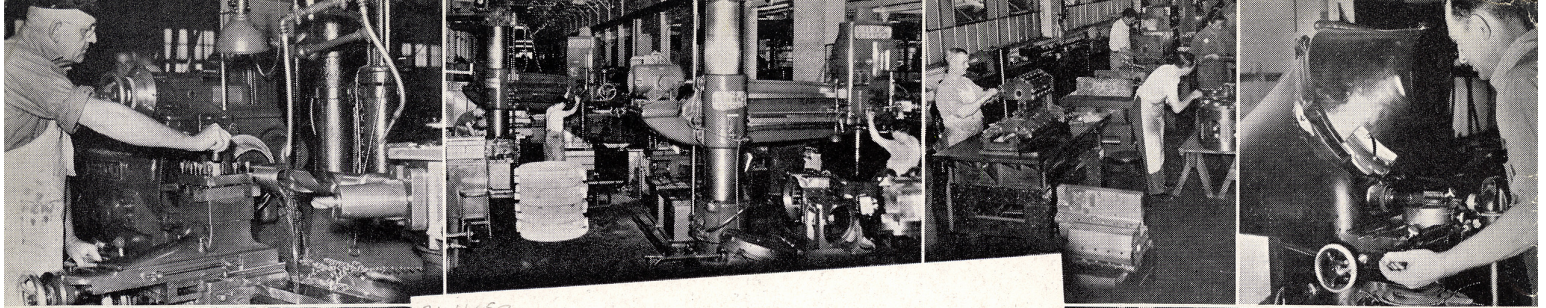
GREENLEE

AUTOMATIC SCREW MACHINE



DESIGNED FOR SHORT
AND LONG RUN JOBS
ENGINEERED FOR QUICK
SET-UPS • EASY OPERATION

GREENLEE BROS. & CO.,  ROCKFORD, ILLINOIS, U.S.A.

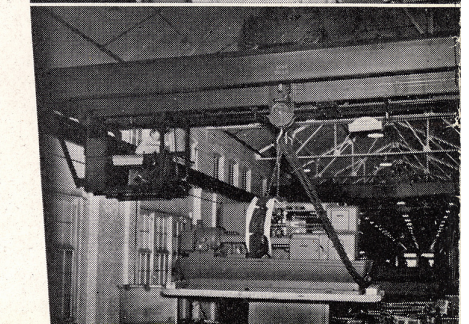
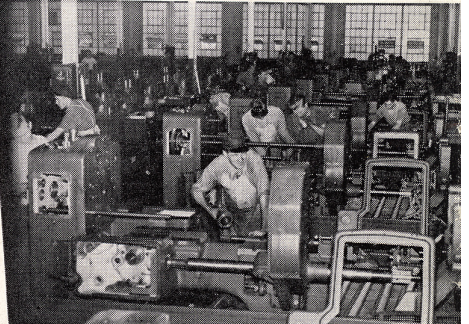


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INTRODUCTION

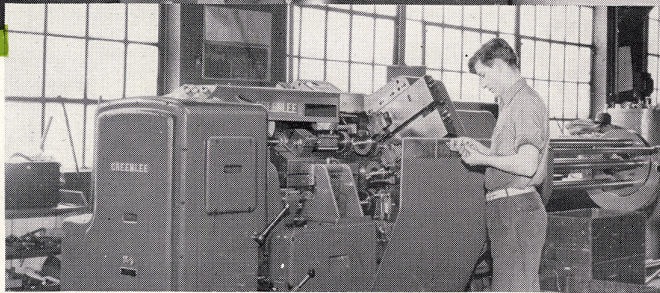
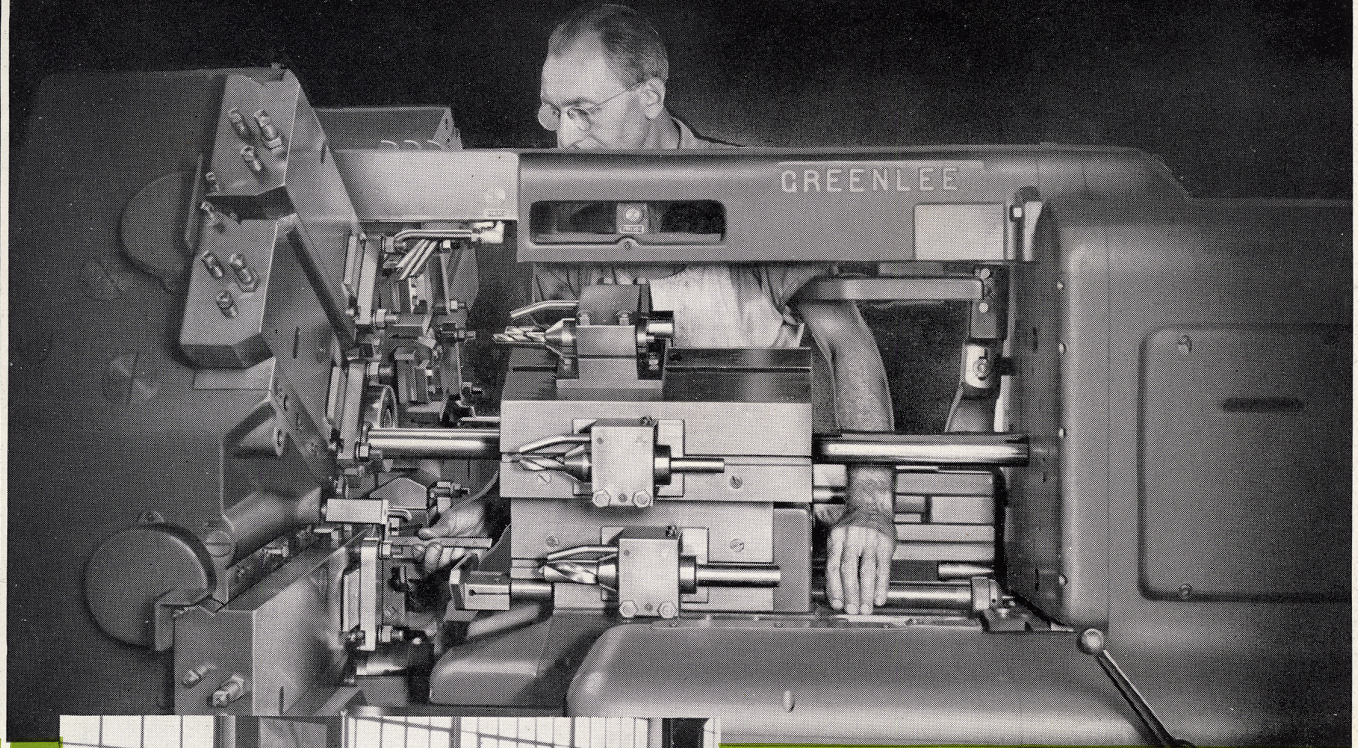
Presented in this catalog are current facts on Greenlee Automatic Screw Machines. While Greenlee builds both four and six-spindle automatics, for the most part these pages are devoted to the Greenlee Six, which has become the most popular of the two machines because of its additional capacity and adaptability for handling a wide variety of work. Illustrations and construction details are confined to major features, and although in condensed form, we believe you will find the general information of value in looking ahead to the future or in planning your immediate production requirements. Any additional data that may be desired will be gladly furnished on request, including production estimates.

Inside plant photos on this page show some of the modernized production methods and equipment used in building Greenlee Automatics.

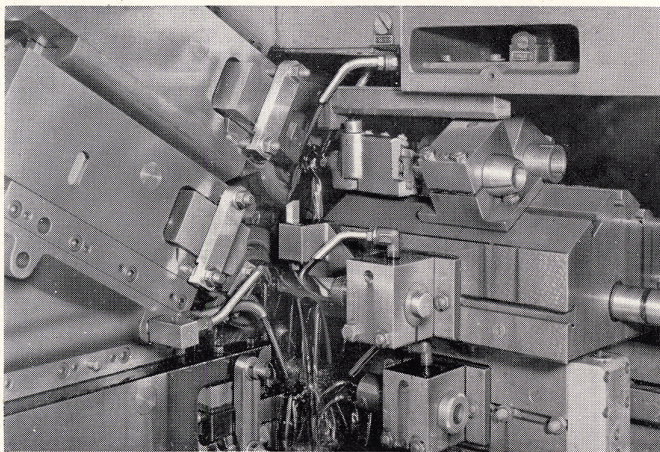


**GREENLEE BROS. & CO.
ROCKFORD, ILLINOIS, U.S.A.**
This view shows the spacious 28-acre Greenlee Plant. Complete manufacturing facilities include two large, well-equipped foundries for producing fine gray-iron and semi-steel castings.

WIDE-OPEN TOOLING AREA



Note in the above photograph the convenient height of Greenlee machine which permits easy access to tooling.



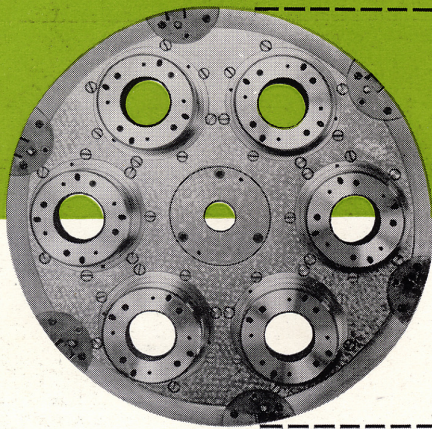
The above photo of a typical Greenlee set-up shows how short nozzles are connected to built-in coolant system.

★ The wide-open tooling area of the Greenlee is a major feature especially engineered for accessibility . . . facilitates easy adjustments and quick change-overs in set-up. Center of tooling area on the Greenlee Six is only two feet from the outside of the machine . . . maximum machine height is only 5'-4". Thus, tools are easy to get at for adjustment, and hazardous climbing and reaching are avoided. Likewise, the advantages of reduced physical strain on operators and set-up men are apparent.

BUILT-IN COOLANT SYSTEM

The built-in coolant system on the Greenlee is totally enclosed. Cross-slides, main tool-slide, and attachments are equipped with convenient outlets so that short, easy-to-attach, flexible nozzles may be used to bring coolant to cutting areas. Each outlet is individually controlled by a separate valve. There is a main control valve for the entire system within easy reach on both sides of machine. When shut off, coolant circulates through an automatic by-pass valve. Centrifugal pump of ample capacity is located on the gear box at front end of machine.

REFINEMENTS IN SPINDLE CONSTRUCTION

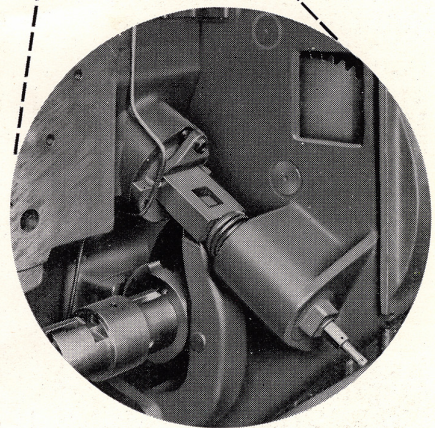
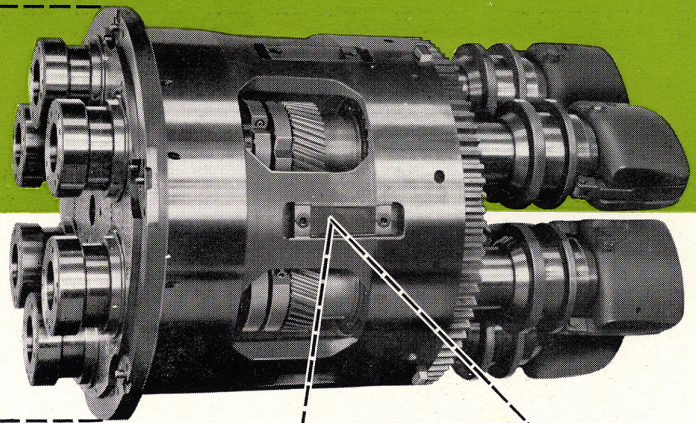


SPINDLES PRECISELY SPACED

The spindles of the Greenlee are assembled in the carrier with infinite care and precision. Holes in the spindle carrier for bearing races are accurately bored and equally spaced to assure precise relation between the cutting tools and work at all spindle positions.

