

**TECHNICAL MANUAL**  
**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,**  
**AND GENERAL SUPPORT MAINTENANCE MANUAL**  
**INCLUDING REPAIR PARTS LIST**  
**FOR**  
**SHAPER**  
**NSN 3418-00-412-4506**  
**(MITTS & MERRILL INC.)**

---

**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**JUNE 1981**

Technical Manual }  
No. 9-3418-204-14&P, }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, DC, 30 June 1981

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,  
AND GENERAL SUPPORT MAINTENANCE MANUAL  
INCLUDING REPAIR PARTS LIST  
FOR  
SHAPER  
(NSN 3418-00-412-4506)**

**REPORTING OF ERRORS**

You can improve this manual by recommending improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in the back of this manual and mailing the form direct to Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished direct to you.

	Page
Setting Up Machine.....	1
Lubrication .....	1
Oil Specifications .....	3
Operation .....	3
Table of Dimensions .....	5
Power Downfeed To Tool Head .....	6
Adjustments .....	6
Parts List.....	9

Manufactured by: Mitts & Merrill Inc.  
109 McCoskry Street  
Saginaw, MI 48601

Procured under Contract No.: DAAA09-79-C-4832

This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

# **INSTRUCTIONS FOR REQUISITIONING PARTS NOT IDENTIFIED BY NSN**

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

- 1 - Manufacturer's Federal Supply Code Number - 41064
- 2 - Manufacturer's Part Number exactly as listed herein.
- 3 - Nomenclature exactly as listed herein, including dimensions, if necessary.
- 4 - Manufacturer's Model Number -
- 5 - Manufacturers Serial Number (End Item)
- 6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.
- 7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number-\_\_\_\_\_ followed by a colon and manufacturer's Part Number for the repair part.

(b) Complete Remarks field as follows:

Noun: (nomenclature of repair part)

For: NSN: 3418-00-412-4506

Manufacturer: Mitts & Merrill Inc.

109 McCoskry Street  
Saginaw, MI 48601

Model:

Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

## • SETTING UP MACHINE •

Shapers are shipped with all the finished surfaces coated with compound to prevent moisture and dirt from getting on the machine in transit. All surface compound should be removed with kerosene. DO NOT use naphtha or benzine. Clean ram ways, attach rear ram guard, and coat all finished surfaces with oil. If equipped with automatic tool lifter, clean actuating rail but do not oil rail or unit. The shoe must be kept dry to function.

### LEVEL MACHINE

The shaper must be set level and secured to a concrete foundation or good solid wood floor. To level the shaper lengthwise and crosswise, place an accurate spirit level on the vise body or table.

First, level frame section of base with flat steel shims and bolt machine to floor at points B and C (See Fig 3).

Second, level extended portion of base as follows:

Remove table front support and attach an indicator to the table. Adjust indicator so that pointer contacts the finished plate on which the table support slides. Move table horizontally and note indicator reading which should be zero across full length of plate. If necessary,

use tapered shims temporarily to obtain proper alignment of extended portion of base then insert flat shims and bolt at two front holes A.

### CHECK DIRECTION OF ROTATION

The pulley shaft on the machine must revolve at the speed and in the direction specified on the plate attached to the frame. If the motor is improperly wired, or the belt improperly attached, the pulley will run in the wrong direction, lubrication system will not function, and machine may be damaged mechanically or thru lack of oil.

The feed selector handle should be positioned at zero feed until the correct rotating direction of the pulley is obtained.

### ALIGN VISE

It is essential for accurate shaping that the vise be set square with the ram. The vise should be accurately aligned and squared by clamping a square against the solid jaw and indicating the blade with a dial indicator attached to the tool head.

Each shaper is given a thorough running test before shipping and is very carefully inspected for accurate operation. It is advisable, however, to run the machine at slow speed for several hours before using.

## • LUBRICATION •

The sustained accurate service of which this machine is capable depends upon the proper lubrication and attention given to its bearings and the working parts. As far as practical, lubrication has been made automatic.

Each machine is equipped with a circulatory pressure oiling system which automatically supplies oil to all essential moving and rotating parts, including the crank pin block, ram guideways, crossrail, and the transmission gears. The oil is pumped from the main reservoir in the base through an oil filter and is distributed to the various outlets through several pressure lines (see Fig. 1). A cartridge type replaceable filter is provided. Change filter when needle of gage on operator's side enters red area. It is normal for this red condition to exist for some time after machine is started until the oil is warmed.

The main reservoir is in the base of the machine and is filled by removing door on side of the frame. Additional oil as needed may be added through the fill hole in the base. Always keep reservoir filled to "H" (High) level mark of dip stick on fill hole plug.

The oil reservoir in the base should be checked weekly and cleaned out about twice a year. Sight oilers are provided at each of the four corners of the ram guideways in the frame to constantly lubricate the- ram bearing. Allow motor to run until oil flows in all sight oilers before engaging the clutch control to operate the machine. If bubbles appear in transparent caps there is not sufficient oil in reservoir. A drop in pressure observed through the sight oilers indicates lack of oil in the base or sediment covering the filter cartridge. Add oil or replace filter as required.

## CIRCULATORY PRESSURE LUBRICATION

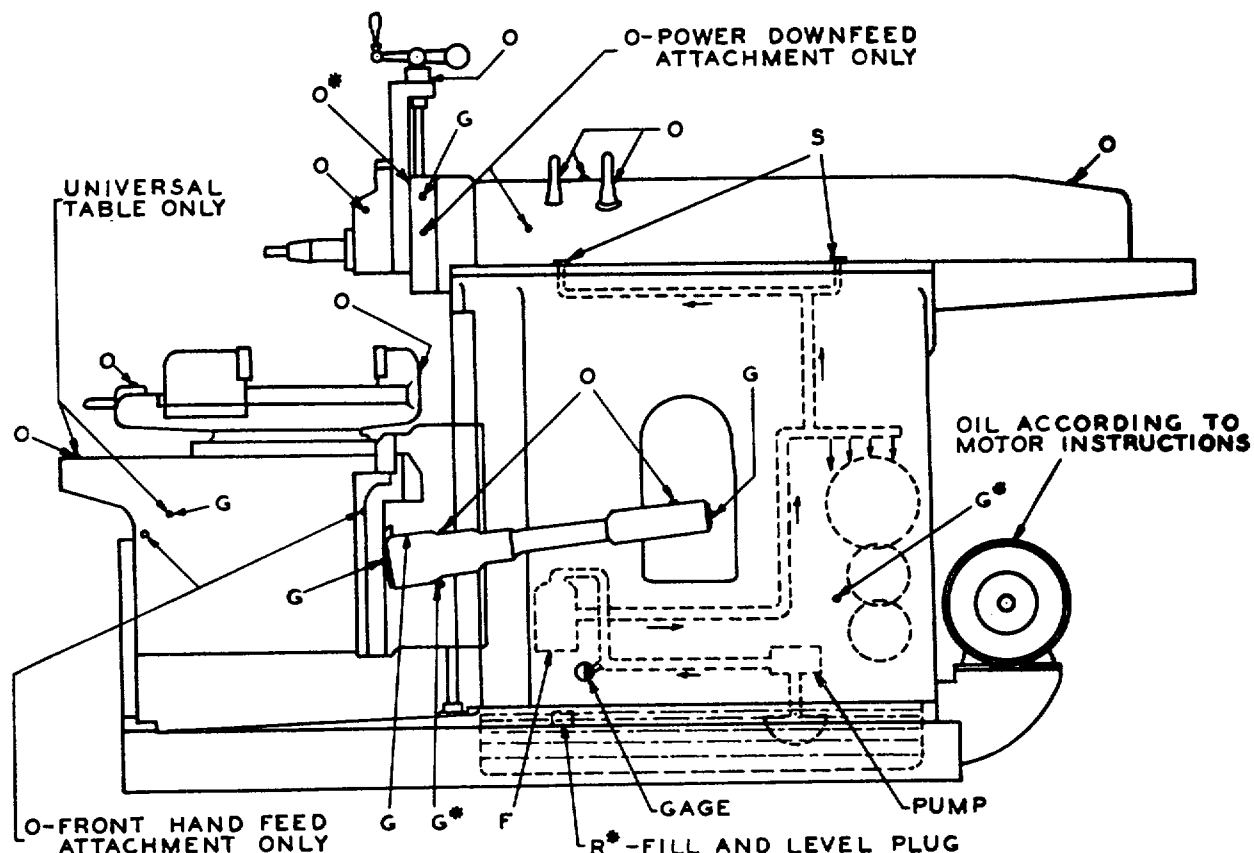


Figure 1.

R-Reservoir. Check weekly. Use oil 450/600 S.S.U. viscosity at 100 F. Clean out twice a year.

O-Oil cups or grooves. Same oil as above.

G-Pressure fittings. Use soft grease of #2 consistency.

S--Sight oilers. To regulate loosen or tighten wick.

F-Filter.

\*-See opposite side of machine.

Lubrication of the crossrail unit is accomplished by metering pins. The oil flow to these pins is regulated by a bleeder hole in the line located inside the frame. In the case of too little or too much oil being delivered to the crossrail unit due to oil temperature or viscosity conditions, the bleeder plug should not be altered or incorrect pressures may result. Gould and Eberhardt should be consulted about furnishing the necessary plug with correctly modified orifice.

The following approximate amounts of lubricating oil are required and should be put

into the machine before starting. After the machine is started some of the oil will remain in the lines and it may be necessary to add oil.

Machine	Gallons
16" Tool Room Shapers	5
16", 16-20", 20" and 20-24" Industrial Shapers	7
24", 28", 32" heavy Industrial Shapers	11

## LUBRICATION (Cont'd)

### • OIL SPECIFICATIONS •

We recommend using a highly refined straight mineral oil of 450/600 seconds Say bolt Universal Viscosity at 100 deg. F., if scoring of the rams is to be avoided. It is particularly important not to use the ordinary grade of "machine" oil or red engine oil generally found in machine shops as this is

usually from 200/400 seconds viscosity at 100 deg. F., is entirely too light, and not sufficiently refined. The following oils of reputable manufacturers are suggested, although other good oils of these specifications may be suitable.

Trade Name of Oil	S.S.U.V. @ 100°F.
Eureka Oil H .....	500/515
Pacemaker #5.....	525/535
Nuto 67 .....	550/560
Gulf Seneca Oil D .....	500/510
Cosmolubric #840 .....	490/510
Imperial D.B. 61 .....	500/525
Nuto 67 .....	550/560
Klondyke Heavy .....	500/530
Shell Carnea Oil 41 .....	500/549
Rubilene Medium Heavy .....	530/560
Mobil DTE Oil Extra Hvy .....	590/600
Stanoil #50.....	500/515
Nuto 67 .....	550/560
Sutraco L50.....	490/510
Solnus Heavy Medium .....	525/575
Texaco Texol E .....	500/520
Tycol 119 .....	510/530
Valvoline Product R506.....	500/510

### • OPERATION •

BEFORE STARTING, BE SURE THE RAM WAYS ARE WIPED CLEAN AND ARE WELL OILED. A machine having a mechanical clutch is started by pulling the clutch control away from the machine and is stopped by pushing this lever toward the machine. To start ram on machine equipped with an electric clutch turn switch control to the left. Turning this switch to the right stops the ram.

#### ADJUST STROKE LENGTH

To adjust the length of stroke, stop the machine so that the zero mark on the stroke indicator is upward. Apply the crank handle to the stroke length control and turn clockwise to increase and counter-clockwise to decrease the length of stroke. A dial indicates the length of stroke.

#### POSITION RAM

The ram is positioned by first loosening the ram lock and then revolving the ram positioning control by means of the crank handle. This can be done while the machine is in motion. After making adjustment tighten ram lock.

If ram is positioned so that the tool head returns past the front of the frame, **be sure that head is not set too low or at an angle which would cause it to strike the frame.**

#### SET TOOL HEAD

The tool head is unclamped by applying the crank handle to the head lock and turning counter-clockwise. The tool head can then be swiveled and set to any desired position in 120 deg. Turn the handle clockwise to clamp and lock the head. A tool slide lock is provided to prevent the tool slide from creeping.

## ADJUST RAPID TRAVERSE

Horizontal and vertical rapid traverse is always available whether the machine is running or idle, as long as the motor is operating. Traverse is engaged by pulling outward on the rapid traverse control. (See Fig. 2). Direction of traverse is determined by the position of the directional feed control and is indicated on an adjacent plate.

To traverse horizontally: Place the directional feed control in the direction desired (jogging the rapid traverse control handle to engage clutch teeth) and place the vertical movement control in its lower position (which is the standard position for feeding and traversing horizontally). Pull outward on the rapid traverse control to traverse.

**THE DIRECTION OF HORIZONTAL RAPID TRAVERSE IS ALWAYS OPPOSITE TO THE DIRECTION OF THE FEED SET.** Releasing the control disconnects the traverse and automatically reinstates the feed.

Always place directional feed control in neutral when positioning work table horizontally by hand to avoid damaging the feed mechanism. Overtravel past either end limit of horizontal rapid traverse or feed is pre-

vented by a slip clutch. A loud sound produced by this clutch warns of reaching the limit.