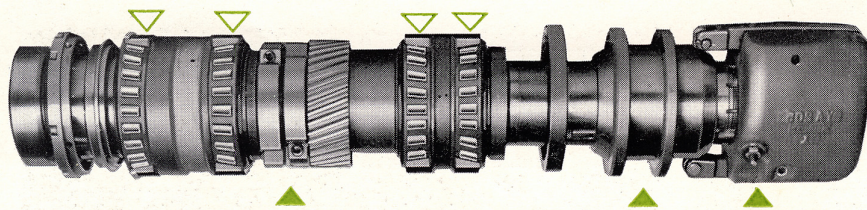
HEAT-TREATED, GROUND SPINDLE CARRIER

Spindle carrier, a rugged one-piece semi-steel casting, is heat-treated and precision ground. Mounts in a rigid headstock which is scraped to fit carrier. Indexes fast and smoothly with Geneva motion combined with gearing. Adjusting blocks are provided to eliminate end play.



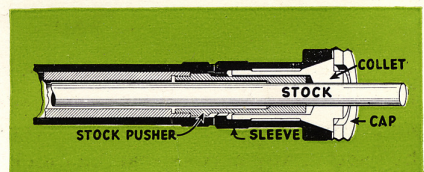
POSITIVE LOCKING MECHANISM

Removable steel inserts in carrier recesses form seats for the large rectangular locking block shown above. Locking block with tapered upper surface accurately locates and positively locks carrier at each station. Block and inserts are made from alloy steel, hardened and ground.



SPINDLES EQUIPPED WITH DOUBLE-OPPOSED BEARINGS

Spindles, ground inside and out, run smoothly and accurately in Timken precision tapered bearings. Bearings are spaced front and rear of the center drive gear with oversize flange bearings at front. Convenient adjustment is provided with split lock nuts. To reduce wear, each spindle is equipped with a hardened steel collet spool which shifts and rotates freely on an internal bronze bearing. One screw in collet lever body provides fine positive adjustment of collet pressure. Spindles are made from alloy steel tubing.

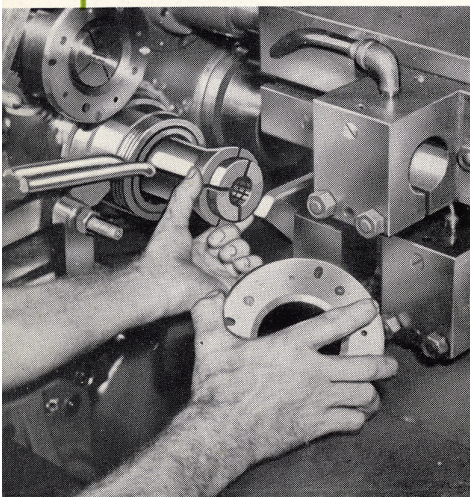


COLLET PRINCIPLE INSURES ACCURATE FEED-OUT

Greenlee collets are operated, as shown above, by the action of a sliding sleeve over the taper of the collet. There is no endwise movement of collet and, therefore, none is transmitted to stock. Thus, greater accuracy is assured in length of the piece fed out to the stock stop.

SPINDLE NOSE CAP HOLDS COLLETS POSITIVELY

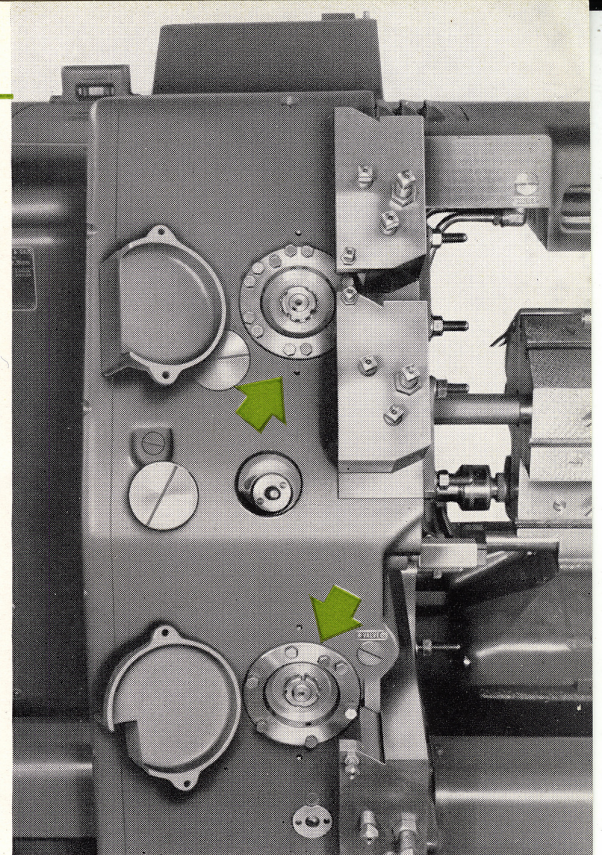
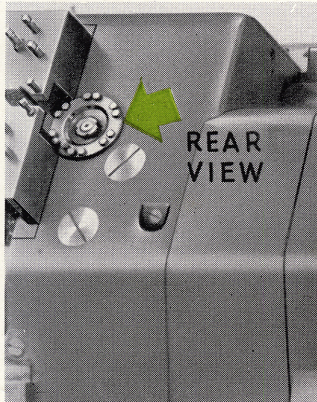
The Greenlee collet principle is well known for the close control it maintains over the length of work pieces. Collets close positively and hold stock firmly. A nose cap holds collet in a fixed position inside spindle. As illustrated at left, collets and nose caps are easy to remove. All six collets, including pushers, on the Greenlee may be changed in a jiffy without indexing the spindle carrier.



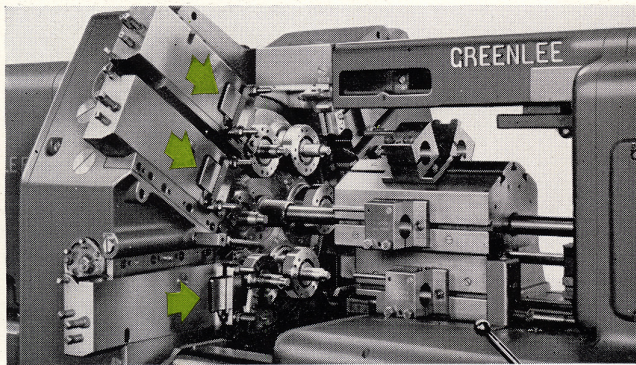
COMPENSATING STOPS INSURE UNIFORM ACCURACY

To insure accuracy and uniform production at all spindle positions, the Greenlee is equipped with cross-slide compensating stops which index in unison with the spindle carrier. Compensating wheels carrying the hardened steel stop buttons are solidly supported in machine housing.

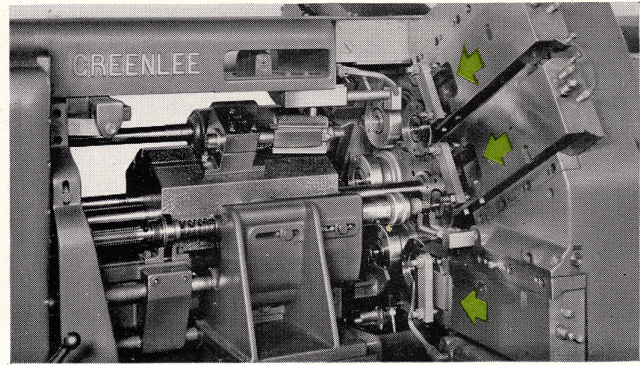
Each button is locked in adjusted position to limit the travel of a given cross-slide to correspond with spindle position. The lower wheel, shown at right, controls No. 1 cross-slide — upper wheel with dual button controls No. 2 and 3. On the opposite side of machine, similar dual set controls No. 4 and 5 cross-slides. None is required for cut-off position. All buttons are set at factory and seldom require attention. A compensating stop screw, conveniently located on the outer end of each cross-slide, is provided for making any necessary adjustment of tension.



IDENTICAL CROSS SLIDE TOOL CAVITIES



FRONT VIEW



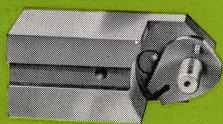
REAR VIEW

Offer These Distinct Advantages

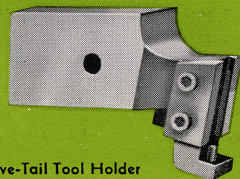
On Greenlee Automatics all cross-slide tool cavities are identical, and the bodies of cross-slide tool holders are made to fit cavities accurately. Thus, tool holders may be used in any cavity—can be quickly and easily shifted from one position to another and from one machine to

another — are completely interchangeable. This saves time on set-ups. Tool holders used on preceding run can often be arranged quickly for use on new job. With tool holders that are interchangeable, fewer are required and substantial savings in tooling expense are effected.

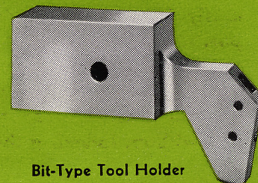
STANDARD TOOL HOLDER BODIES ARE IDENTICAL — FIT ANY CROSS-SLIDE CAVITY



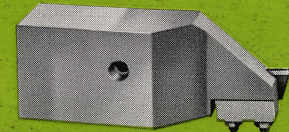
Circular Form-Tool Holder



Dove-Tail Tool Holder



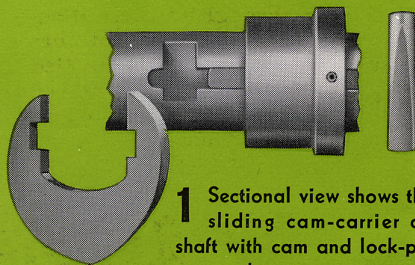
Bit-Type Tool Holder



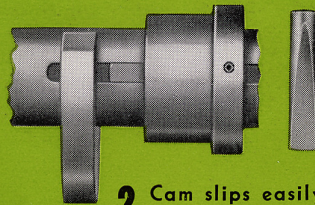
Cut-Off Tool Holder

SIMPLE CROSS-SLIDE CAMMING

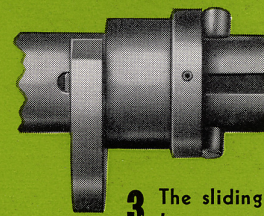
Saves Set-Up Time



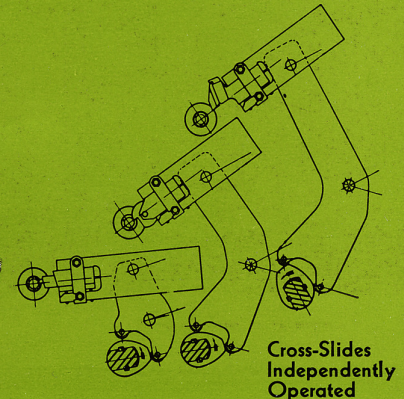
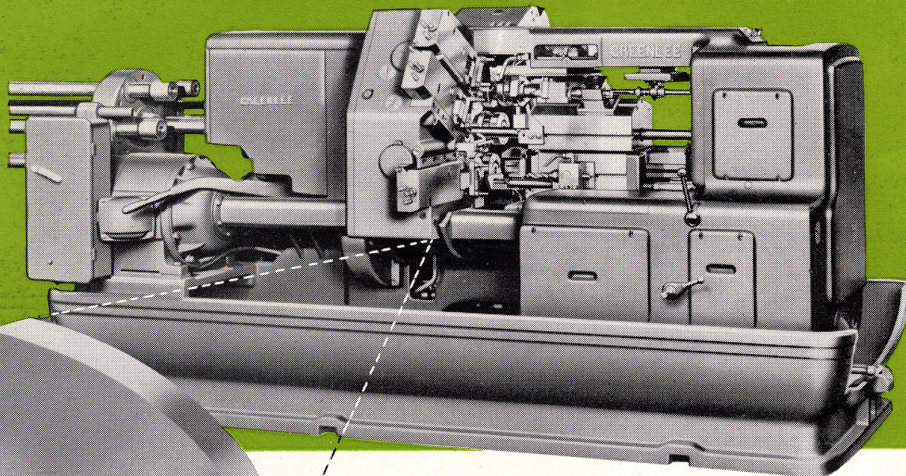
1 Sectional view shows the sliding cam-carrier on shaft with cam and lock-pin removed.



2 Cam slips easily into place on shaft with slots in alignment with keyways.



3 The sliding carrier with keys attached quickly locks cam in position on shaft.



CROSS-SLIDE CAMS INTERCHANGEABLE

Simplicity of design makes it possible to operate Greenlee Automatics effectively on more than just the ordinary "cut-and-dried" multiple-spindle screw machine jobs. The cross-slide cam design and operating features promote production efficiency on many short-run jobs. As shown in top photos, individual cams are quickly and easily slipped on or off, which saves set-up time. All cams are completely interchangeable and may be used on any cross-slide. Thus, obvious savings are effected in cam expense. Each cross-slide is operated independently by a separate cam, which makes it easier to split-up long operations and arrange better tooling set-ups to increase production efficiency. All Greenlee cross-slide cams are designed with a uniform high-point. Because of this feature, *compensating stops require no resetting when cams are changed.*

SMALL INVESTMENT HANDLES 90% OF AVERAGE JOB-SHOP REQUIREMENTS

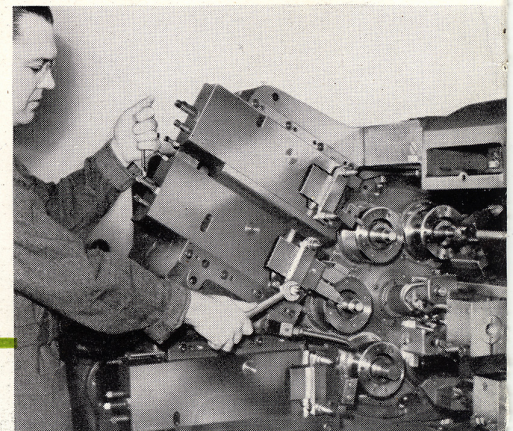
With but fifteen standard cross-slide cams, which provide a wide variety of feeds and strokes, a job-shop can handle 90% of average requirements. Seldom are special cams required. Standard cams are available in ratios from 1½:1 to 8:1. Cams are located directly below cross-slide housing, three on front side and three on back side of machine.

FEED AND STROKE DATA

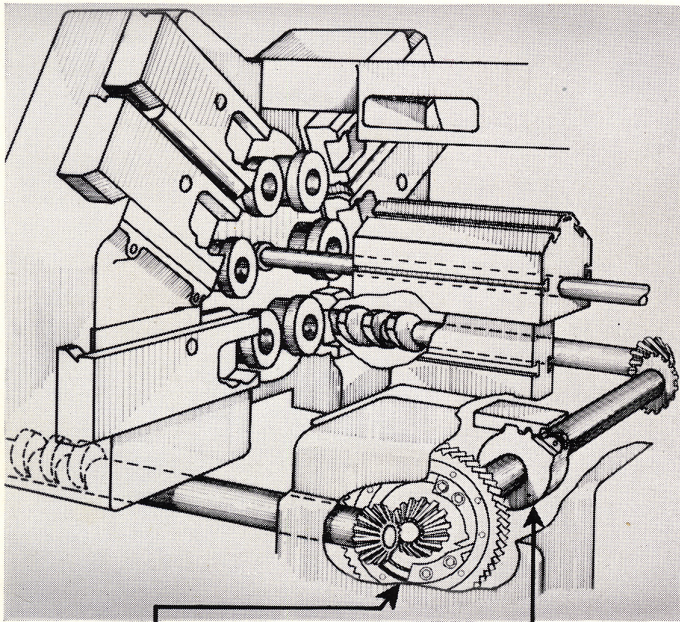
Cross-slide feed is in direct ratio to the feed of the main tool-slide, and standard cams are made in ratios to tool-slide feed and stroke. For example, with a 2:1 cam ($\frac{\text{tool-slide}}{\text{cross-slide}} = \frac{2}{1}$), cross-slide feed and stroke = ½ tool-slide feed and stroke. Maximum cross-slide stroke is 2¼" to clear spindle nose. Maximum feed strokes are delivered by a 25° rotation of cam shaft which is equal to 1½" feed travel on end-working slide.

CONVENIENT CROSS-SLIDE TOOLING

Cross-slide adjusting screws and tool holders are easy to get at on the Greenlee. Center of tooling area is only 2 feet from outside of machine. Slides are made from heavy steel forgings, and move on gibbed ways. Tool holders are adjusted laterally, vertically, and to depth by fine-pitch screws and adjusting wedges. Sequence of operations can be easily arranged or quickly changed to suit requirements.



NO CAMS FOR MAIN TOOL-SLIDE

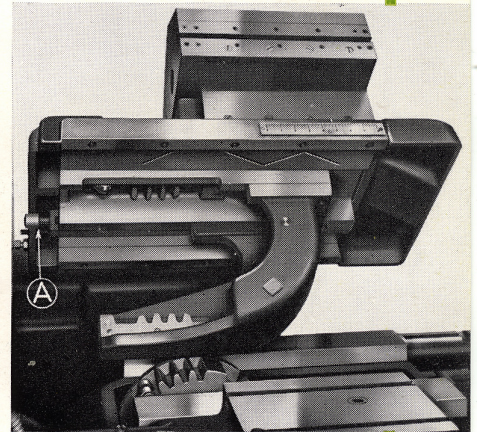


Graduated Worm Wheel

Intermittent Feed Gear

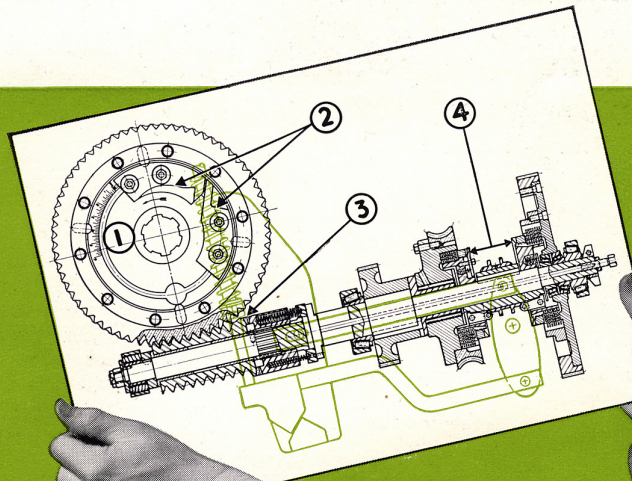
The main tool-slide is driven through an intermittent gear. It makes a full stroke each cycle, approaches fast, shifts smoothly into feed at a point controlled by an adjustable dog on graduated worm wheel. The main clutch is shifted automatically at the end of each rapid approach and feed stroke.

(Right) Tool - slide removed and tilted back from ways, showing the racks attached to its underside and the intermittent feed gear mounted between the ways. Steel rollers act as the last tooth on gear, preventing wear. Taper gib is adjusted with the adjusting screw shown at "A". To insure exactness in forward position of the tool-slide an adjustable stop is carried on the rear guard of the slide, which contacts the rear end of the ways when the slide is at its extreme forward position.



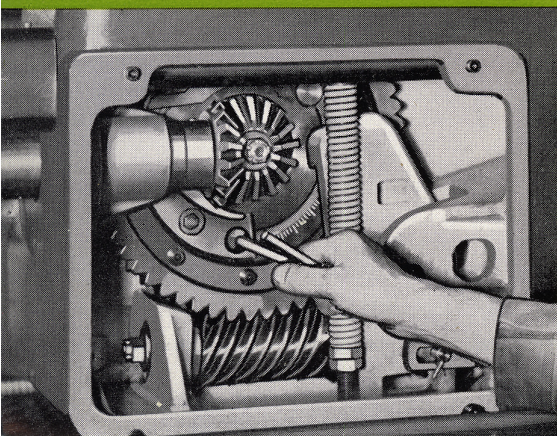
STROKE ADJUSTMENTS IN LESS THAN 5 MINUTES

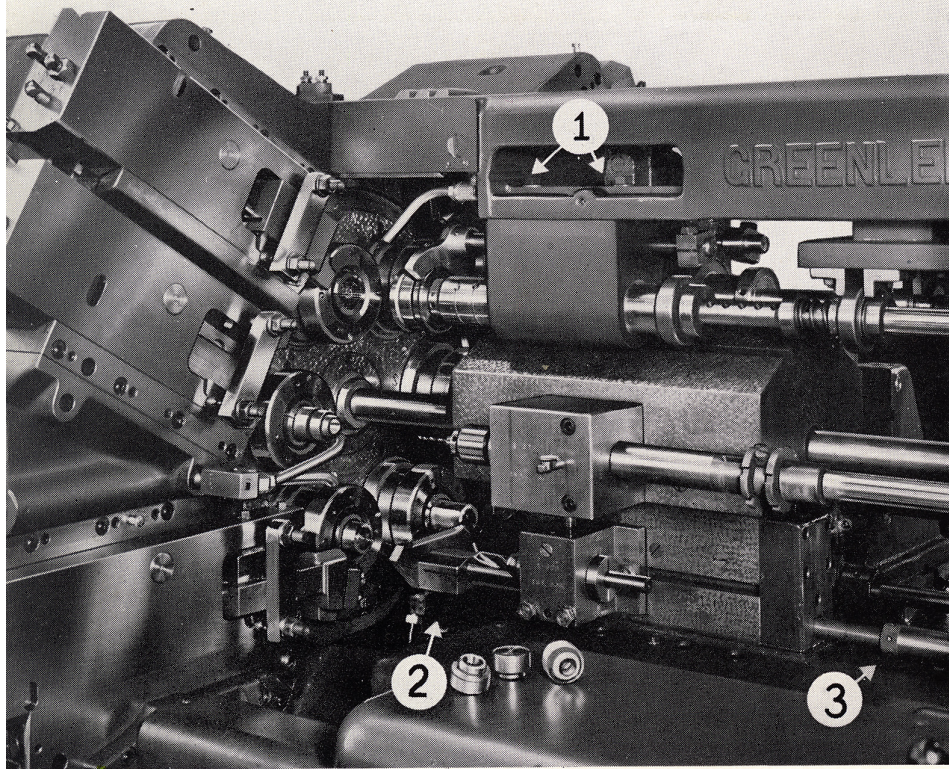
Main tool-slide feed stroke adjustments are quick and easy. Changes are made by adjusting only one dog on graduated worm wheel, as illustrated below. Precise adjustments can be made easily in less than five minutes. Two scales are provided, one on each side of tool-slide, with graduations which correspond to those on worm wheel. These save time in making preliminary stroke adjustments and help operators keep check on stroke while the machine is in operation.



SIMPLICITY OF MAIN CLUTCH ASSEMBLY...

The simplicity of the Greenlee main tool-slide mechanism makes it easy to understand. Its automatic operation and its quick and easy adjustments offer practical aid for the inexperienced operator and set-up man. Drawing above, with clutch assembly in black and shifting levers in color, shows the graduated worm wheel (1); clutch shifting dogs (2); safety clutch (3) which automatically disengages in case of overloading or jamming; and main drive clutch (4). The dog governing the rapid approach of the tool-slide is set at the factory and requires no further attention or adjustment.





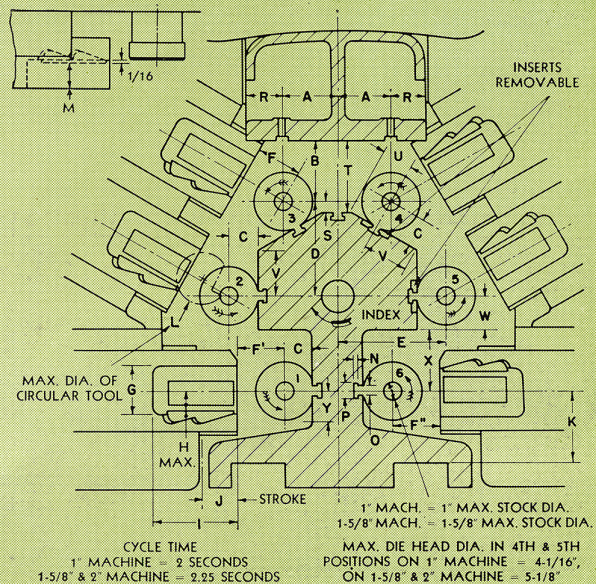
(Above) Standard drill holder in No. 1 position, and a high-speed drilling attachment in No. 2 position on the tool-slide. Threading attachment is shown on overarm in No. 3 position.

END-WORKING TOOLS EASY TO SET UP

Main tool-slide has seven full-length T-slot surfaces, which make for easy arrangement of tooling. Holders, designed with tongues and broad clamping surfaces, clamp rigidly, are quickly and easily slipped on or off, and can be mounted one behind the other. Top surface of the slide carries tooling for either or both of the top spindle positions. Clamping area on overarm (1) is provided for mounting threading, tapping, and reaming attachments in the same positions. Note the convenient position of the stock stop (2), which is carried in tool-slide with support rod contacting face of the gear box. Stop is easily set for different lengths of feed-out with adjusting nut (3). Stock feeds out against the stop while the machine is indexing.

PRINCIPAL TOOLING DIMENSIONS FOR GREENLEE 6-SPINDLE AUTOMATICS 1", 1-5/8" and 2" CAPACITY

The dimensions given here are typical of the generous areas provided for tooling on all Greenlee 6-Spindle Automatics. Note, in the drawing at right, the symmetrical design of the tooling area, which makes for easy accessibility. Also note that all cross-slide tool-holder mounting surfaces are the same distance from spindle centers. Thus, cross-slide tooling is universal and may be quickly and easily interchanged from one position to another. Observe the rigid block-house construction of the main tool-slide with its broad T-slot surfaces. As indicated in drawing, T-slots in 4th and 5th positions carry removable inserts, which are used to accommodate larger die heads.