**NOTE: This clutch does not protect the machine at the upper limit of vertical traverse. Caution should therefore be exercised in positioning the crossrail to prevent damage to the ram or tool head.**

To traverse vertically: First loosen table support clamp and remove the stress block. Then loosen the rail clamp (F) and revolve rail clamp (G) several revolutions counterclockwise. (Do not loosen the jam nuts because they are adjusted to hold the crossrail slideably to the frame.) Place the directional feed control in the vertical traverse direction desired (jogging the rapid traverse control handle to engage clutch teeth) and place the vertical movement control in its upper position. Pull outward on the rapid traverse control to traverse. Releasing the control disconnects the traverse mechanism.

The table is raised or lowered by rapid traverse to its approximate working position. This position should be as high as possible consistent with safety so as to minimize overhang of tool. Final adjustment of the tool in relation with the work is made by setting the tool head.

When table is in position place vertical movement control in its lower position, then secure rail with clamp (F) and rail clamp (G), reset table support and adjust stress block to lock the front of the table.

## ADJUST FRONT SUPPORT

On machines equipped with a front support, always use both the support and the stress block. After clamping the front support, insert the stress block directly under the table on the inside of the front support. If the table is set at or near its lowest position, or if machine is equipped with a universal table, the stress block will not fit beneath the table and should be applied to the clamp outside of the support.

The vise may be swiveled by loosening the four clamping bolts of bottom plate. Tighten bolts securely before beginning to shape.

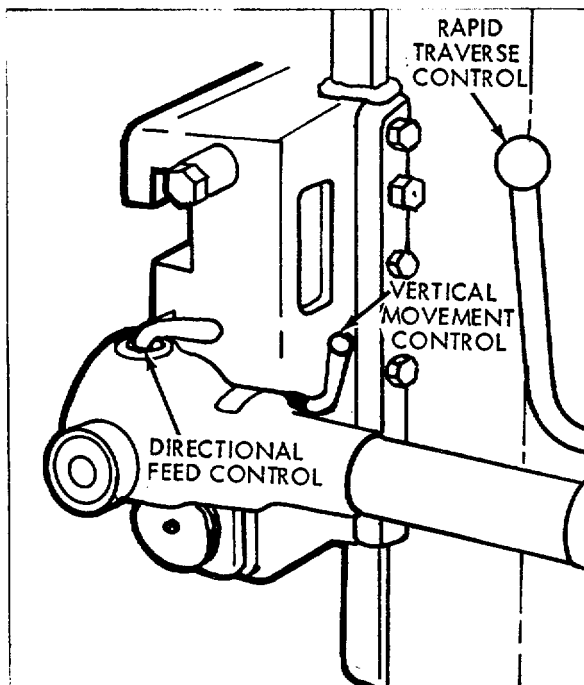


Figure 2.

## OPERATION (Cont'd)

### SELECT SPEED

Sixteen ram speeds are obtained by positioning the range and speed levers. Four speeds are available in each of the four range positions. Always check speed plate on machine for safe combination of speed and stroke length.

Always disengage clutch when shifting gears.

### SELECT FEED

The feed selector controls the amount of feed. A plunger locks and indicates the feed

selected. The feed may be changed whether the machine is running or idle. A feed direction control is provided at the crossrail. Setting this control away from the machine, feeds the table toward the operator. Setting the control in the opposite direction, feeds the table away

from the operator. The feed is disengaged by setting the control in the midway position.

When cleaning chips off the vise and table, always brush away from and not toward the frame or on the ways, to prevent chips from getting inside the machine or scoring the ways. Do not use compressed air.

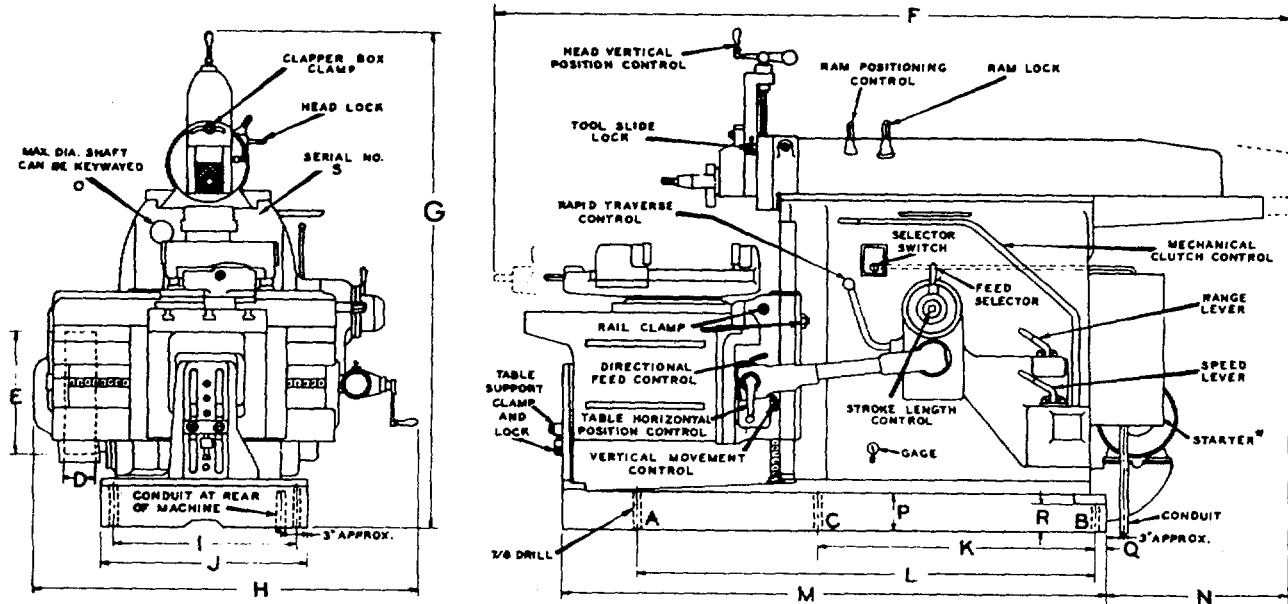


Figure 3.

### • TABLE OF DIMENSIONS •

Subject to change without notice

Size Machine	D	E	F	G	H	I*	J	K*	L*	M	N	O	P	Q	R
16" Plain T.R.	3½"	12"	73"	57"	48"	18½"	21"	29¼"	-	42"	16"	0"	3¾"	1¼"	2"
16" T. R	3½"	12"	73"	57"	48"	18½"	21"	29¼"	45¾"	51½"	16"	0"	3¾"	1¼"	2"
16" Ind.	4"	14"	83½"	60"	48"	21½"	24"	32"	53¼"	59"	19"	2½"	4¾"	1¼"	3½"
16-20" Ind.	4"	14"	85½"	60"	48"	21½"	24"	32"	53¼"	59"	21"	2½"	4¾"	1¼"	3½"
20" Ind.	4"	14"	93"	61"	48"	21½"	24"	32"	55¾"	61½"	26"	2½"	4¾"	1¼"	3½"
20-24" Ind.	4"	14"	95½"	61"	48"	21½"	24"	32"	55¾"	61½"	28"	2½"	4¾"	1¼"	3½"
24" Ind.	5"	16"	105"	68"	56"	25"	28"	38¾"	68¼"	75"	26½"	3"	5"	1½"	3½"
28" Ind.	5"	16"	108½"	68"	56"	25"	28"	38¾"	68¼"	75"	28½"	3"	5"	1½"	3½"
32" Ind.	5"	16"	121"	68"	56"	25"	28"	38¾"	68¼"	75"	37"	3"	5"	1½"	3½"
32" Hvy. Ind.	5"	16"	122½"	73"	56"	31"	34"	44"	75½"	85"	35"	3"	6"	1½"	3½"

\*If hold down bolts are to be permanently located before machine is received, it is necessary to obtain certification of dimensions I, K and L.



## • POWER DOWNFEED TO TOOL HEAD •

After the stroke length and the ram position have been set and the tool slide lock (E) is released, the power downfeed can be set. (See Fig. 4).

Loosen hand screw (B) and position cam (A) so that when the ram is at the end of the return stroke, lever (C) will have traveled not more than one or two inches on the horizontal portion of the cam. Then tighten (B). Feeding occurs on the return stroke as lever (C) rides on cam (A).

To prevent damaging downfeed mechanism, cam (A) is provided with a safety lobe which locks lever (C) horizontally when cam is located too far forward allowing lever to pass beyond the cam. To reset lever (C), pull out pin (D) which will permit returning lever to vertical position. Then reposition cam so that lever does not travel more than an inch or two on the horizontal portion. The feed selector controls the amount of downfeed. A plunger locks and indicates the feed selected. The feed should be changed while the machine is idle. For manual operation of tool slide, pull out knob (F) and turn knob 90 degrees.

Always move the cam (A) to its extreme

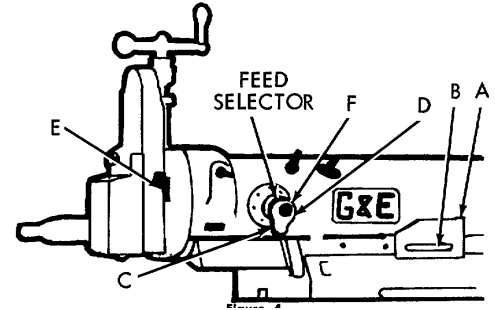


FIGURE 4.

rear position on frame when not in use, when changing the stroke length, or positioning ram.

An automatic stop is provided on the tool head screw and is set by loosening the lock screw in the stop, revolving the stop to desired position on screw, and retightening lock screw. This stop operates in conjunction with a slip clutch, thereby providing a positive stop for any predetermined depth of cut. This clutch also indicates the low limit of vertical feed travel.

## • ADJUSTMENTS •

### RAM

Alignment of ram is uniformly maintained throughout the entire length of guideway by a single adjustable gib. Wear on the ram guideways is taken up by first slightly loosening the clamping bolts that hold down the left wedge (viewing front of machine) then adjusting the screws along the side of the frame. It is essential that this adjustment be carefully made to have the ram snug but not so tight as to bind and score.

Adjustment of the ram lock is provided at the ram lock post. To increase locking effect, remove retaining ring and washer, lift up blackened ring and rotate ring one SPLINES tooth in a counter-clockwise direction, and reassemble washer and retaining ring.

### TOOL HEAD

A taper wedge is provided to compensate for wear on the guideways of the tool head. This wedge is located on the operator's side

of the head and can be adjusted by loosening the top screw and tightening the lower screw.

### SLIDE

The adjustment of the table slide upper guide to the crossrail is made by removing the strap running across the top of the rail and peeling off a lamination from the center and/or end sections of the shim. Localized wear may be compensated for by this means.

To adjust the lower guide to the crossrail, traverse table slide to the extreme left position, loosen the lock screw at the back of the slide, and turn the adjusting screw at the end of the wedge.

### MECHANICAL CLUTCH

On machines equipped with a mechanical clutch, adjustment means are available to compensate for wear of the clutch plate. By withdrawing the plunger provided, the toggle unit can be turned in a clockwise direction until the plunger drops into the next hole,

which increases the plate pressure. It may be necessary to advance the plunger several holes to obtain the proper pressure between the plates when the clutch is engaged. Excessive plate pressure will make control difficult to engage and clutch will drag.

If ram creeps or will not stop with clutch control in stopped position, dirty clutch plates are indicated. Disassemble clutch, clean plates with carbon-tetrachloride and wire brush and reassemble, adjusting as above if necessary.

### ELECTRIC CLUTCH

When machines are equipped with an electric clutch and brake, a rheostat is provided to control the braking action for stopping the ram. The rheostat is positioned at the factory. If faster brake action is desired turn rheostat slowly toward a higher setting until the ram stops within the limits desired.

### V-BELTS

On motor driven shapers, the motor is attached to a bracket on the rear of the machine. Screws in the bracket permit lining up the motor and adjusting tension of the V belts.

### UNIVERSAL SHAPERS

The preceding instructions apply to Universal Shapers equipped with swiveling tables having tilting work surfaces. To swivel the table, first loosen table front support clamp, stress block, and the four swiveling table clamping nuts. Apply crank handle to swivel control, and after positioning table to desired angular setting, tighten table clamping nuts. Reset table support and adjust stress block.

To tilt table top, loosen four tilting-surface clamping nuts and apply crank handle to tilting control. Set top at angle desired and tighten tilting surface clamping nuts. If a tapered cut should occur, check and level machine as per instructions "Level Machine."

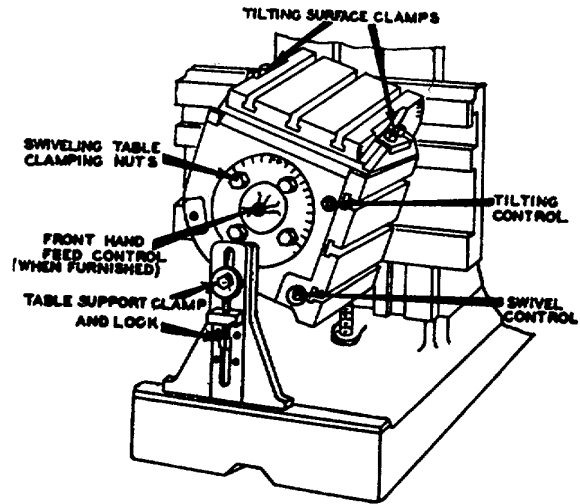


FIGURE 5.

### SERIAL NUMBER AND REPAIR PARTS

The machine serial number is stamped on the frame in the front upper right-hand corner, directly below the ram guideway. (See Fig. 3). When referring to your shaper, always mention this serial number. When ordering repair parts, please refer to Parts List Bulletin for instructions. It is important that the serial number be indicated to assist us in filling your order correctly.

**PARTS LIST**

**for 16 SPEED**

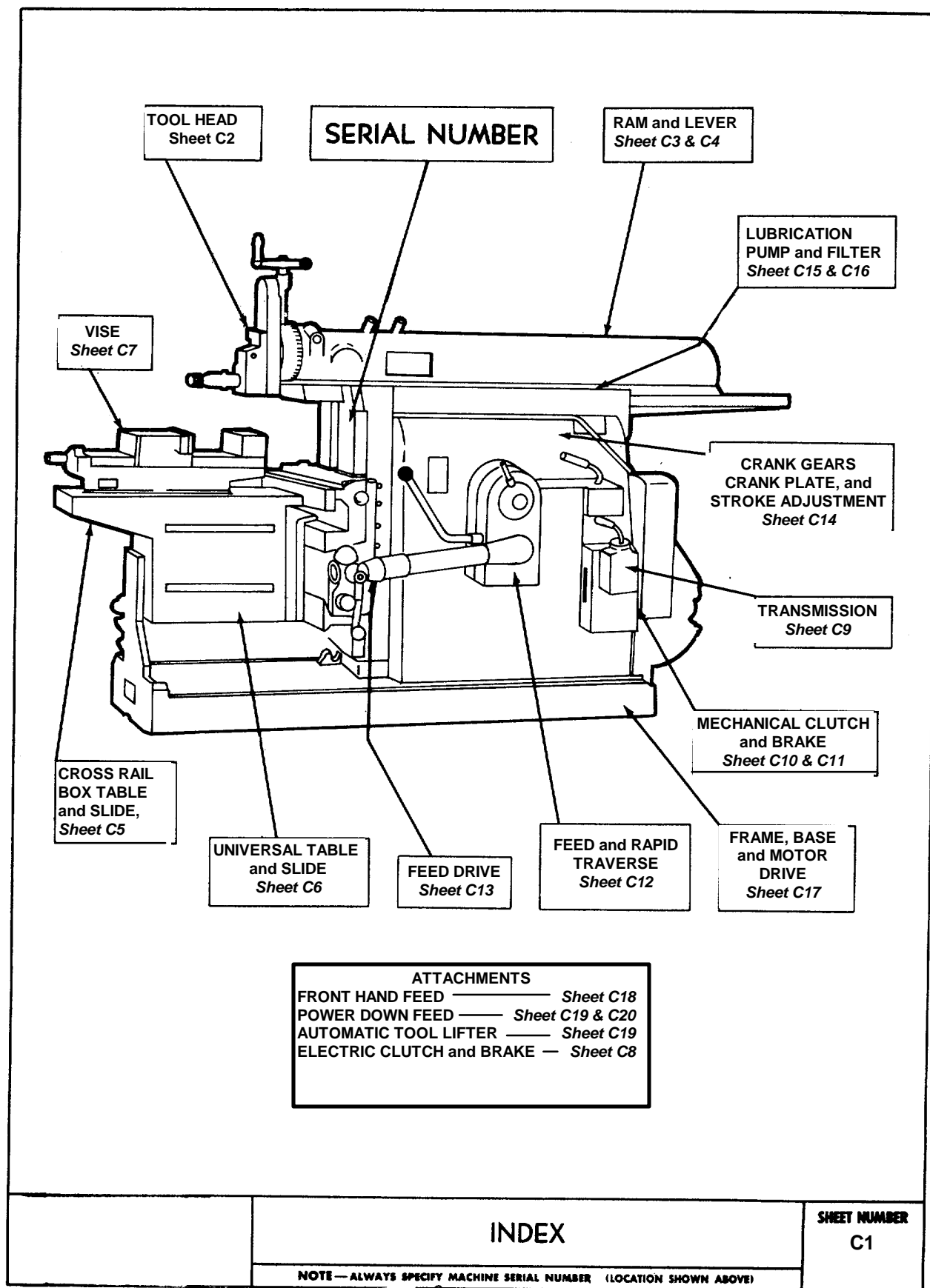
**TOOL ROOM**

***and***

**INDUSTRIAL SHAPERS**

**USE FOR SHAPERS  
BEGINNING WITH SERIAL NUMBER 4950A**

**9/(10(blank))**



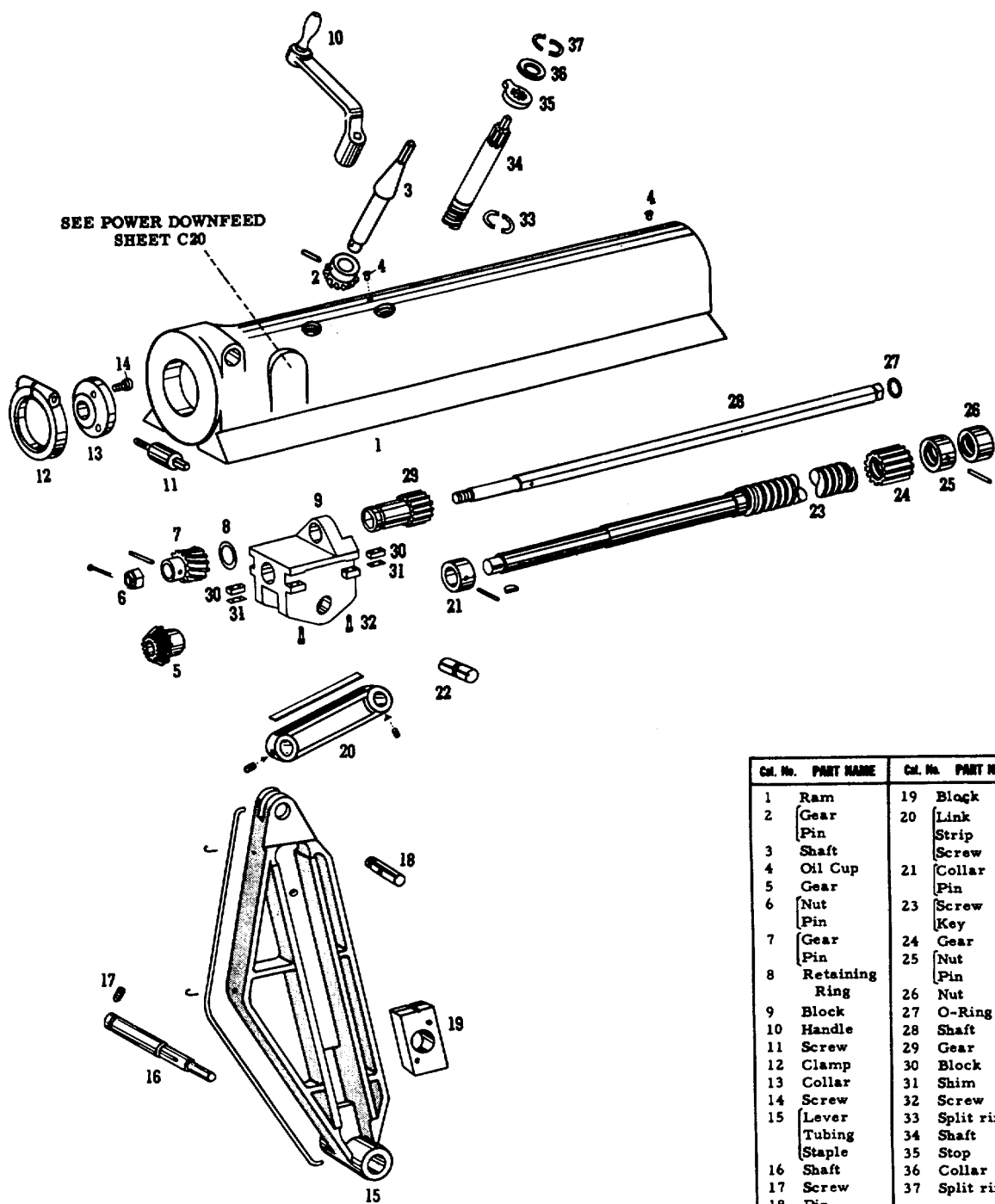




Groups bracketed are sold as units.

1-Catalog number opposite part name  
2-This sheet number                      3-Part name  
4-Quantity required  
5-Machine Serial Number(See Sheet C01)

**SHEET NUMBER**  
**C3**



Cat. No.	PART NAME	Cat. No.	PART NAME
1	Ram	19	Block
2	Gear	20	Link
3	Pin	Strip	
4	Shaft	Screw	
5	Oil Cup	21	Collar
6	Gear	Pin	
7	Nut	23	Screw
8	Pin	Key	
9	Gear	24	Gear
10	Pin	25	Nut
11	Retaining	Pin	
12	Ring	26	Nut
13	Block	27	O-Ring
14	Handle	28	Shaft
15	Screw	29	Gear
16	Clamp	30	Block
17	Collar	31	Shim
18	Screw	32	Screw
19	Lever	33	Split ring
20	Tubing	34	Shaft
21	Staple	35	Stop
22	Shaft	36	Collar
23	Screw	37	Split ring
24	Pin		

Groups bracketed are sold as units only.

# **WHEN ORDERING PARTS ALWAYS SPECIFY**

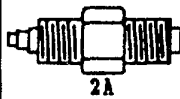
- 1-Catalog number opposite part name
- 2-This sheet number
- 3-Part name
- 4-Quantity required
- 5-Machine Serial Number(See Sheet C41)

## **SOLID TOP RAM and LEVER**

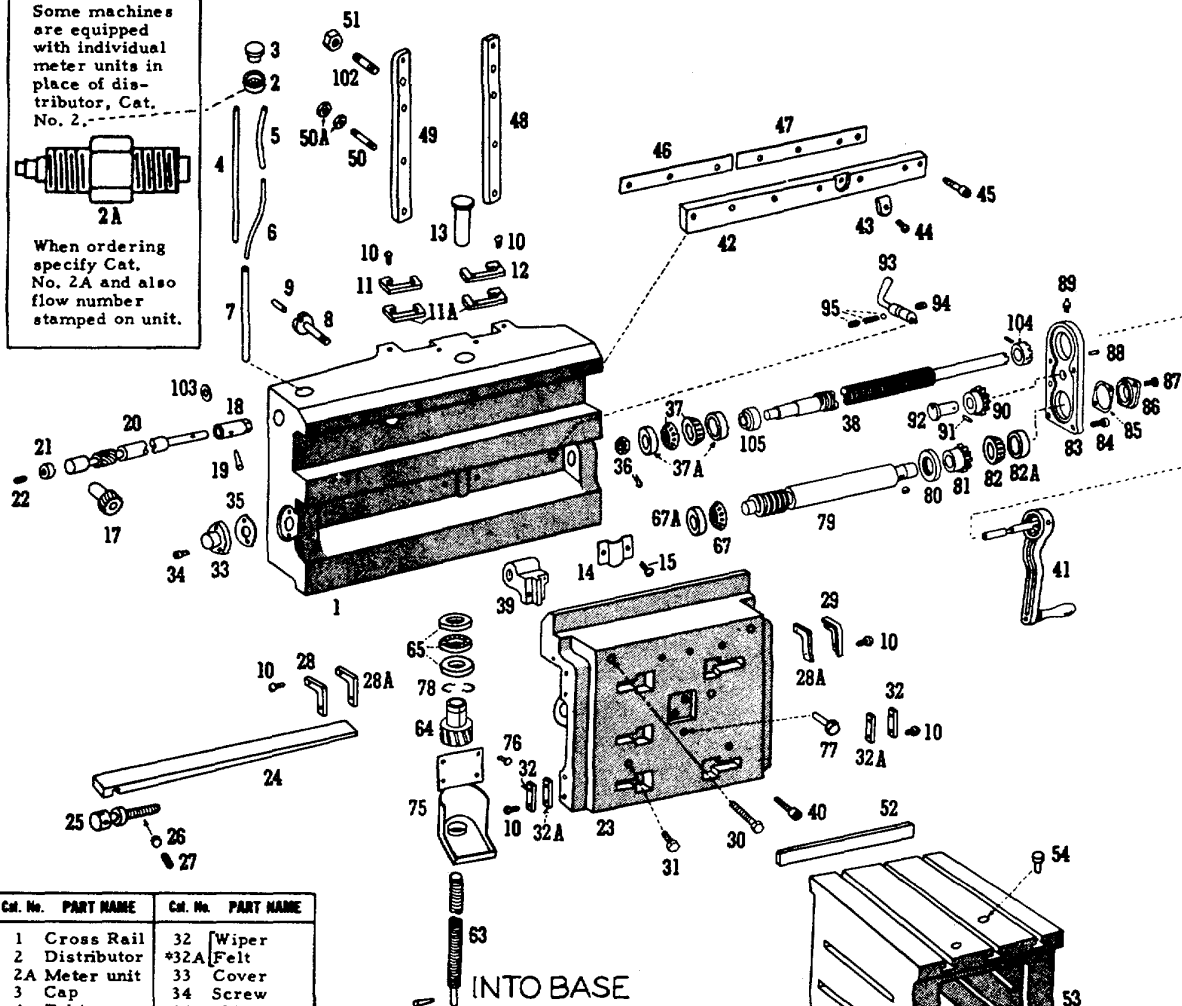
### **SHEET NUMBER**

C4

Some machines are equipped with individual meter units in place of distributor, Cat. No. 2.