MACH.	A	B	C	D	E	F	F'	F''	G	H	I	J	K
1"	3.000	3.491	1.594	5.196	6.000	2-5/8	2-5/8	2-5/8	2-5/8	1-3/16	4-5/8	1-3/4	3.929
1-5/8" & 2"	3.625	4.096	2.047	6.278	7.250	3-1/8	3-5/8	3-3/8	3-1/16	1-3/8	5-1/2	2-1/4	4.971

MACH.	L	M	N	O	P	R	S	T	U	V	W	X	Y
1"	2-3/4	1-1/2	5/16	1/2	13/16	2	.571	4.062	1.619	2.544	1-3/4	3.446	1-7/8
1-5/8" & 2"	3-1/4	2	7/16	9/16	1-1/16	1-7/8	.778	4.874	1.994	3.000	2-1/8	4.153	2-11/32

Capacity TO MEET CHANGING REQUIREMENTS

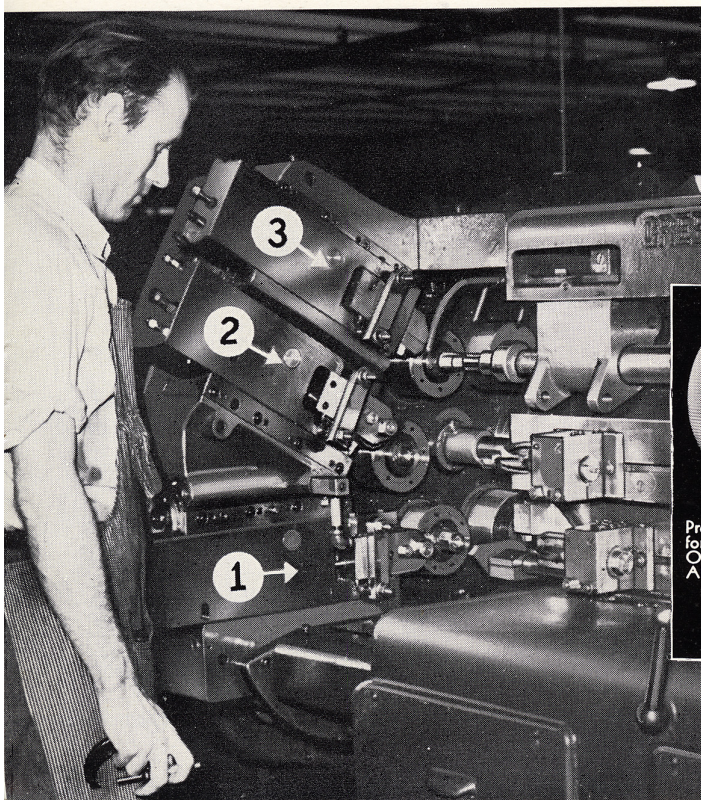
CROSS-SLIDE OPERATIONS	POS. NO. 1	POS. NO. 2	POS. NO. 3	POS. NO. 4	POS. NO. 5	POS. NO. 6
Forming	√	√	√	√	√	√ †
Form Turning	√	√	√	√	√	√ †
Shaving	√	√	√	√	√	√ †
Skiving	√	√	√	√	√	√ †
Stenciling	√	√	√	√	√	√ †
Knurling	√	√	√	√	√	√ †
Wide Form Knurling	√	√	√	√	√	√ †
Facing	√	√	√	√	√	√ †
Burnishing	√	√	√	√	√	√ †
Thread Rolling	√	√	√	√	√	√ †
Under Cutting			√	√		
*Cut-Off	√	√	√	√	√	√
END-WORKING OPERATIONS						
Threading			√	√	√	√
Tapping			√	√	√	√
Reaming			√	√	√	√
Drilling	√	√	√	√	√	√
High-Speed Drilling	√	√	√	√	√	√
Boring	Any	Position	Except	Cut-Off		
Eccentric Boring	"	"	"	"	"	"
Facing	"	"	"	"	"	"
Burnishing	"	"	"	"	"	"
Recessing	"	"	"	"	"	"
Chamfering	"	"	"	"	"	"
Milling	"	"	"	"	"	"
Roller Turning	"	"	"	"	"	"

THREADING, TAPPING, REAMING IN 3rd, 4th, 5th, and 6th POSITIONS

Built to handle a wide range of operations efficiently, the Greenlee Six is easily adapted to year-in-and-year-out service, which usually entails a wide variety of set-ups. To simplify the arrangement of tooling, the Greenlee is designed with unusual flexibility, which permits handling operations at various spindle positions, as indicated on chart at left. With these provisions, it is easier to split up the long operations, which directly control the over-all speed of production, and effectively use the machine's inherent capacity. The capacity for performing threading, tapping, reaming operations in 3rd, 4th, 5th, and 6th positions is a special Greenlee feature, which permits greater efficiency and increases the range of jobs that may be handled over an extended period of time. Tooling set-ups for producing two or more identical parts simultaneously can be applied more frequently to speed production.

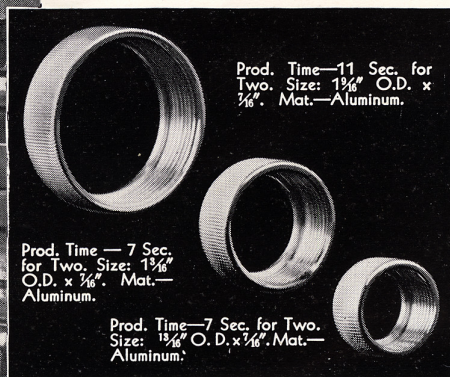
† Only when used at cut-off position.

* Cut-off not usually combined with another operation on same cross-slide. Position may be varied to produce two or more pieces simultaneously.



AN EXAMPLE OF TOOLING CAPACITY

The three aluminum couplings shown below are produced on a 1-5/8" capacity Greenlee Six. The machine, tooled with a dual set-up, produces two couplings of identical size simultaneously. A double length of stock is fed out, and operations are handled as indicated below. View of tooling shows tapping attachment on overarm in No. 3 position. Note the range of three sizes handled.



SEQUENCE OF OPERATIONS

- 1 Form two pieces.
Drill small hole for two pieces.
- 2 Knurl two pieces.
Tap drill 1st piece.
- 3 Tap 1st piece.
Cut off 1st piece.
- 4 Tap drill 2nd piece.
- 5 Tap 2nd piece.
- 6 Cut off 2nd piece.

ACCESSIB

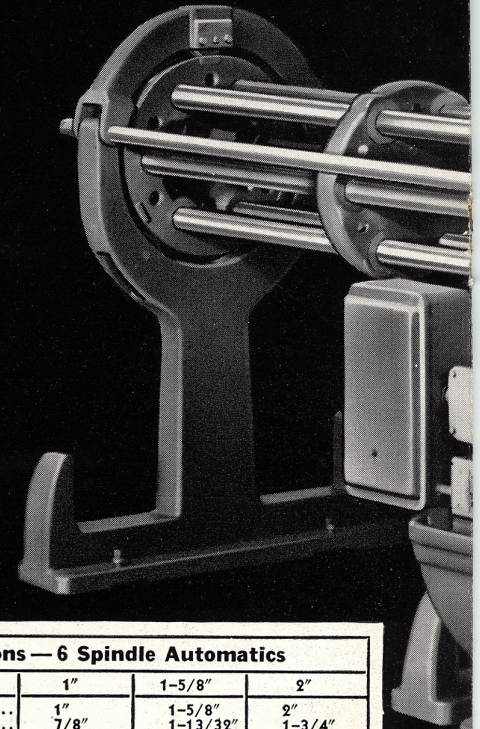
GENERAL CONSTRUCTION

Smooth, rugged, semi-steel castings . . . designed for easy accessibility and produced under close metallurgical control in the Greenlee foundries . . . support rigidly the operating mechanisms of the Greenlee Automatic.

The framework consists mainly of seven castings . . . the pan, frame, gear box, two cross-slide members, spindle carrier housing, and the overarm. Securely bolted and doweled together, they form a rugged, compact unit, capable of maintaining rigid accuracy at high speeds.

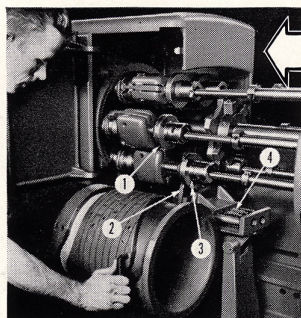
The pan, with generous area for chips, contains a large coolant reservoir, strainer, and settling tanks. The rugged frame, with an inverted V-section to clear chips, is equipped with hardened and ground steel ways for the tool-slide. The L-shaped gear box, heavily ribbed and reinforced, is enclosed with convenient lift-off covers. The spindle carrier housing mounts securely on frame, has hinged doors at sides. A removable top cover gives access to spindle bearing adjusting nuts. Two cross-slide members are secured to the spindle carrier housing to assure perfect alignment with spindles. The overarm serves as a rigid connecting link between the gear box and the spindle carrier housing.

These are a few of the provisions incorporated in the structural design to insure accurate production, convenient operation, and long life.



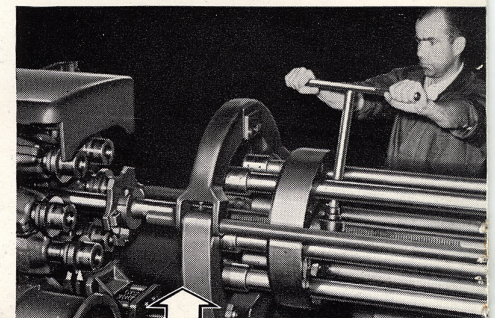
Specifications — 6 Spindle Automatics

Rating	1"	1-5/8"	2"
Chuck Capacity, Round	1"	1-5/8"	2"
Chuck Capacity, Hexagon . . .	7/8"	1-13/32"	1-3/4"
Chuck Capacity, Square	3/4"	1-1/8"	1-7/16"
Stock Feed	6-3/16"	8-5/16"	8-5/16"
Turning Length	6"	7-1/2"	7-1/2"
Spindle Speed Range	225 to 2500	105 to 2175	95 to 1935
Feed Range per Spindle Rev. . .	.0014 to .0218	.0017 to .0388	.0019 to .043
Motor Horsepower	15	20	25
R.P.M.	1800	1800	1800
Floor Space:			
Length with Stock Reel	17'- 6"	17'- 3"	17'- 3"
Length without Stock Reel . . .	10'- 5"	10'- 6"	10'- 6"
Width	5'- 0"	5'- 4"	5'- 4"
Height	4'-11"	5'- 4"	5'- 4"
Net Weight in Pounds	14400	17940	18150
Domestic Shipping Weight . . .	14850	18390	18500
Boxed for Export (Approx.) . . .	16800	20430	20600
Cubic Feet, Boxed	378	400	400



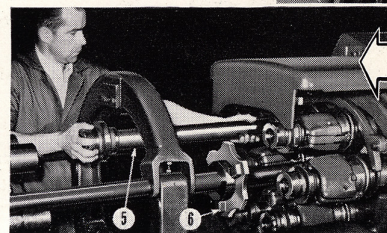
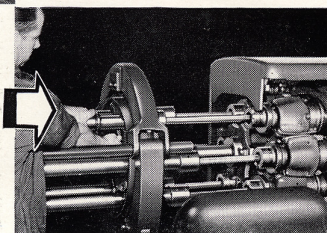
GREENLEE STOCK-FEED ADVANTAGES

The stock-feed on the Greenlee 6 is set up by merely mounting suitable number of standard cam strips. Hardened feed-tube collars (1), equipped with ball-bearings, do not rotate when stock feeds. Hardened shoes (2-3) move stock-feed tubes; one shoe (3) yields if stock is obstructed. Springs (4), behind shoe, prevent damage if a short piece of stock remains in the collet.



STOCK-REEL CONVENIENCE

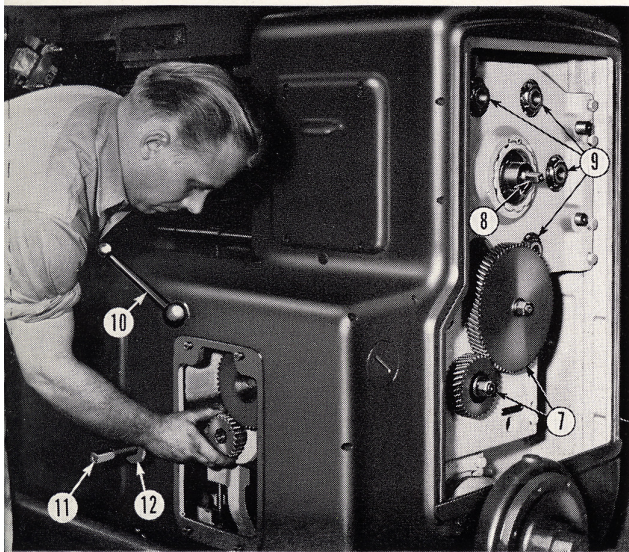
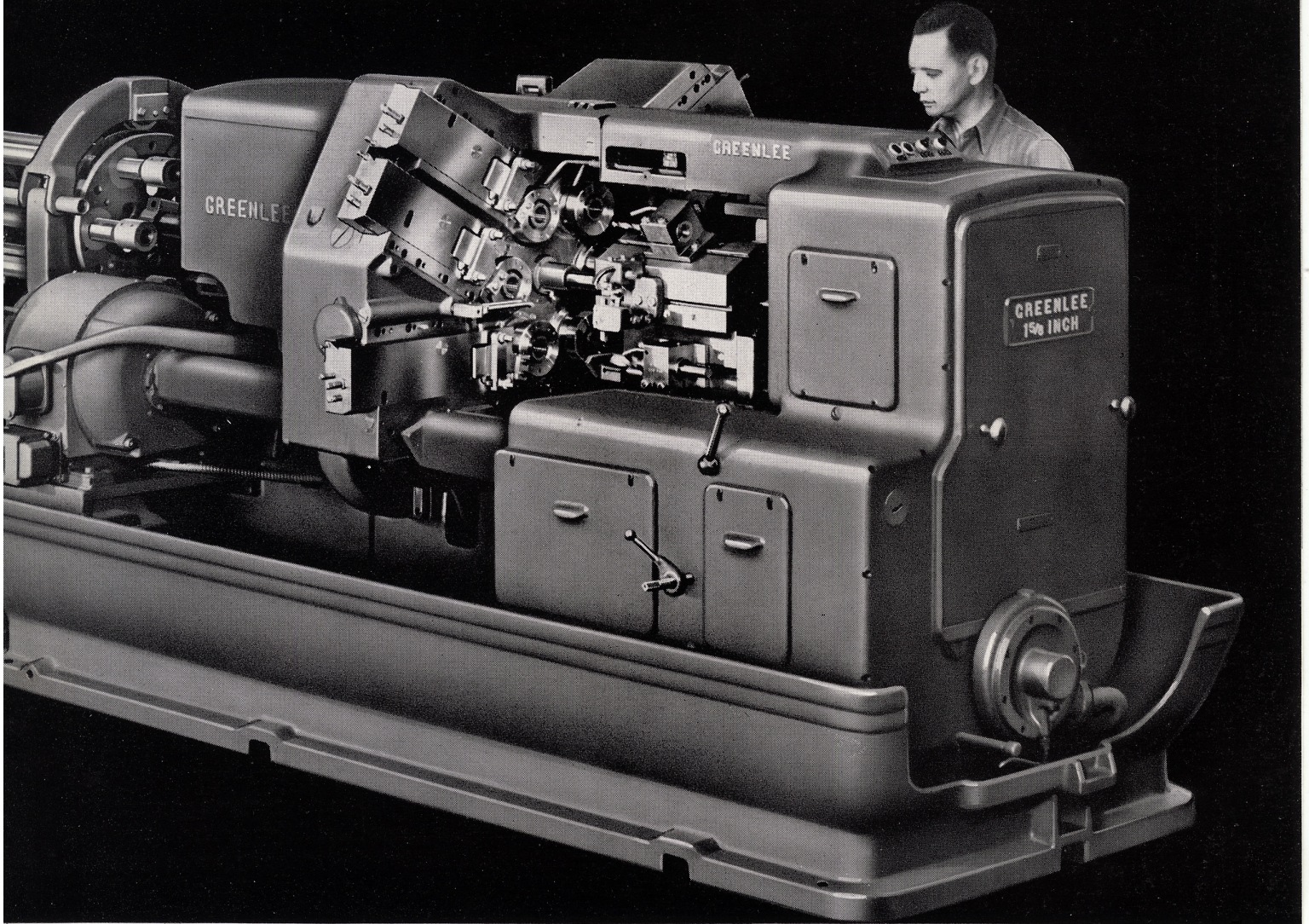
Any of the six ball-bearing tubes in the stock-reel can be released instantly by hand to provide more room for operator to handle stock while reloading spindles. This is an exclusive Greenlee feature.



CHANGING PUSHER TUBES

A few turns on a wrench moves the head of the stock-reel backward to afford the operator plenty of room on the Greenlee to change the stock pusher tube assemblies (5), after releasing and indexing retainer plate (6).

LE...RUGGED...COMPACT

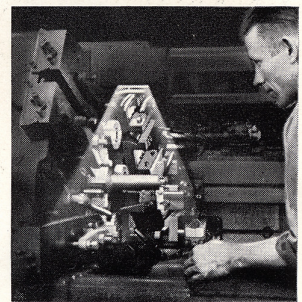


SPEEDS AND FEEDS FOR PRODUCTION AND ECONOMY

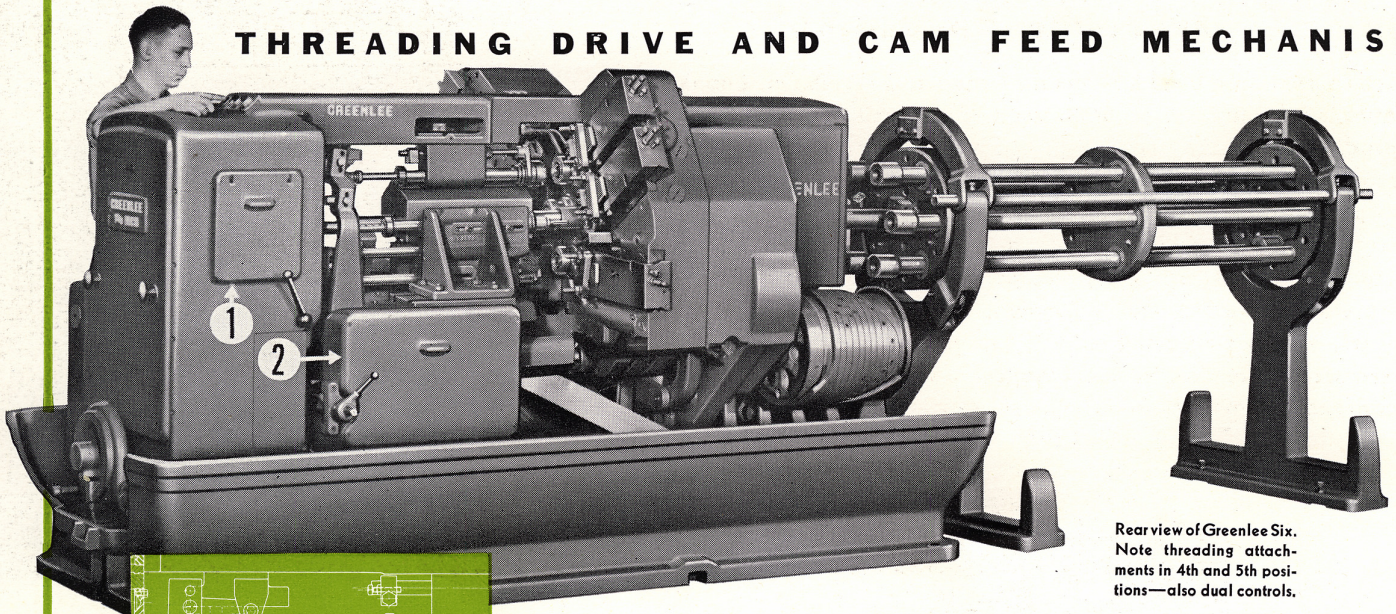
The Greenlee 6 has a wide range of speeds and feeds. Feed changes are made quickly with splined pick-off gears. Spindle speed changes are obtained easily by changing helical gears (7) in the end compartment. View also shows spindle drive shaft (8) with squared end for hand crank, and splined ball-bearing sleeves (9) built in as standard equipment for driving the threading and tapping attachments in 3rd, 4th, 5th and 6th positions. Note the convenient start and stop lever (10) for machine cycle. Shaft (11), with squared end, is for hand cranking tool-slide through cycle. A safety cam lever (12) must be shifted before cranking — until it is released, power feed can not be reengaged.

BUILT-IN LIGHTING

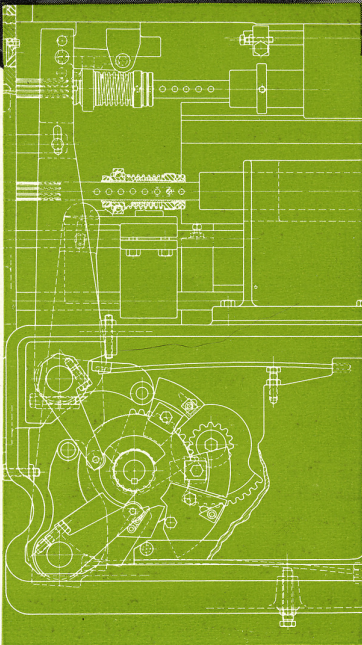
The built-in light on the Greenlee eliminates blind-spots in the tooling area and provides safe, convenient lighting where good visibility is essential. The light is built into the overarm section and is protected by a sealed plastic window.



THREADING DRIVE AND CAM FEED MECHANISM.



Rear view of Greenlee Six. Note threading attachments in 4th and 5th positions—also dual controls.



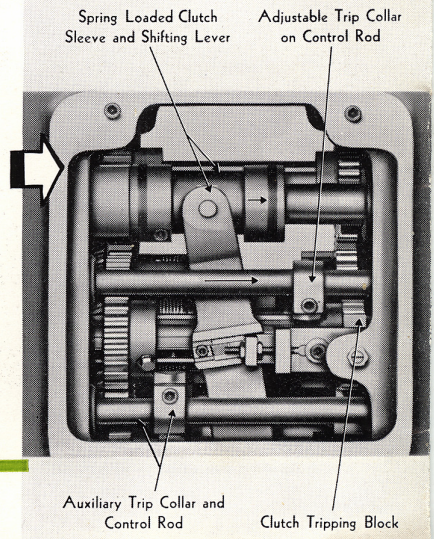
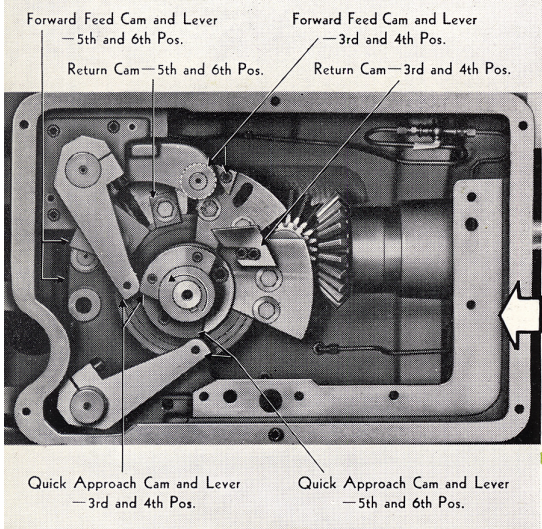
A STANDARD BUILT-IN FEATURE

The threading drive and feed mechanism is a standard built-in feature on Greenlee Automatics. The drive is contained in the top section of the gear box where four ball-bearing splined sleeves are provided to handle threading attachments in 3rd, 4th, 5th, and 6th positions. To alternate the speed of threading spindles for threading-in and threading-out, a duplex clutch and shifting mechanism is provided, which can be set to handle either right-hand or left-hand threading and tapping operations. All Greenlee threading attachments are universal and are used for threading or tapping.

The cam feed mechanism, shown at left, controls the fast approach, the loading, and the rapid return movement of threading spindles. The cam hub is mounted on a stub shaft and is driven by segment gears on the intermittent cross-shaft. The long operating lever controls 3rd and 4th position attachments, and the short lever controls 5th and 6th position work. If necessary, a 5th position attachment can be operated from the long lever. Reaming attachments are also operated in a similar manner and can be mounted in the same positions as threading attachments.

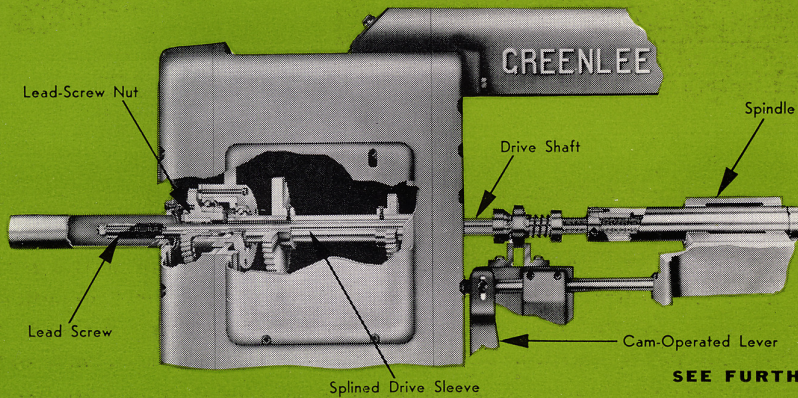
1 View of gear box shows threading drive and clutch tripping mechanism. Two control rods, either of which may be used to trip the clutch for threading-out, are connected to the threading spindle operating levers. An adjustable rod on front side of machine, connected to a shifting fork, contacts cam on tool-slide during its backward travel and resets clutch for another forward stroke.