When ordering specify Cat. No. 2A and also flow number stamped on unit.



Cat. No.	PART NAME	Cat. No.	PART NAME
1	Cross Rail	32	Wiper
2	Distributor	*32A	Felt
2A	Meter unit	33	Cover
3	Cap	34	Screw
4	Tubing	35	Shim
5	Hose	36	Nut
6	Hose	37	Pin
7	Tubing	37A	Cone
8	Screw	37A	Cup
9	Pin	38	Screw
10	Screw	39	Nut
11	Wiper	40	Screw
*11A	Felt	41	Handle
12	Wiper	42	Strap
*11A	Felt	43	Leather
13	Cap	44	Screw
14	Guard	45	Screw
15	Screw	46	Shim
17	Gear	47	Shim
18	Collar	48	Strap
19	Pin	49	Strap
20	Worm Shaft	50	Stud
21	Plug	50A	Nut
22	Screw	51	Nut
23	Slide	52	Leather
24	Gib	53	Table
25	Screw	54	Pin
26	Plug	55	Strap
27	Screw	56	Stud
28	Wiper	56A	Nut
*28A	Felt	57	Support
29	Wiper	58	Screw
*28A	Felt	58A	Nut
30	Screw	59	Block
31	Screw		

Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
60	Screw	80	Seal	95	Screw
61	Wiper	81	Gear	96	Spring
*61A	Felt	82	Cone	97	Stud
62	Wrench	82A	Cup	97A	Nut
63	Screw	83	Bearing	98	Collar
*64	Gear	84	Screw	99	Pin
65	Bearing	85	Shim	100	Block
66	Cone	86	Bearing	101	Screw
67A	Cup	87	Screw	101A	Nut
75	Guard	88	Pin	102	Stud
76	Pin	89	Fitting	103	Collar
77	Pin	90	Gear	104	Clutch
78	Snap Ring	91	Pin	105	Collar
*79	Worm Shaft	92	Shaft		
	Key	93	Lever		
		94	Screw		

NOTE: On Tool Room Shapers, 23 and 53 are integral and 30, 31 and 77 are not furnished.

Parts 96 to 101A and 103 for Tool Room and 16 and 20 Industrial Shapers only. NOTE: Parts 96 to 101A not furnished on Plain Tool Room Shapers.

Groups bracketed are sold as units except parts indicated by \* which can be purchased separately.

\*64 and 79 sold as a unit.  
All felts sold in strip form.

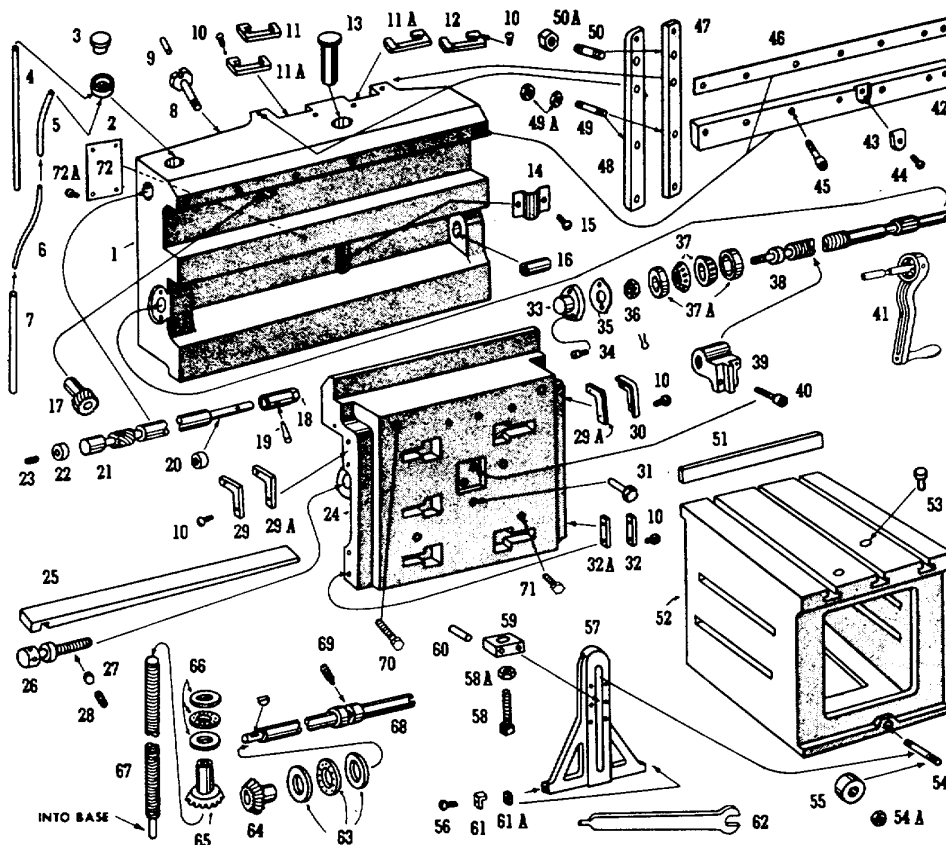
**WHEN ORDERING PARTS ALWAYS SPECIFY**  
1-Catalog number opposite part name  
2-This sheet number 3-Part name  
4-Quantity required  
5-Machine Serial Number (See Sheet C1)

**CROSS RAIL, BOX TABLE, and SLIDE**

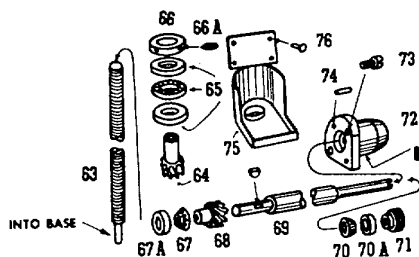
**SHEET NUMBER**

**C5**





The above parts are for Tool Room and 16" & 20" shapers. The small section below is for 24" thru 36" Industrial Shapers. Please specify when ordering parts.



- |           |            |
|-----------|------------|
| 66 Collar | 70 Cone    |
| 66A Screw | 70A Cup    |
| 67 Cone   | 71 Screw   |
| 67A Cup   | 72 Bearing |
| 68 Worm   | 73 Screw   |
| 69 Shaft  | 74 Pin     |
|           | 75 Guard   |
|           | 76 Pin     |

NOTE: On Tool Room Shapers 24 and 52 are integral, and 31, 70, and 71 are not furnished.

On Plain Tool Room Shapers parts 54 to 61A are not furnished.

Groups bracketed are sold as units except parts indicated by \*, which can be purchased separately.

All felts sold in strip form.

# Key No. Part Name

- |      |             |
|------|-------------|
| 1    | Cross Rail  |
| 2    | Distributor |
| 3    | Cap         |
| 4    | Tubing      |
| 5    | Hose        |
| 6    | Hose        |
| 7    | Tubing      |
| 8    | Screw       |
| 9    | Pin         |
| 10   | Screw       |
| 11   | Wiper       |
| *11A | Felt        |
| 12   | Wiper       |
| *11A | Felt        |
| 13   | Cap         |
| 14   | Guard       |
| 15   | Screw       |
| 16   | Bush        |
| 17   | Gear        |
| 18   | Collar      |
| 19   | Pin         |
| 20   | Collar      |
| 21   | Worm Shaft  |
| 22   | Plug        |
| 23   | Screw       |
| 24   | Carriage    |
| 25   | Gib         |
| 26   | Screw       |
| 27   | Plug        |
| 28   | Screw       |
| 29   | Wiper       |
| *29A | Felt        |
| 30   | Wiper       |
| *29A | Felt        |
| 31   | Pin         |
| 32   | Wiper       |
| *32A | Felt        |
| 33   | Cover       |
| 34   | Screw       |
| 35   | Shim        |
| 36   | Nut         |
| 37   | Pin         |
| 37A  | Cone        |
| 38   | Screw       |
| 39   | Nut         |
| 40   | Screw       |
| 41   | Handle      |
| 42   | Strap       |
| 43   | Leather     |
| 44   | Screw       |
| 45   | Screw       |
| 46   | Shim        |
| 47   | Strap       |
| 48   | Strap       |
| 49   | Stud        |
| 49A  | Nut         |
| 50   | Stud        |
| 50A  | Nut         |
| 51   | Leather     |
| 52   | Table       |
| 53   | Pin         |
| 54   | Stud        |
| 54A  | Nut         |
| 55   | Collar      |
| 56   | Screw       |
| 57   | Support     |
| 58   | Screw       |
| 58A  | Nut         |
| 59   | Block       |
| 60   | Pin         |
| 61   | Wiper       |
| *61A | Felt        |
| 62   | Wrench      |
| 63   | Bearing     |
| 64   | Gear        |
| 65   | Gear        |
| 66   | Bearing     |
| 67   | Screw       |
| 68   | Shaft       |
| 69   | Screw       |
| 70   | Screw       |
| 71   | Screw       |
| 72   | Guard       |
| 72A  | Screw       |

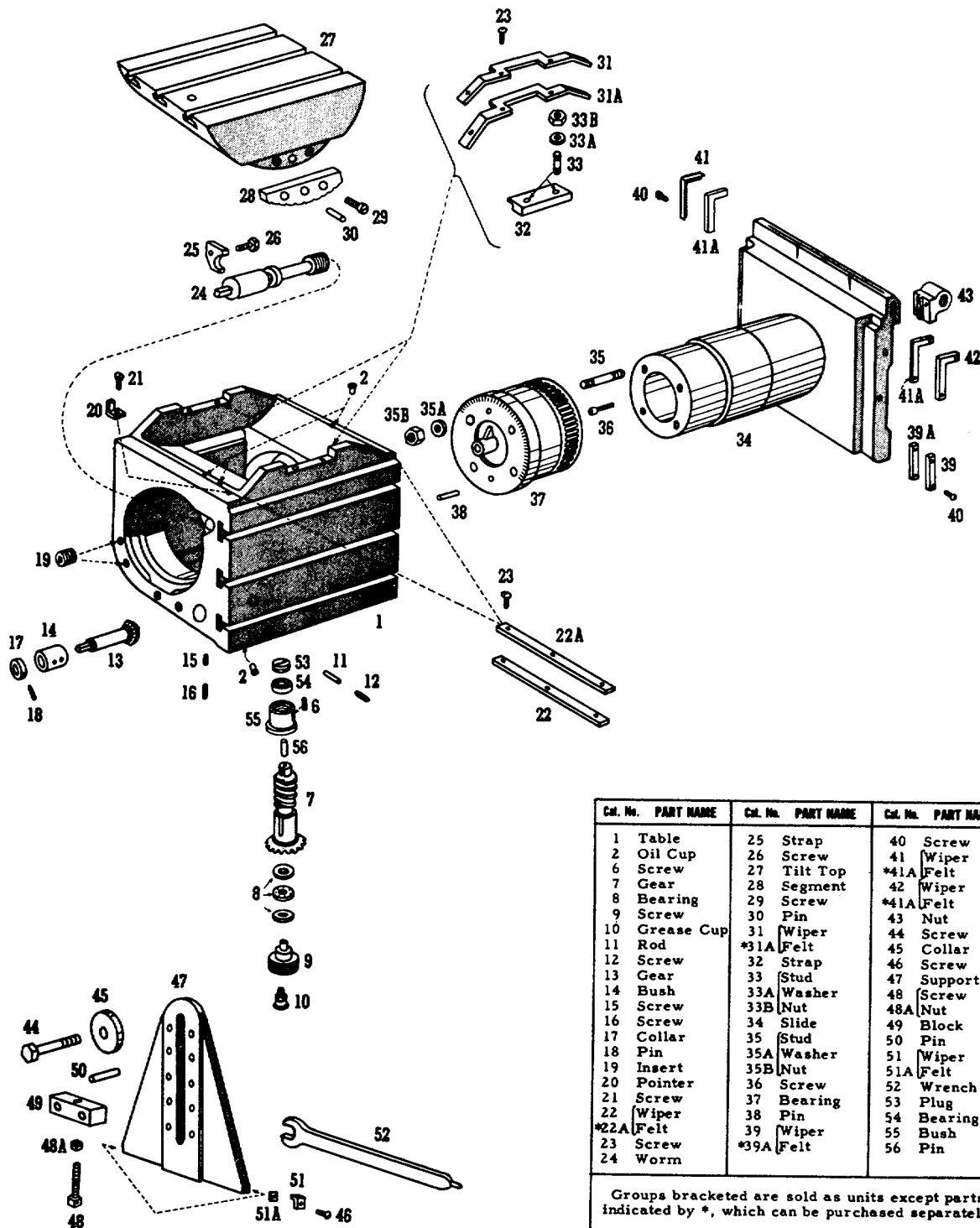
## WHEN ORDERING PARTS ALWAYS SPECIFY

- 1-Catalog number opposite part name
- 2-This sheet number
- 3-Part name
- 4-Quantity required
- 5-Machine Serial Number (See Sheet C1)

## CROSS RAIL, BOX TABLE, and SLIDE

## SHEET NUMBER

C5-A



Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
1	Table	25	Strap	40	Screw
2	Oil Cup	26	Screw	41	Wiper
6	Screw	27	Tilt Top	*41A	Felt
7	Gear	28	Segment	42	Wiper
8	Bearing	29	Screw	*41A	Felt
9	Screw	30	Pin	43	Nut
10	Grease Cup	31	Wiper	44	Screw
11	Rod	*31A	Felt	45	Collar
12	Screw	32	Strap	46	Screw
13	Gear	33	Stud	47	Support
14	Bush	33A	Washer	48	Screw
15	Screw	33B	Nut	48A	Nut
16	Screw	34	Slide	49	Block
17	Collar	35	Stud	50	Pin
18	Pin	35A	Washer	51	Wiper
19	Insert	35B	Nut	51A	Felt
20	Pointer	36	Screw	52	Wrench
21	Screw	37	Bearing	53	Plug
22	Wiper	38	Pin	54	Bearing
*22A	Felt	39	Wiper	55	Bush
23	Screw	*39A	Felt	56	Pin
24	Worm				

Groups bracketed are sold as units except parts indicated by \*, which can be purchased separately.