2 View of threading box, with cover and retaining plate removed, shows the cams and operating levers. The cams are standard and are adjustable on the cam hub. Settings can be made to handle a wide range of standard threading, tapping, and also reaming operations. Bevel gears, in foreground, drive the rear camshaft.

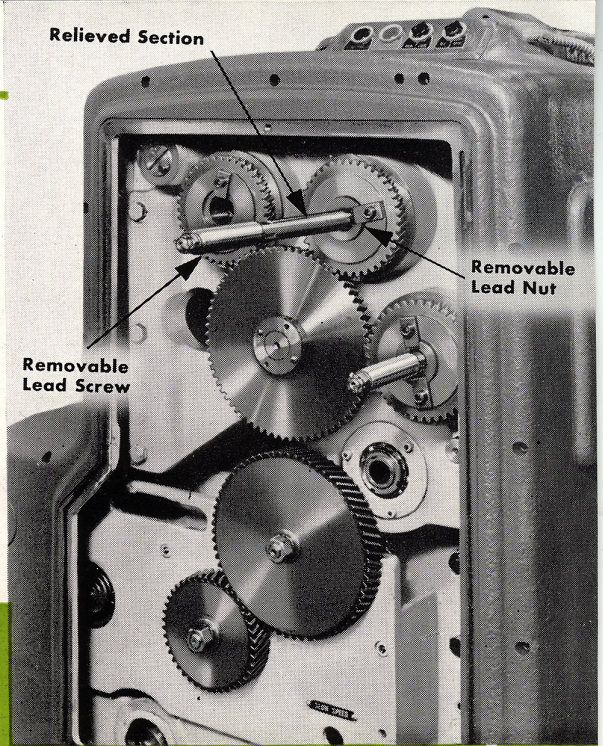


SIMPLIFIED LEAD-SCREW FEED FOR PRECISION THREADING

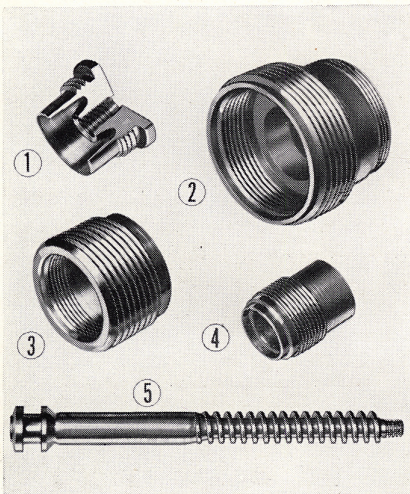
Lead-screw equipment for operating threading attachments on Greenlee Automatics offers an exclusive method of cutting precision threads at production speeds. Here both cam and lead-screw methods are combined, affording the advantages of rapid approach, precision threading-in and threading-out, and quick withdrawal. The individual lead screws and nuts, which control the actual threading operation, insure a uniform thread with a very accurate lead. They are supplied to order, are easy to remove, and convenient to store. No special cams, feed gears, or special clutches are required. A machine equipped for lead-screw threading is interchangeable and can be quickly set-up in a conventional manner to handle ordinary jobs.



SEE FURTHER DETAILS IN SEPERATE BULLETIN A401



(Above) View showing lead-screw threading spindle drive shafts in 4th and 5th positions. Attachments can also be used in 3rd position. The bronze lead nuts are driven at constant speed. They are retained by shear keys in the driven gears. A relieved section of the threading drive shaft, just ahead of the removable lead screw, allows clearance for the cam-operated, quick approach and return strokes.

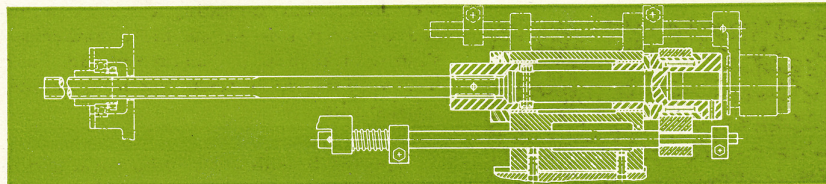


TYPICAL THREADING JOBS

Brass part (1) with R. H. cut threads; Brass part (2), smaller outside threads rolled L.H., larger outside and the inside threads are cut R.H.; Aluminum part (3) R.H. cut threads; Steel piece (4) L.H. cut threads; Acme threads on Stainless Steel Valve cut with lead screw equipment.

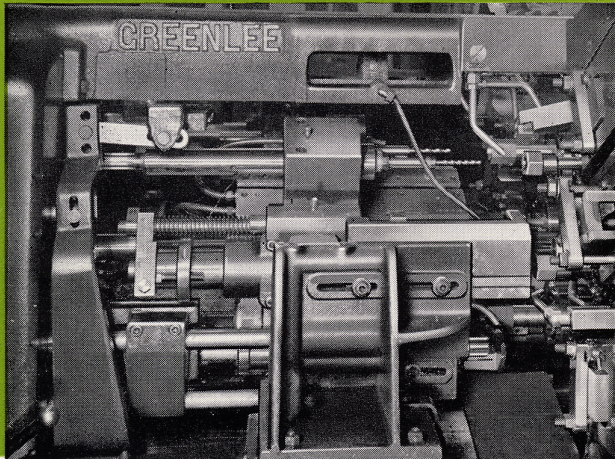
DOUBLE CLUTCHES FOR SIMULTANEOUS RIGHT-HAND AND LEFT-HAND THREADING

The standard threading drive with a single duplex clutch, as explained previously, handles either right-hand or left-hand threading jobs, but not both simultaneously when tapping. However, Greenlee Automatics can be built with two duplex clutches and especially geared to produce right-hand and left-hand threads on the same work piece. Machines, so equipped, will handle a wide variety of threading and tapping operations. Both clutches are mounted in the gear box—one maintains speed control over threading spindles in 3rd and 4th positions, and the other controls 5th and 6th position work. Both work spindles and threading spindles rotate counter-clockwise. Therefore threading spindles are driven at a slower speed than the work spindle when cutting right-hand threads, and at a higher speed when cutting left-hand threads.



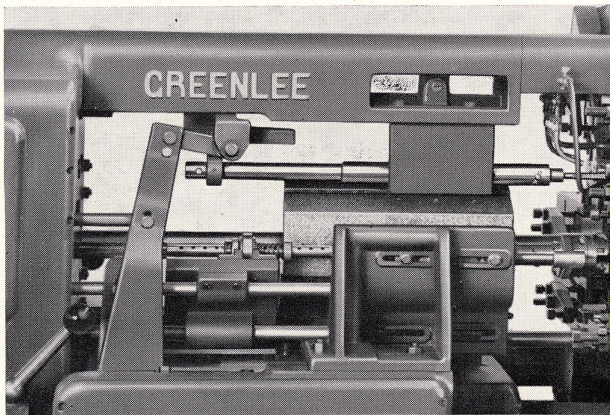
SENSITIVE THREADING SPINDLE — an attachment to insure precision in cutting fine delicate threads. Small telescoping die-head spindle, with pin and rollers engaging angular grooves in housing, moves easily with a smooth rolling action, reducing to a minimum the load or drag on threads. May be used on any Greenlee with standard threading drive and feed mechanism.

ATTACHMENTS FOR DRILLING, REAMING, RECESSING



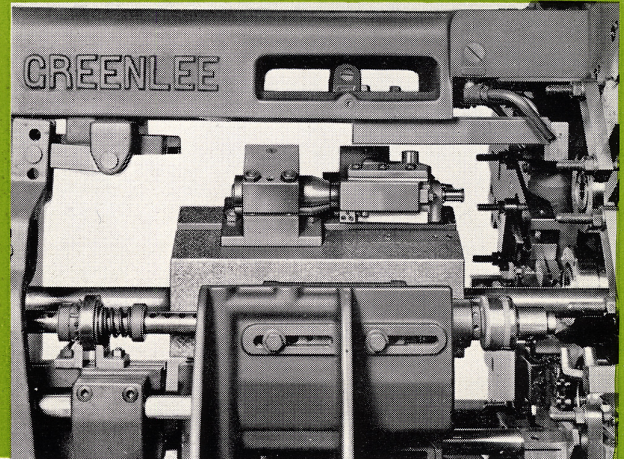
HIGH-SPEED DRILLING ATTACHMENT

On Greenlee 6-Spindle Automatics, high-speed drilling attachments can be used in any position except cut-off. They provide the means for stepping up the speed of small drills and permit the use of a heavier tool-slide feed. As illustrated above, the attachment mounts on the main tool-slide and is driven by a splined shaft. High-speed drilling attachments are usually supplied with a standard 2:1 gear ratio. Photo above also shows a Geared Reaming Attachment mounted in 5th position.



STANDARD REAMING ATTACHMENT

As illustrated above, the standard cam-feed reaming attachment mounts on the overarm for 3rd and 4th position work and can also be mounted in 5th and 6th positions. The spindle is lever operated and has a quick approach stroke. It returns independently of the main tool-slide, which makes the attachment desirable for a wide range of work. It can be used in the cut-off position. Cams are standard and are supplied in ratios up to 5:1.

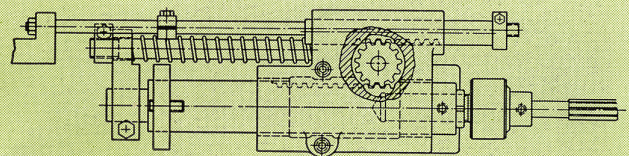


STANDARD RECESSING ATTACHMENT

The standard recessing attachment, shown above in 4th position, is mounted on the main tool-slide and is operated from a stop on the frame. It is designed for all-round screw machine work where cuts are comparatively light and extreme accuracy is not essential. It can be used in 3rd, 4th, and 5th positions.

COMPENSATING RECESSING ATTACHMENT

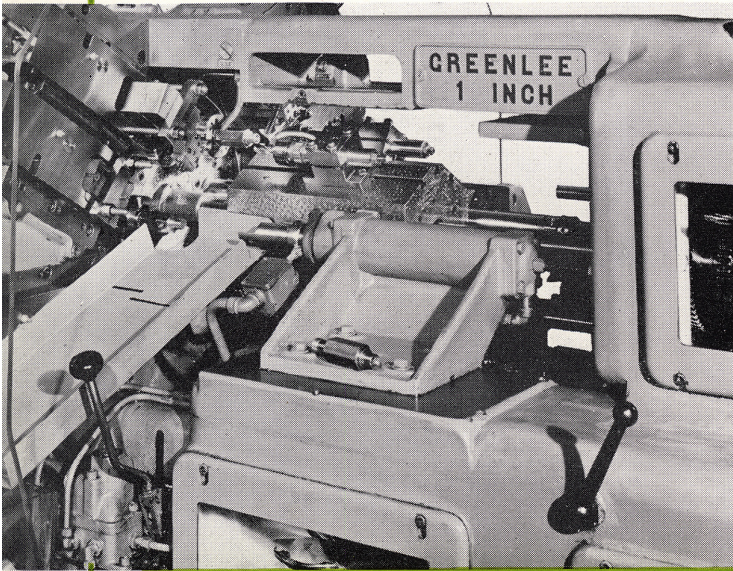
A compensating, swing-type recessing attachment is also available for handling heavy cuts on jobs requiring extreme accuracy, such as a part with an internal ball race. It can be used in 3rd, 4th, and 5th positions, is carried on the main tool-slide, and operates from a cross-slide. This has the advantage of controlled feed and provides for great accuracy.



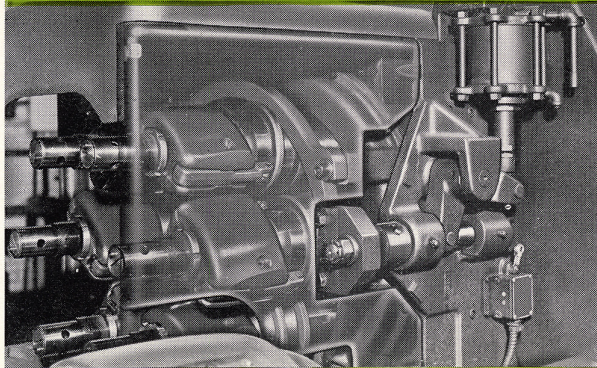
GEARED REAMING ATTACHMENT

A gear-feed reaming attachment is also available, which gives exceptionally sturdy feed through its entire working stroke and holds depth very accurately when reaming to a step or shoulder. The attachment can be furnished for 3rd, 4th, and 5th position work on the Greenlee Six in gear ratios of 2:1 or 3:1, which means the reaming spindle will feed at two or three times the tool-slide feed. Stroke can be adjusted in the same ratio. Reaming spindle returns with main tool-slide.

SPECIAL 6-SPINDLE AUTOMATICS SPEED . . .



(Above) Front view showing air-operated loading spindle on a Greenlee Six set up for second operation work. Hexagon work piece is shown in foreground.



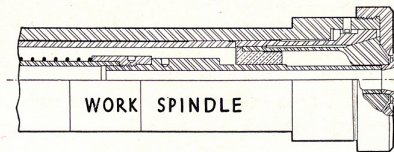
(Above) Phantom view of collet operating mechanism.

HAND LOADING EQUIPMENT

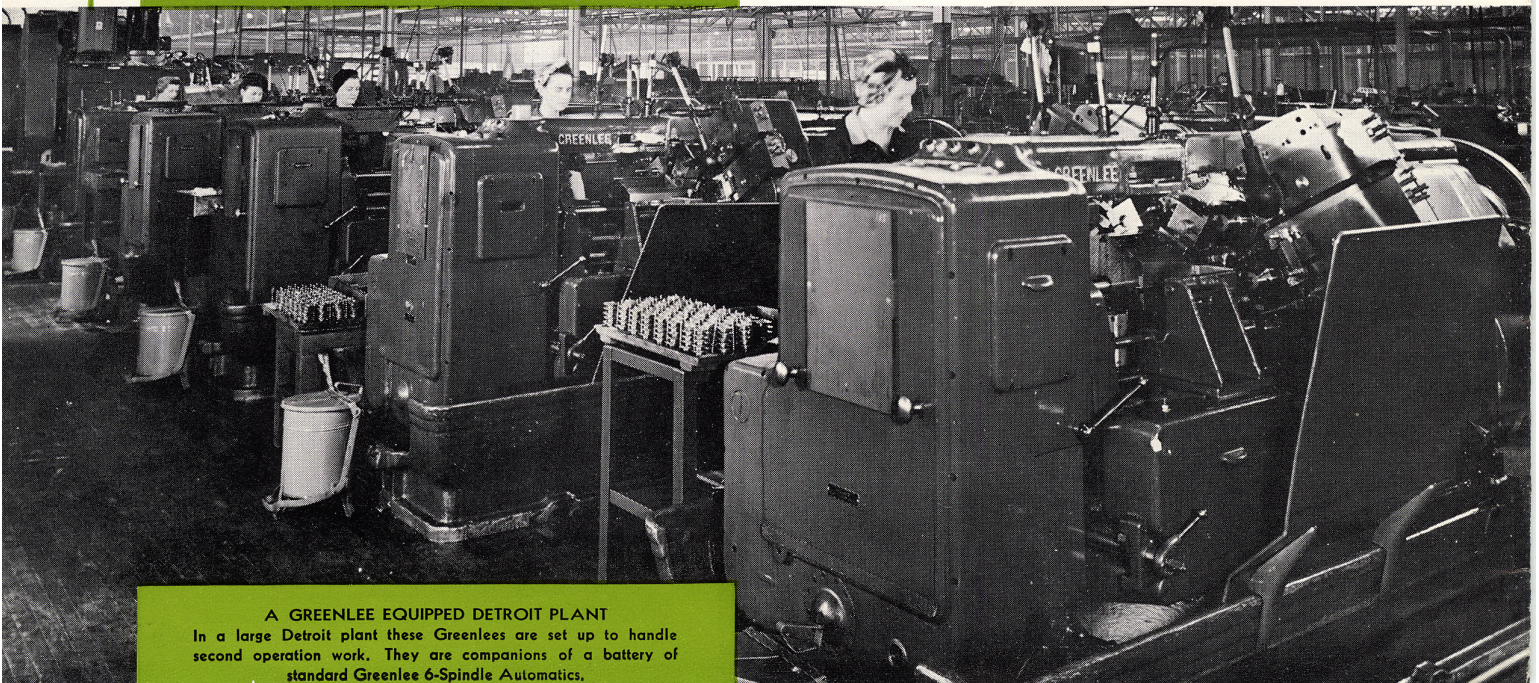
To speed second operation work, Greenlee has frequently designed machines for industry which incorporate the basic features and inherent production and operating advantages of the standard Greenlee 6-Spindle Automatic. Here is one example of a popular unit—a standard Greenlee "6" arranged with special loading equipment which is adaptable to a wide range of parts of regular shape. It is equipped with an air-operated loading spindle and air-operated collets. With five machining stations (one station is used for loading) operations are performed rapidly in continuous cycle by both end-working and cross-slide tools. Of special significance is the fact that, although built for second operation work, the machine can be quickly converted to a standard bar automatic. Usually in four hours, two experienced men can handle the conversion. If desired for change-over purposes, the necessary standard machine parts are supplied as auxiliary equipment.

PARTS EJECTED AUTOMATICALLY

While machine is in feed, operator loads part into the work spindle against the tension of an adjustable spring-loaded ejector, which is equipped with a positive stop. After indexing, collet opens automatically and finished part is ejected automatically. Both loading and unloading of work takes place at No. 2 station. Safety switches and an operating lever with a cam-controlled release assure proper loading of the work piece in the collets.



By means of a special inlet manifold and sleeves attached to the back end of spindles, coolant is directed through the tubular spindles to provide efficient cooling and prevent chips from clogging in the collets.

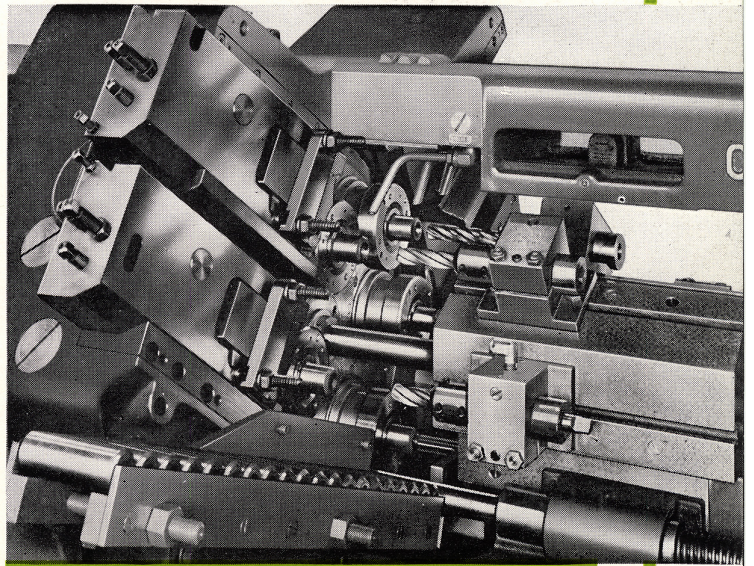


A GREENLEE EQUIPPED DETROIT PLANT
In a large Detroit plant these Greenlees are set up to handle second operation work. They are companions of a battery of standard Greenlee 6-Spindle Automatics.

PRODUCTION OF SPECIAL PARTS . . .

MAGAZINE LOADING EQUIPMENT

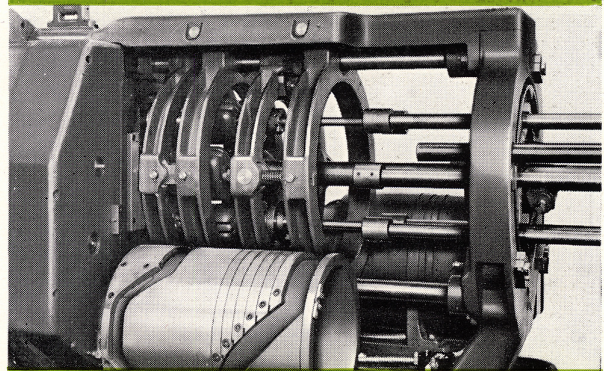
Here's another special Greenlee 6-Spindle Automatic arranged with magazine loading equipment. Similar to the second operation machine described on the opposite page, it also can be quickly changed over, in approximately 4 hours, to a standard bar automatic. Likewise, in such cases, the necessary standard operating units are supplied as auxiliary equipment. As illustrated, this particular machine was arranged to handle secondary operations on piston pins, but it is, of course, also adaptable to other similar parts which can be handled with magazine loading equipment. Loading of work pieces, which takes place at No. 1 station, is by means of an air-operated loading spindle. The spindle loads the part during the feed cycle of the machine. Work spindles are equipped with spring-loaded ejectors and positive stops. Collets are mechanically opened and closed with an air-cylinder.



The magazine of this special Greenlee Six is adjustable for various lengths of work pieces and is capable of handling a wide range of parts.

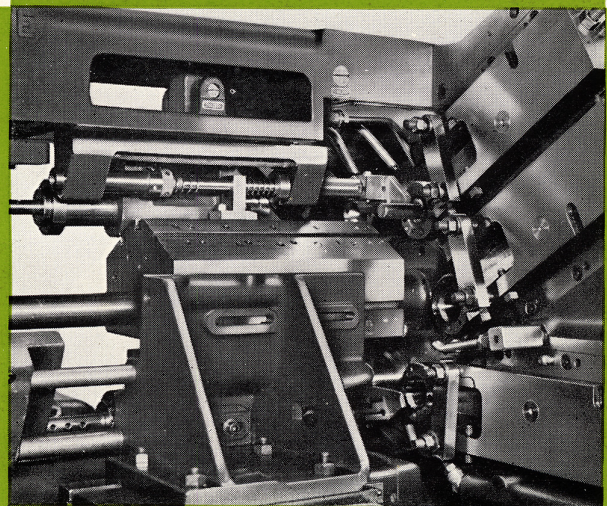
MULTIPLE FEED-OUT EQUIPMENT

The Greenlee 6-Spindle Automatic can also be especially arranged to feed out bar stock in two or more positions to suit requirements of specific jobs. This type of machine offers advantages in speeding production when work pieces require only a few operations. Obviously, over-all production can be greatly stepped up when two or more pieces are completed in one cycle. In most cases both end-working and cross-slide tools can be applied. The illustration shown at right, and the photo below, are views of a Greenlee 6-Spindle Automatic which has been arranged with double feed-out equipment. In this case, a special stock feed and collet operating mechanism and an additional stock stop are used.

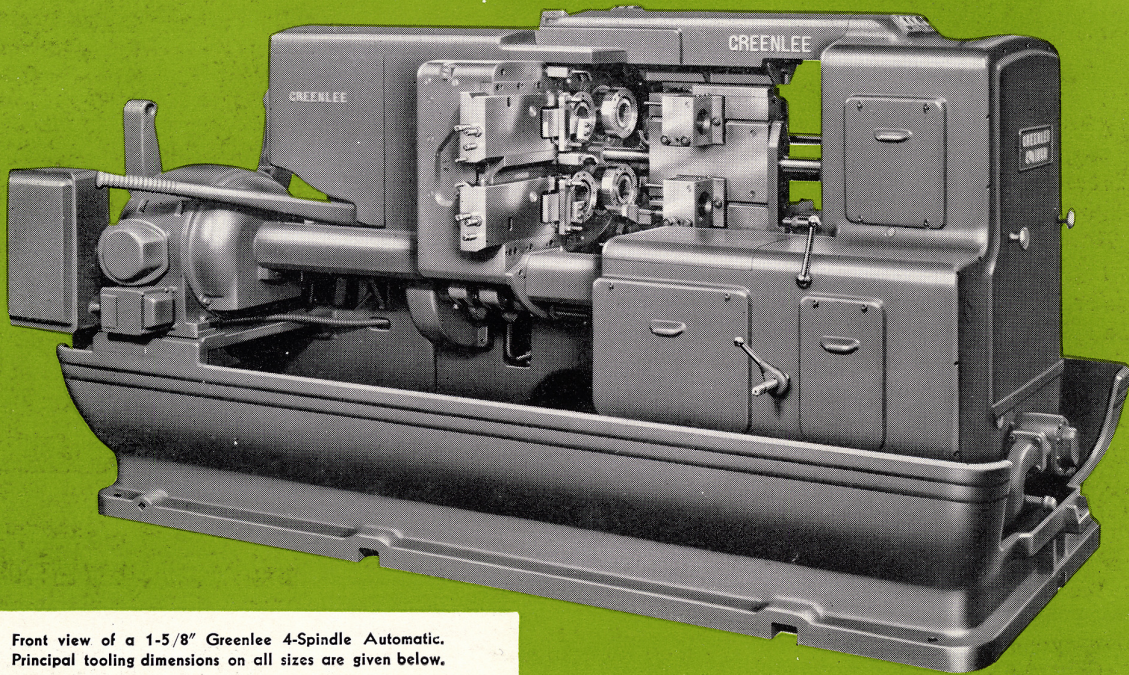


1 Rear view of a double feed-out machine, showing the collet operating and stock feed mechanism. The first set of two operating rings, to the left, controls the opening and closing of the collets. The rear set of operating rings controls the stock feed. The operating rings are carried on guide bars and are cam operated.