On Plain Tool Room Shapers parts 44 to 51A are not furnished.

All felts sold in strip form.

#### WHEN ORDERING PARTS ALWAYS SPECIFY

- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

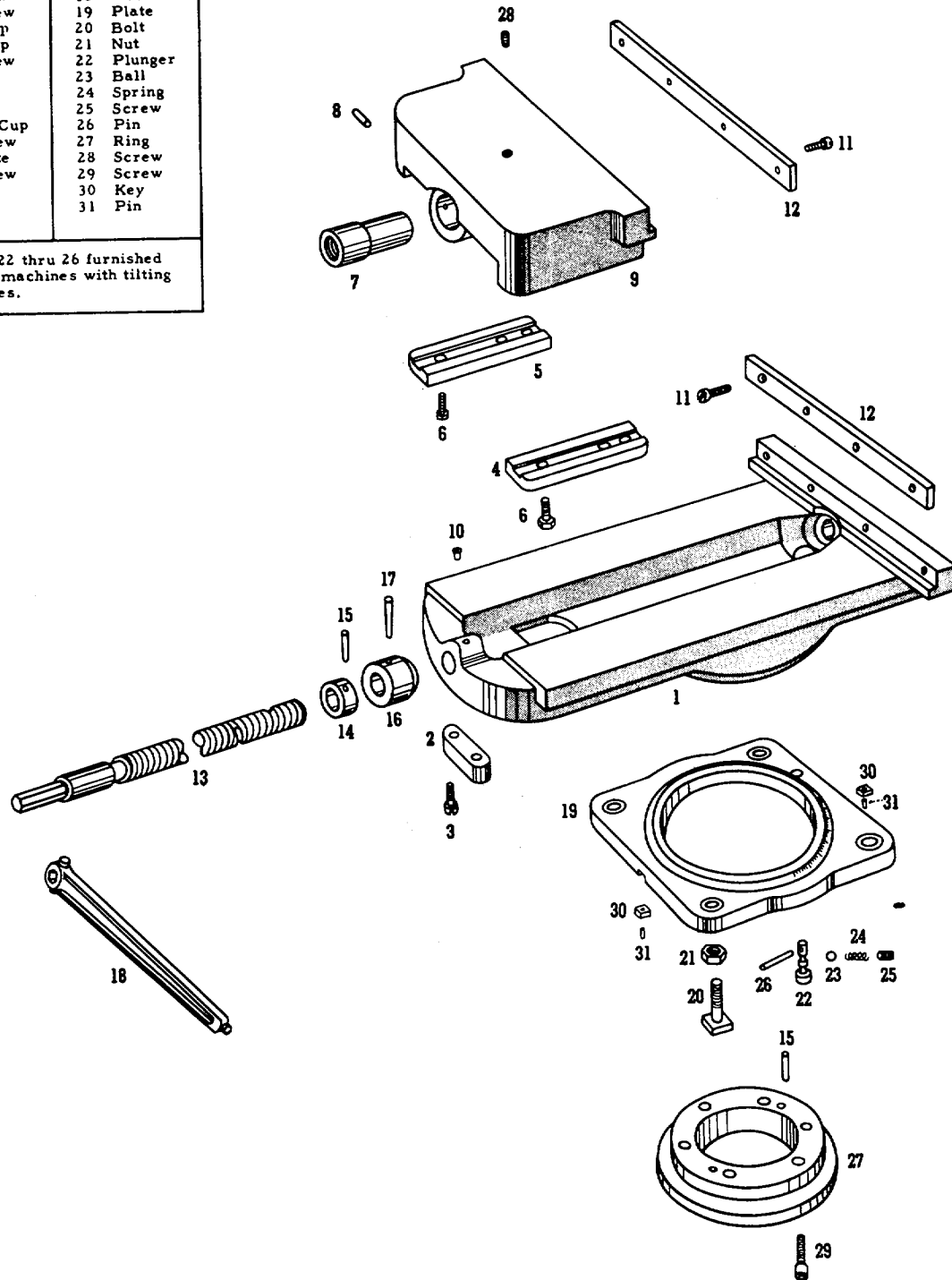
## UNIVERSAL TABLE and SLIDE

#### SHEET NUMBER

C6

Cat. No.	PART NAME	Cat. No.	PART NAME
1	Body	17	Pin
2	Block	18	Wrench
3	Screw	19	Plate
4	Strap	20	Bolt
5	Strap	21	Nut
6	Screw	22	Plunger
7	Nut	23	Ball
8	Pin	24	Spring
9	Jaw	25	Screw
10	Oil Cup	26	Pin
11	Screw	27	Ring
12	Plate	28	Screw
13	Screw	29	Screw
14	Nut	30	Key
15	Pin	31	Pin
16	Nut		

Parts 22 thru 26 furnished only on machines with tilting top tables.



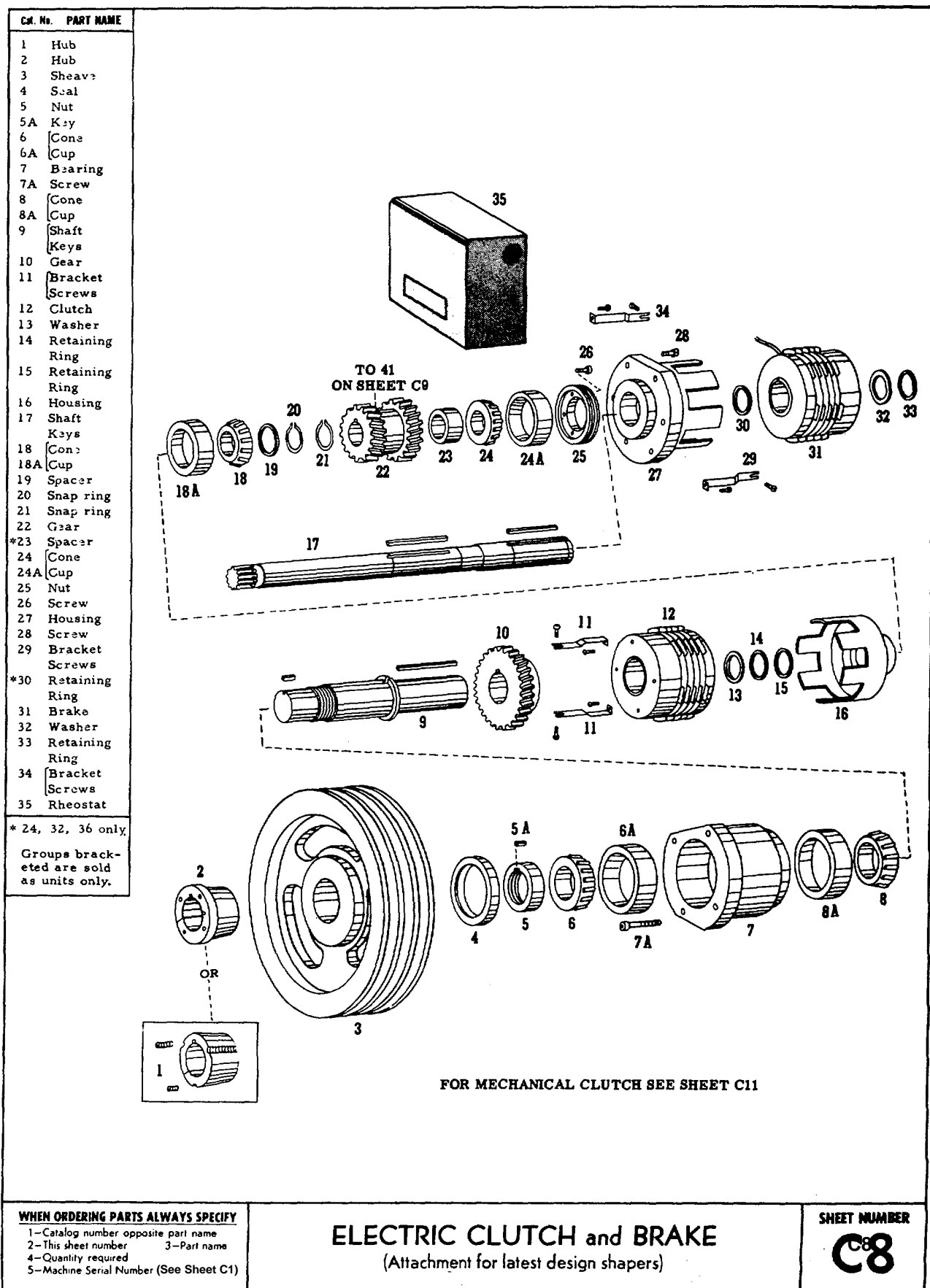
**WHEN ORDERING PARTS ALWAYS SPECIFY**

- 1—Catalog number opposite part name
- 2—This sheet number      3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

WISE

SHEET NUMBER

**C7**



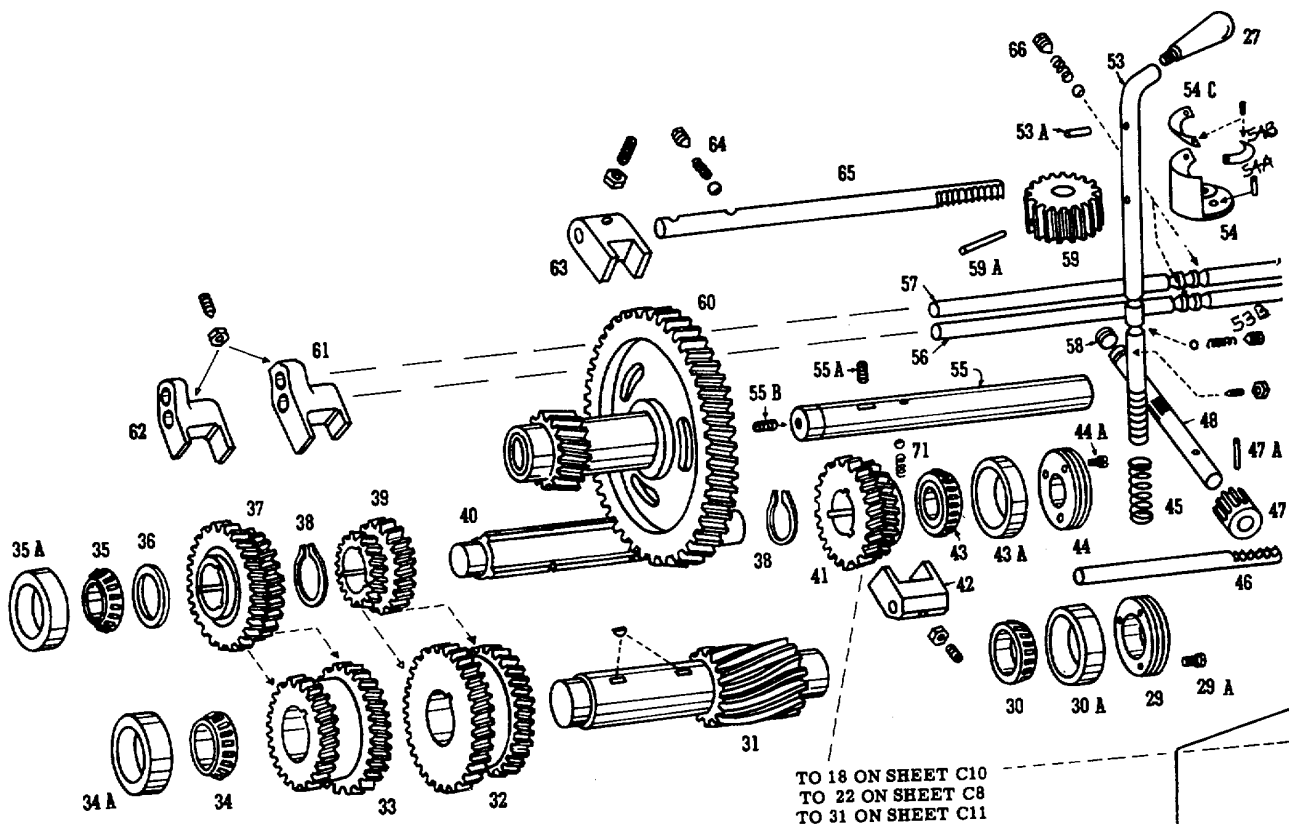
# WHEN ORDERING PARTS ALWAYS SPECIFY

- 1-Catalog number opposite part name
- 2-This sheet number
- 3-Part name
- 4-Quantity required
- 5-Machine Serial Number (See Sheet C1)