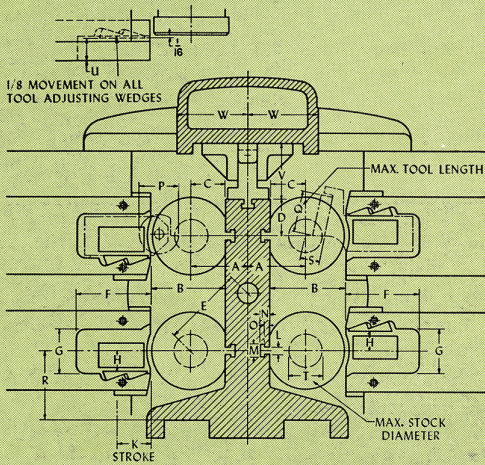
2 View of tooling area on double feed-out machine, showing the stock stops arranged for handling feed-out between the 3rd and 4th positions, and between the 1st and 6th positions. Stock is fed out to the stops in the same manner as on the standard Greenlee 6-Spindle Automatic, while the machine is indexing.



GREENLEE 4 - SPINDLE AUTOMATIC



Front view of a 1-5/8" Greenlee 4-Spindle Automatic. Principal tooling dimensions on all sizes are given below.

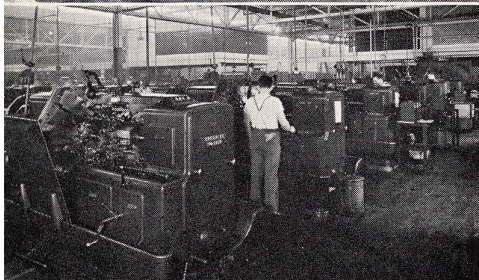
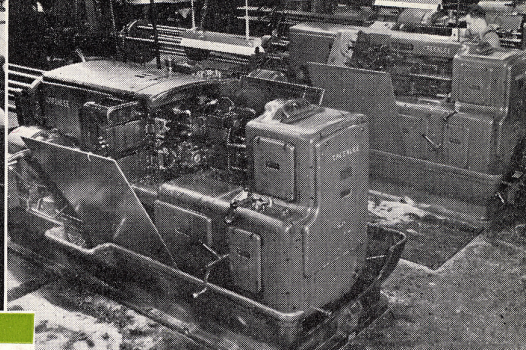
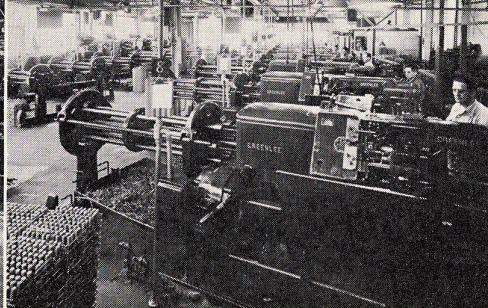
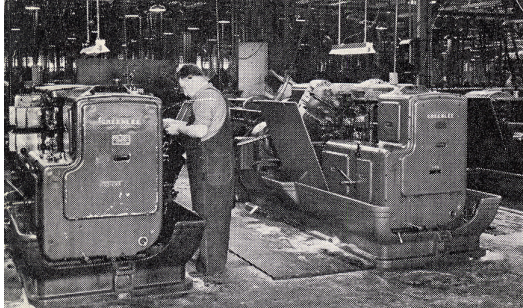


Mach.	A	B	C	D	E	F	G	H	K	L
1-5/8	4.242	5-11/16	2.625	2.946	6	5-1/2	3-1/8	1-3/8	2-3/4	9/16
2-5/8	4.684	6-1/4	2.937	2-15/16	6-5/8	6	3-5/8	1-11/16	2-1/2	9/16

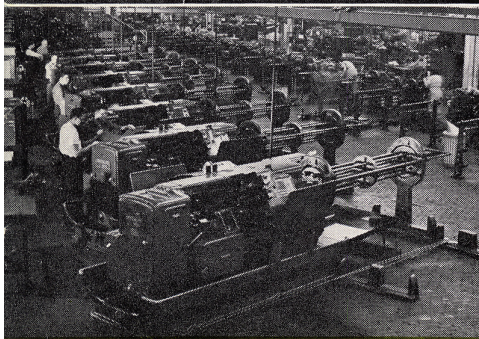
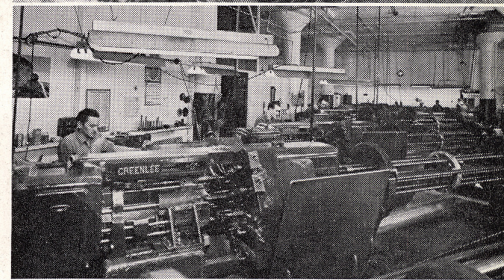
Mach.	M	N	O	P	Q	R	S	T	U	V	W
1-5/8	1-1/16	25/32	7/16	3-1/4	3-3/16	4.882	1-1/8	1-5/8	2	3.5	5.125
2-5/8	1-1/16	25/32	7/16	3-1/4	3-5/8	5.690	1-11/16	2-5/8	2	4.379	5.625

Greenlee 4-Spindle Automatic Screw Machines, predecessors of the Sixes, have demonstrated accuracy and speed on a variety of pieces in many shops. They, too, are designed for easy accessibility and quick change-overs in set-ups. They have independent cross-slides, standard interchangeable cross-slide cams, and the same ease of operation with refinements in construction that are provided in the Greenlee Six. For 4-spindle work, get quotations on the Greenlee Four.

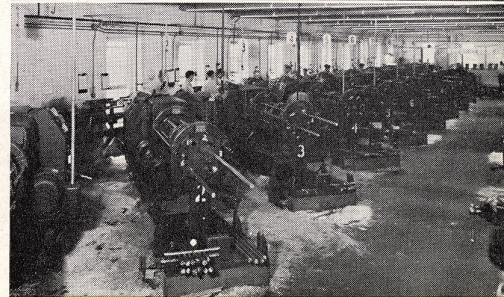
Rating	1-5/8"	2-5/8"
Chuck Capacity, Round.....	1-5/8"	2-5/8"
Chuck Capacity, Hexagon.....	1-13/32"	2-1/4"
Chuck Capacity, Square.....	1-1/8"	1-7/8"
Stock Feed.....	7-1/8"	8-3/16"
Turning Length.....	6"	7-1/2"
Spindle Speed Range.....	210 to 2100	120 to 1200
Feed Range per Spindle Rev.....	.0016 to .025	.002 to .0458
Motor Horse Power.....	15	20
R.P.M. of Motor.....	1800	1800
Floor Space:		
Length with Stock Reel.....	17'-6"	17'-3"
Length without Stock Reel.....	10'-5"	10'-6"
Width.....	5'-0"	5'-4"
Height.....	4'-7"	5'-0"
Net Weight in Pounds.....	15,300	17,000
Domestic Shipping Weight.....	15,750	17,450
Boxed for Export (Approx.).....	17,800	19,500
Cubic Feet, Boxed.....	400	400



MANY OUTSTANDING FEATURES OF GREENLEE AUTOMATIC SCREW MACHINES have been presented throughout the pages of this Catalog. In addition, examples have been given to suggest what can be done to modify the standard machines in order to meet unusual requirements. Batteries of Greenlees are installed in many important plants throughout the country, and the upper portion of this page shows some typical installations turning out a wide variety of parts.

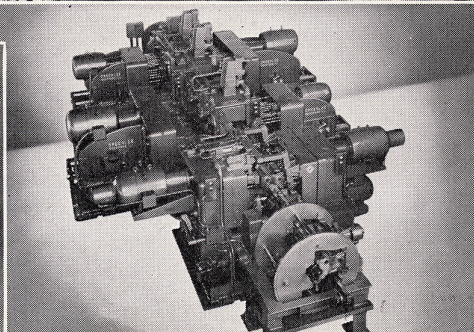
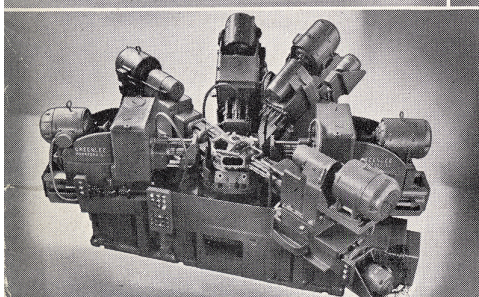
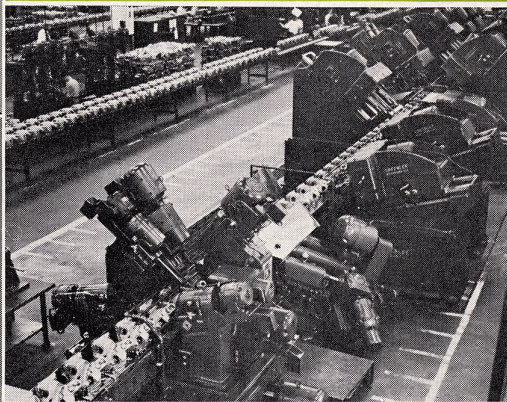
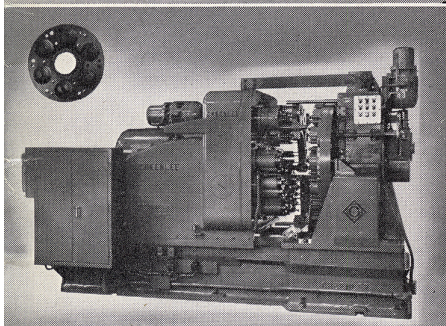
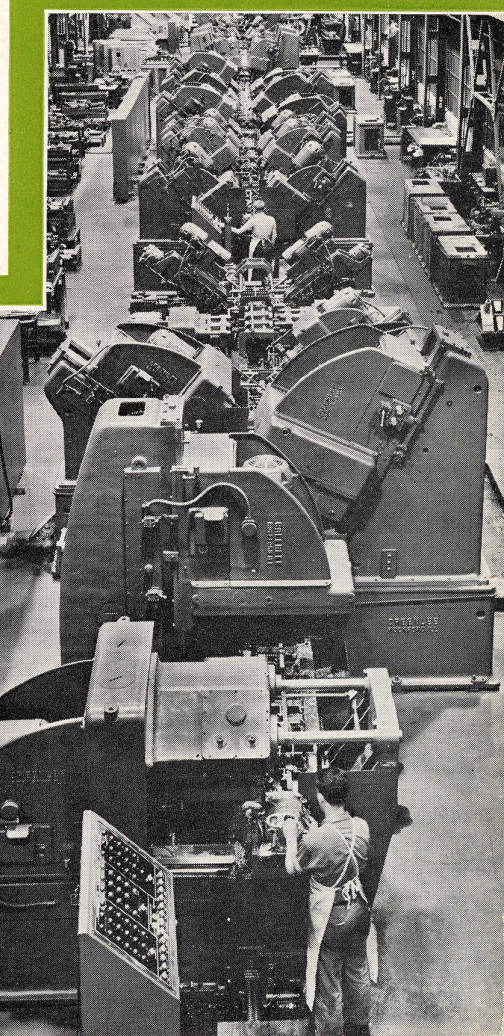
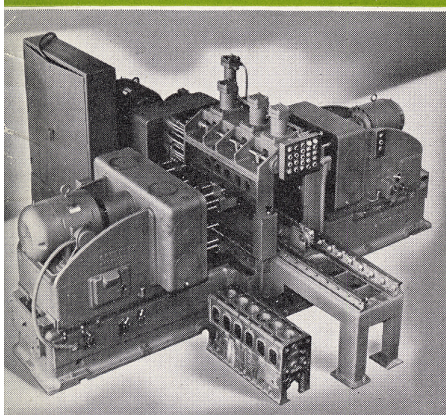


However, automatic screw machines are but one product of the machine-tool department of Greenlee Bros. & Co. Here also are built special-purpose machines for the mass production of parts requiring drilling, boring, reaming, tapping, milling, and similar operations. Outstanding among the many that have been built during World War II are the huge transfer-type processing machines for airplane cylinder heads. Photographs of these high-production machines are shown below and to the right.



Transfer-type processing machines for automobile and tractor cylinder blocks are also shown here, as are two indexing types of multiple-spindle machines. These and many others of varying design can be adapted for a great variety of parts from the simplest to the most complex.

If you have a production problem requiring special-purpose equipment, send us full details and let us suggest a solution.





GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U.S.A.