# ELECTRIC CLUTCH and BRAKE (Attachment for latest design shapers)

SHEET NUMBER

C8



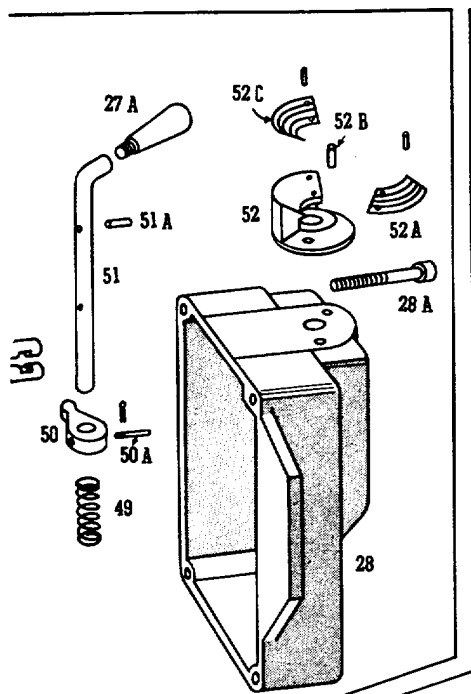
Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
27A	Handle	38	Snap Ring	49	Spring	*54	Bracket	62	Yoke
28	Case	39	Gear	50	Finger	54A	Pin		Screw
*28A	Screw	40	Shaft	50A	Pin	*54B	Plate		Nut
29	Nut	41	Gear		Pin		Pin	63	Yoke
29A	Screw	42	Fork	51	Lever	*54C	Plate		Nut
30	Cone		Nut	51A	Pin		Pin		Screw
30A	Cup		Screw	*52	Bracket	55	Shaft	64	Screw
31	Pinion	43	Cone	*52A	Plate	55A	Screw		Spring
	Keys	43A	Cup		Pin	55B	Screw		Ball
32	Gear	44	Nut	52B	Pin	56	Rod	65	Rack
33	Gear	44A	Screw	*52C	Plate	57	Rod	66	Screw
34	Cone	45	Spring	*53	Lever	58	Plug		Spring
34A	Cup	46	Rack	53A	Pin	59	Gear		Ball
35	Cone	47	Gear	53B	Screw	59A	Pin		
35A	Cup	47A	Pin		Spring	60	Gear		
36	Washer	48	Rod		Ball	61	Yoke		
37	Gear		Screw						
			Nut						

Groups bracketed are sold as units only, except part indicated by \*, which can be purchased separately.

**WHEN ORDERING PARTS ALWAYS SPECIFY**  
 1—Catalog number opposite part name  
 2—This sheet number 3—Part name  
 4—Quantity required  
 5—Machine Serial Number (See Sheet C1)

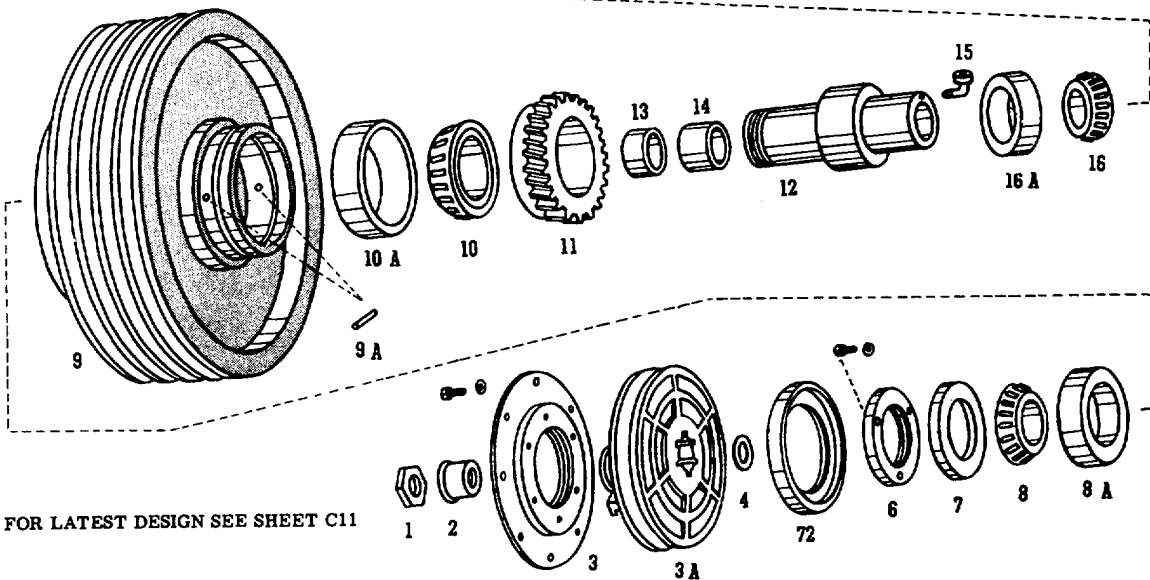
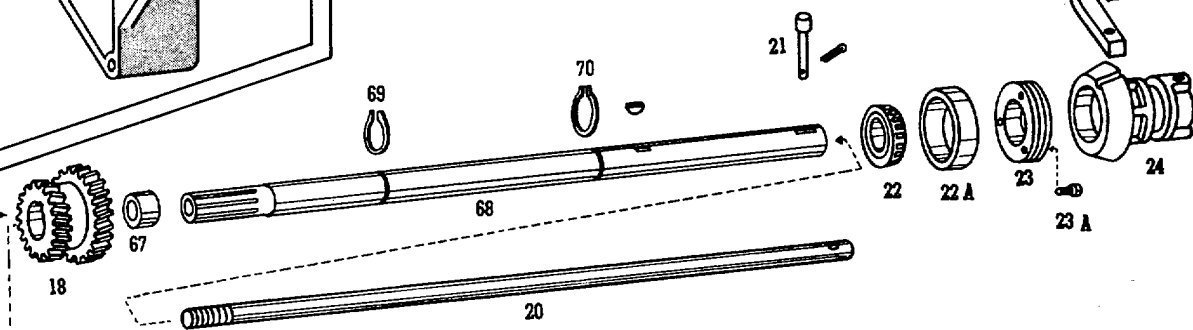
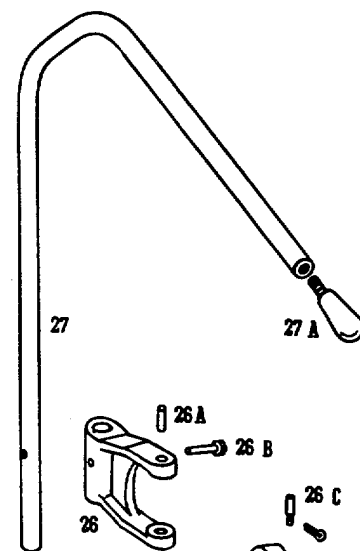
## TRANSMISSION

**SHEET NUMBER**  
C9



Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
1	Nut	11	Gear	26	Yoke
2	Bush	12	Bush	26A	Pin
3	Disc	13	Bush	26B	Pin
	Screw	14	Bush	26C	Pin
	Washer	15	Elbow		Pin
3A	Body	16	Cone	27	Lever
4	Washer	16A	Cup	* 27A	Handle
6	Nut	18	Gear	67	Bush
	Screw	20	Shaft	68	Shaft
	Washer	21	Pin		Key
7	Washer		Pin	69	Snap Ring
8	Cone	22	Cone	70	Snap Ring
8A	Cup	22A	Cup	72	Seal
9	Pulley	23	Nut		
9A	Pin	23A	Screw		
10	Cone	24	Brake		
10A	Cup	25	Yoke		

Groups bracketed are sold as units except parts indicated by \*, which can be purchased separately. \* Part 67 furnished 24, 32, 36 shapers only.



FOR LATEST DESIGN SEE SHEET C11

**WHEN ORDERING PARTS ALWAYS SPECIFY**  
 1-Catalog number opposite part name  
 2-This sheet number 3-Part name  
 4-Quantity required  
 5-Machine Serial Number (See Sheet C1)

## MECHANICAL CLUTCH and BRAKE

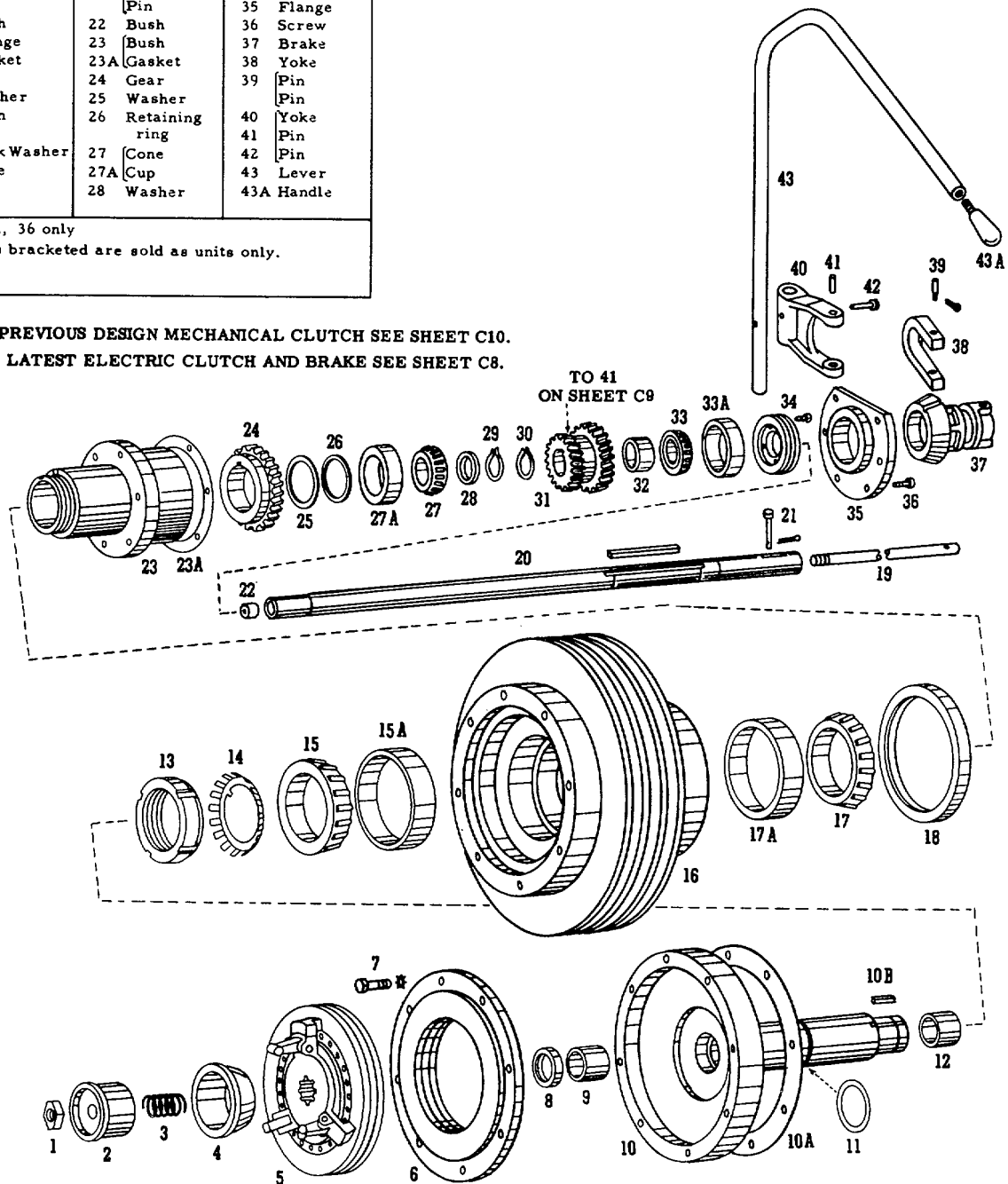
(Previous design)

**SHEET NUMBER**  
**C10**

Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
1	Nut	16	Pulley	29	Snap ring
2	Bush	17	Cone	30	Snap ring
3	Spring	17A	Cup	31	Gear
4	Cone	18	Seal	32	Bush
5	Clutch Body	19	Shaft	33	Cone
6	Clutch Plate	20	Shaft	33A	Cup
7	Screw		Key	34	Nut
	Washer	21	Pin		Screw
8	Seal		Pin	35	Flange
9	Bush	22	Bush	36	Screw
10	Flange	23	Bush	37	Brake
10A	Gasket	23A	Gasket	38	Yoke
10B	Key	24	Gear	39	Pin
11	Washer	25	Washer		Pin
12	Bush	26	Retaining	40	Yoke
13	Nut		ring	41	Pin
14	Lock Washer	27	Cone	42	Pin
15	Cone	27A	Cup	43	Lever
15A	Cup	28	Washer	43A	Handle

24, 32, 36 only  
Groups bracketed are sold as units only.

FOR PREVIOUS DESIGN MECHANICAL CLUTCH SEE SHEET C10.  
FOR LATEST ELECTRIC CLUTCH AND BRAKE SEE SHEET C8.



#### WHEN ORDERING PARTS ALWAYS SPECIFY

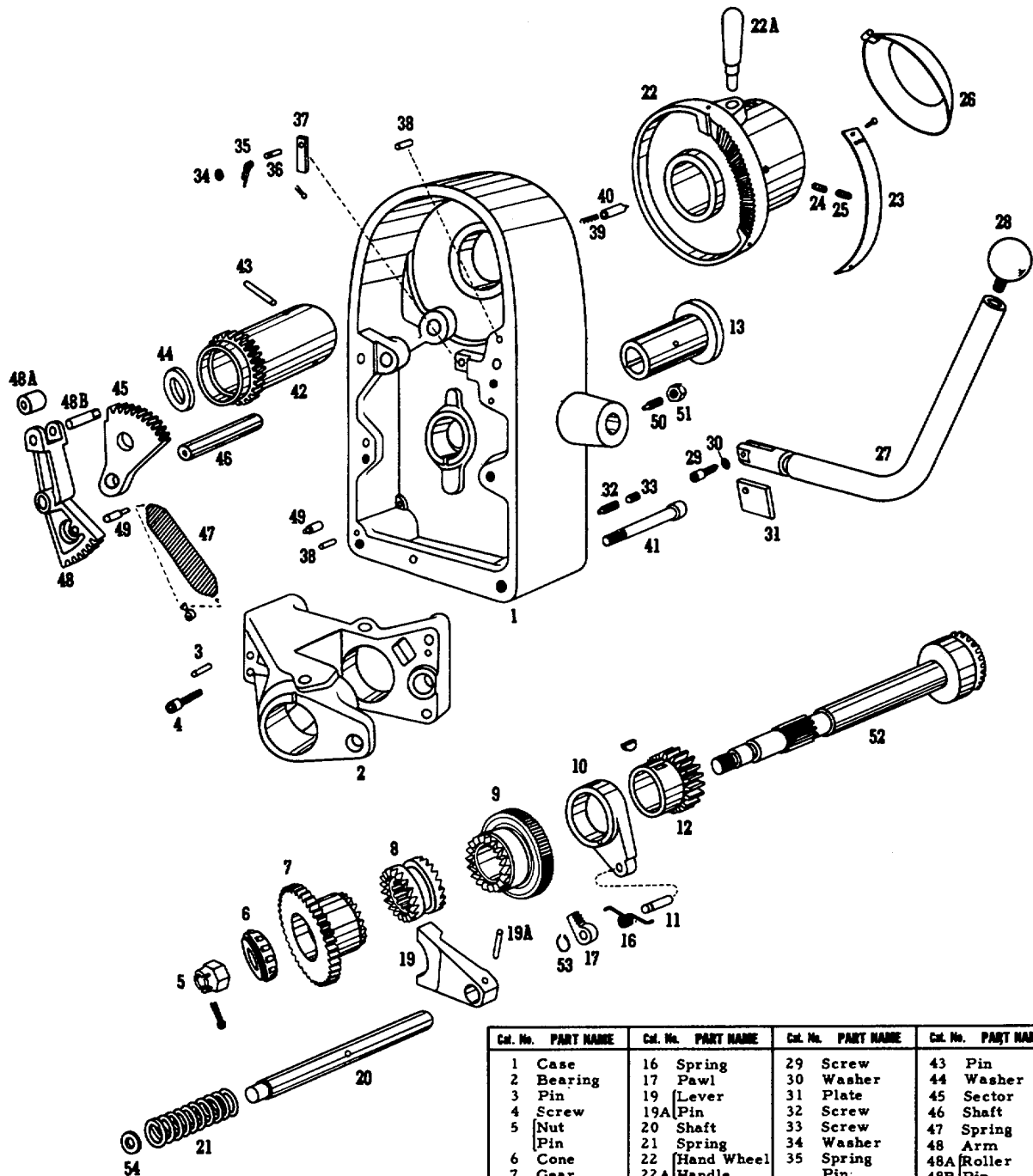
- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

## MECHANICAL CLUTCH and BRAKE

(Latest design)

SHEET NUMBER

**C11**



Col. No.	PART NAME	Col. No.	PART NAME	Col. No.	PART NAME	Col. No.	PART NAME
1	Case	16	Spring	29	Screw	43	Pin
2	Bearing	17	Pawl	30	Washer	44	Washer
3	Pin	19	Lever	31	Plate	45	Sector
4	Screw	19A	Pin	32	Screw	46	Shaft
5	Nut	20	Shaft	33	Screw	47	Spring
6	Pin	21	Spring	34	Washer	48	Arm
7	Gear	22	Hand Wheel	35	Spring	48A	Roller
8	Clutch	22A	Handle	36	Pin	48B	Pin
9	Ratchet	23	Plate	37	Lever	49	Pin
10	Lever	24	Screw	38	Pin	50	Screw
11	Pin	25	Screw	39	Spring	51	Nut
12	Gear	26	Cover	40	Plunger	52	Gear Shaft
13	Key	27	Lever	41	Screw	53	Snap Ring
		28	Ball	42	Gear	54	Shim

Groups bracketed are sold as units only, except part indicated by \*, which can be purchased separately.

#### WHEN ORDERING PARTS ALWAYS SPECIFY

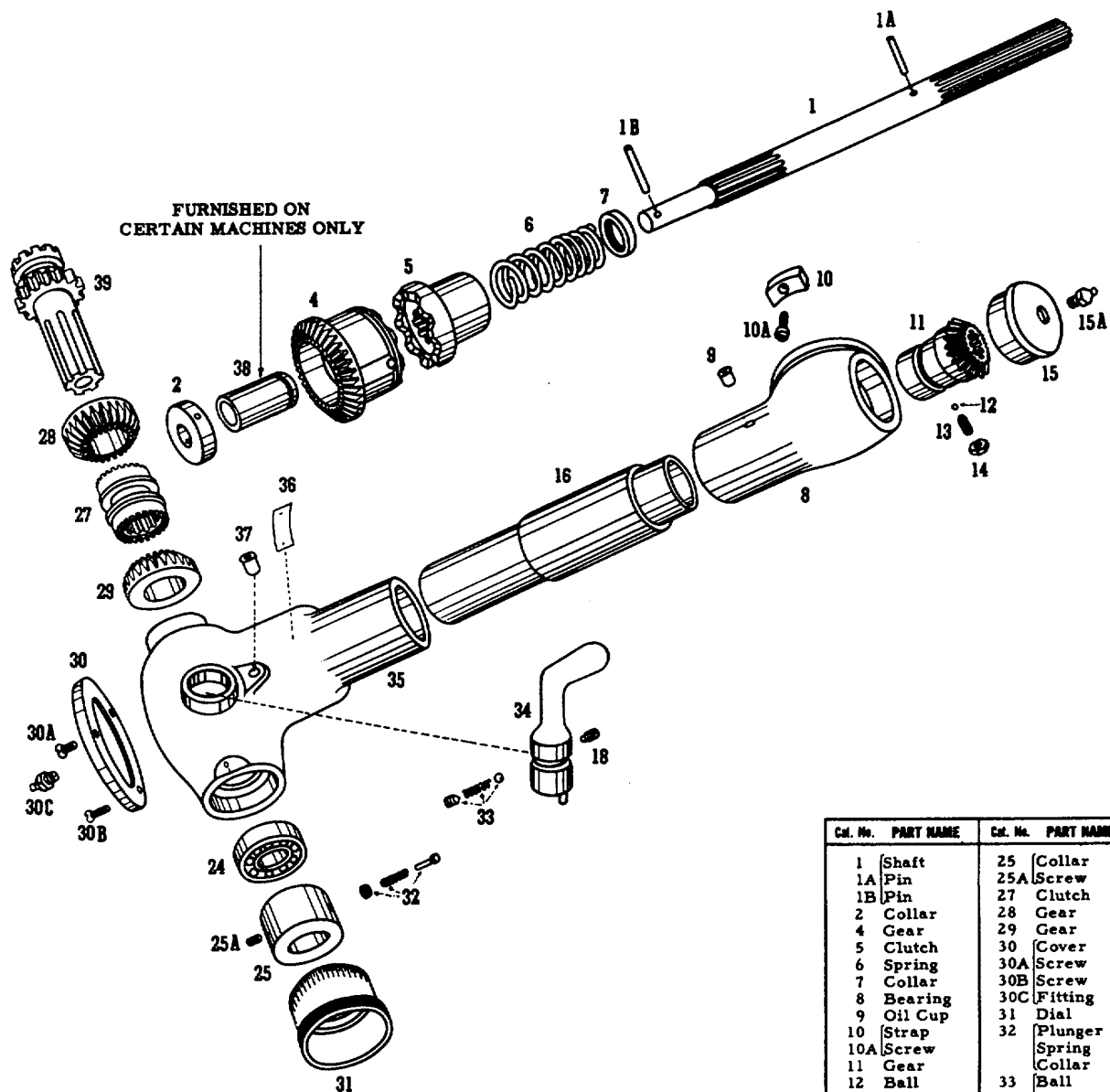
- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

## FEED and RAPID TRAVERSE

#### SHEET NUMBER

C12





Cat. No.	PART NAME	Cat. No.	PART NAME
1	Shaft	25	Collar
1A	Pin	25A	Screw
1B	Pin	27	Clutch
2	Collar	28	Gear
4	Gear	29	Gear
5	Clutch	30	Cover
6	Spring	30A	Screw
7	Collar	30B	Screw
8	Bearing	30C	Fitting
9	Oil Cup	31	Dial
10	Strap	32	Plunger
10A	Screw		Spring
11	Gear		Collar
12	Ball	33	Ball
13	Screw		Spring
14	Nut		Screw
15	Cap	34	Lever
*15A	Fitting	35	Bearing
16	Tube	36	Plate
18	Screw	37	Oil Cup
24	Bearing	38	Bush
		39	Gear

Groups bracketed are sold as units except part indicated by \*, which can be purchased separately.

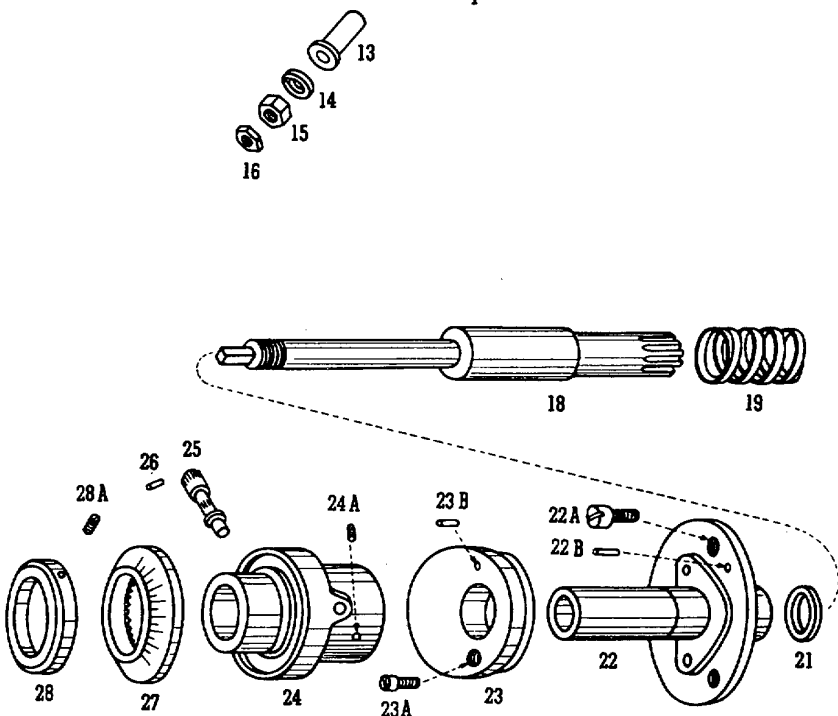
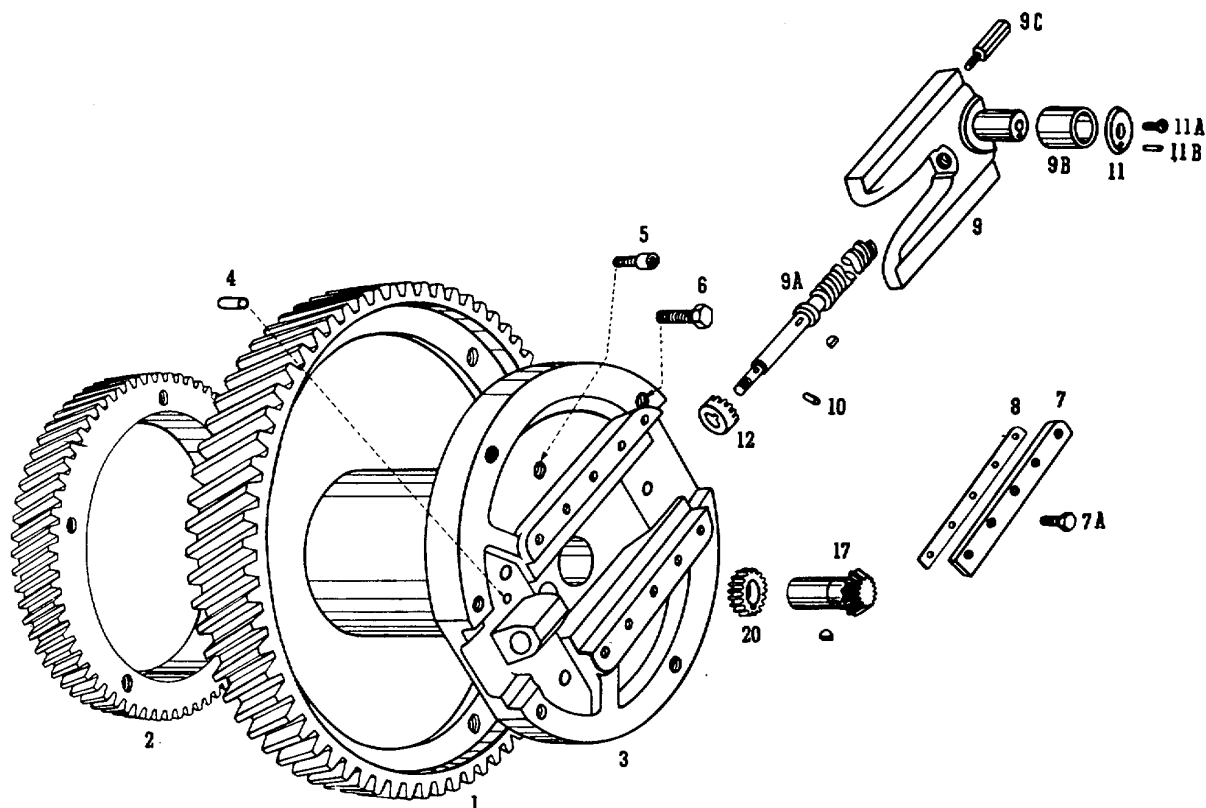
#### WHEN ORDERING PARTS ALWAYS SPECIFY

- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

## FEED DRIVE

SHEET NUMBER

**C13**



Cat. No.	PART NAME	Cat. No.	PART NAME
1	Gear	15	Nut
2	Gear	16	Nut
3	Crank Plate	17	Key
4	Pin	18	Shaft
5	Screw	19	Spring
6	Screw	20	Gear
7	Strap	21	Washer
7A	Screw	22	Flange
8	Shim	22A	Screw
9	Crank Pin	22B	Pin
9A	Screw	23	Cam
9B	Bush	*23A	Screw
9C	Screw	23B	Pin
10	Pin	24	Bearing
11	Washer	24A	Screw
11A	Screw	25	Gear
11B	Pin	26	Pin
12	Gear	27	Dial
13	Bush	28	Collar
14	Washer	28A	Screw

Groups bracketed are sold as units except part indicated by \*, which can be purchased separately.

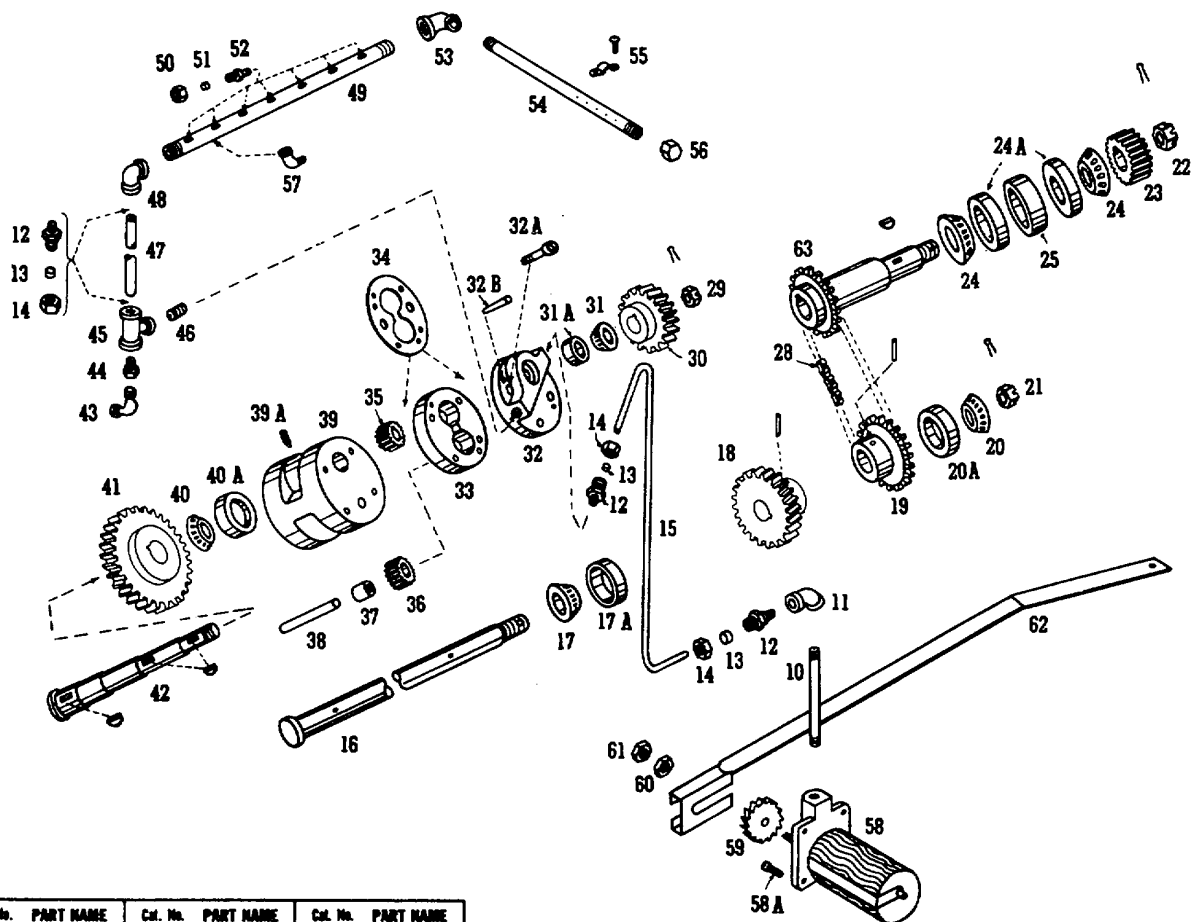
#### WHEN ORDERING PARTS ALWAYS SPECIFY

- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

## CRANK GEARS, CRANK PLATE and STROKE ADJUSTMENT

SHEET NUMBER

**C14**



Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
10.	Nipple	28	Chain	44	Bush
11	Elbow	29	Nut	45	Tee
12	Connector		Pin	46	Nipple
13	Sleeve	30	Gear	47	Tubing
14	Nut	31	Cone	48	Elbow
15	Tubing	31A	Cup	49	Pipe
16	Shaft	32	Bearing	50	Nut
17	Cone	32A	Screw	51	Sleeve
17A	Cup	32B	Pin	52	Connector
18	Gear	33	Bearing	53	Elbow
	Pin	34	Gasket	54	Pipe
19	Sprocket	*35	Gear	55	Clamp
	Pin	*36	Gear		Screw
20	Cone	37	Bush	56	Cap
20A	Cup	38	Shaft	57	Elbow
21	Nut	39	Bearing	58	Filter
	Pin	39A	Screw	58A	Screw
22	Nut	40	Cone	59	Ratchet
	Pin	40A	Cup	60	Nut
23	Gear	41	Gear	61	Nut
24	Cone	42	Shaft	62	Rod
24A	Cup		Keys	63	Sprocket
25	Bush	43	Elbow		Shaft

Groups bracketed are sold as units except parts indicated by \*, which can be purchased separately.

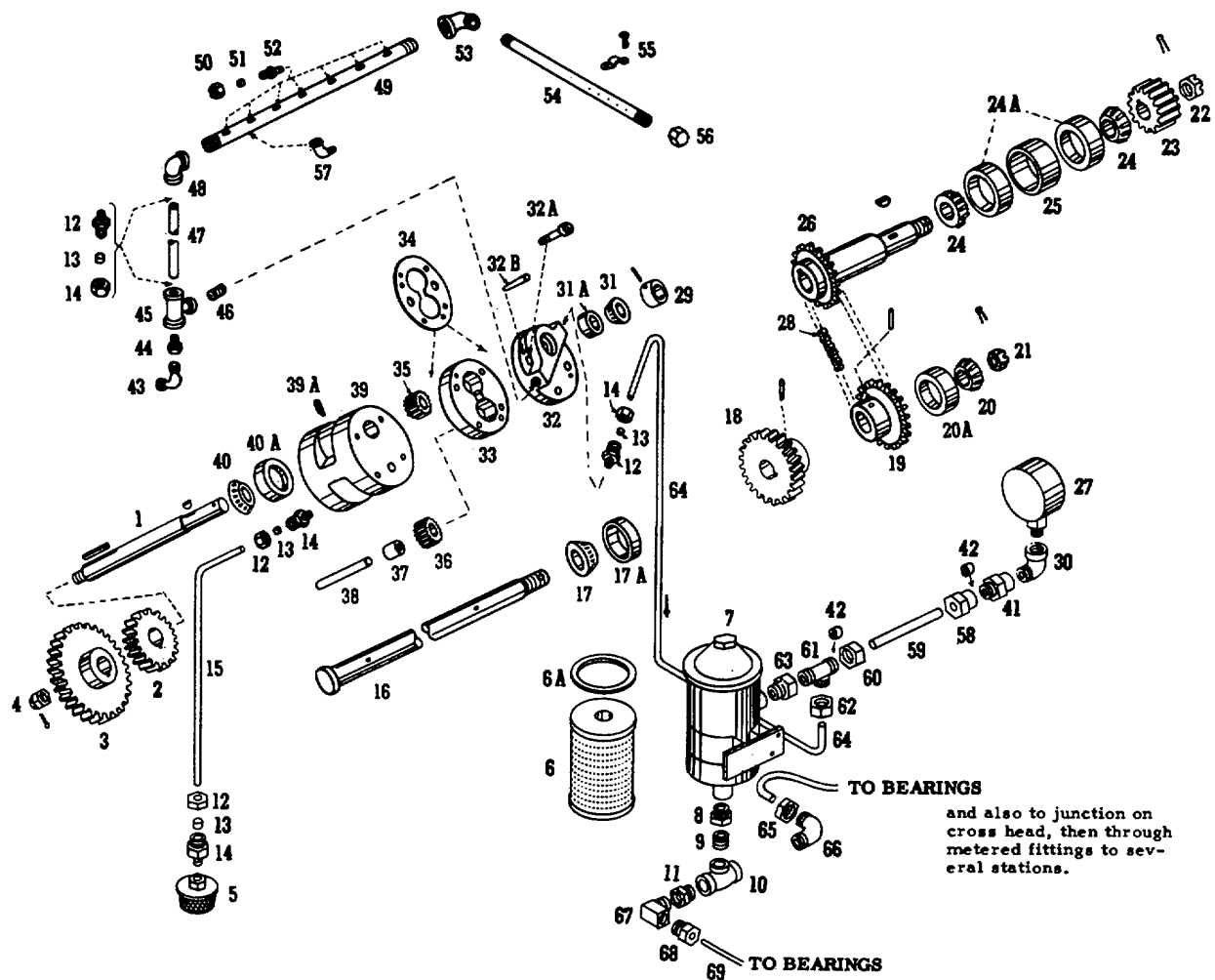
**WHEN ORDERING PARTS ALWAYS SPECIFY**

- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

**LUBRICATION PUMP and  
MECHANICAL TYPE FILTER**  
(For Serial Numbers prior to 6665A-1)

SHEET NUMBER

**C15**



Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
1	Shaft	16	Shaft	27	Gage	40	Cone	55	Clamp
	Keys	17	Cone	28	Chain	40A	Cup		Screw
2	Gear	17A	Cup	29	Collar	41	Connector	56	Cap
3	Gear	18	Gear		Pin	42	Sleeve	57	Elbow
4	Nut		Pin	30	Elbow	43	Elbow	58	Nut
	Pin	19	Sprocket	31	Cone	44	Bush	59	Tubing
5	Screen		Pin	31A	Cup	45	Tee	60	Nut
6	Element	20	Cone	32	Bearing	46	Nipple	61	Tee
6A	Gasket	20A	Cup	32A	Screw	47	Tubing	62	Nut
7	Filter Body	21	Nut	32B	Pin	48	Elbow	63	Bush
8	Bush		Pin	33	Bearing	49	Pipe	64	Tubing
9	Nipple	22	Nut	34	Gasket	50	Nut	65	Nut
10	Tee		Pin	35	Gear	51	Sleeve	66	Elbow
11	Bush	23	Gear	36	Gear	52	Connector	67	Elbow
12	Connector	24	Cone	37	Bush	53	Elbow	68	Nut
13	Sleeve	24A	Cup	38	Shaft	54	Pipe	69	Tubing
14	Nut	25	Spacer	39	Bearing				
15	Tubing	26	Sprocket	39A	Screw				
			Key						

Groups bracketed are sold as units only.

#### WHEN ORDERING PARTS ALWAYS SPECIFY

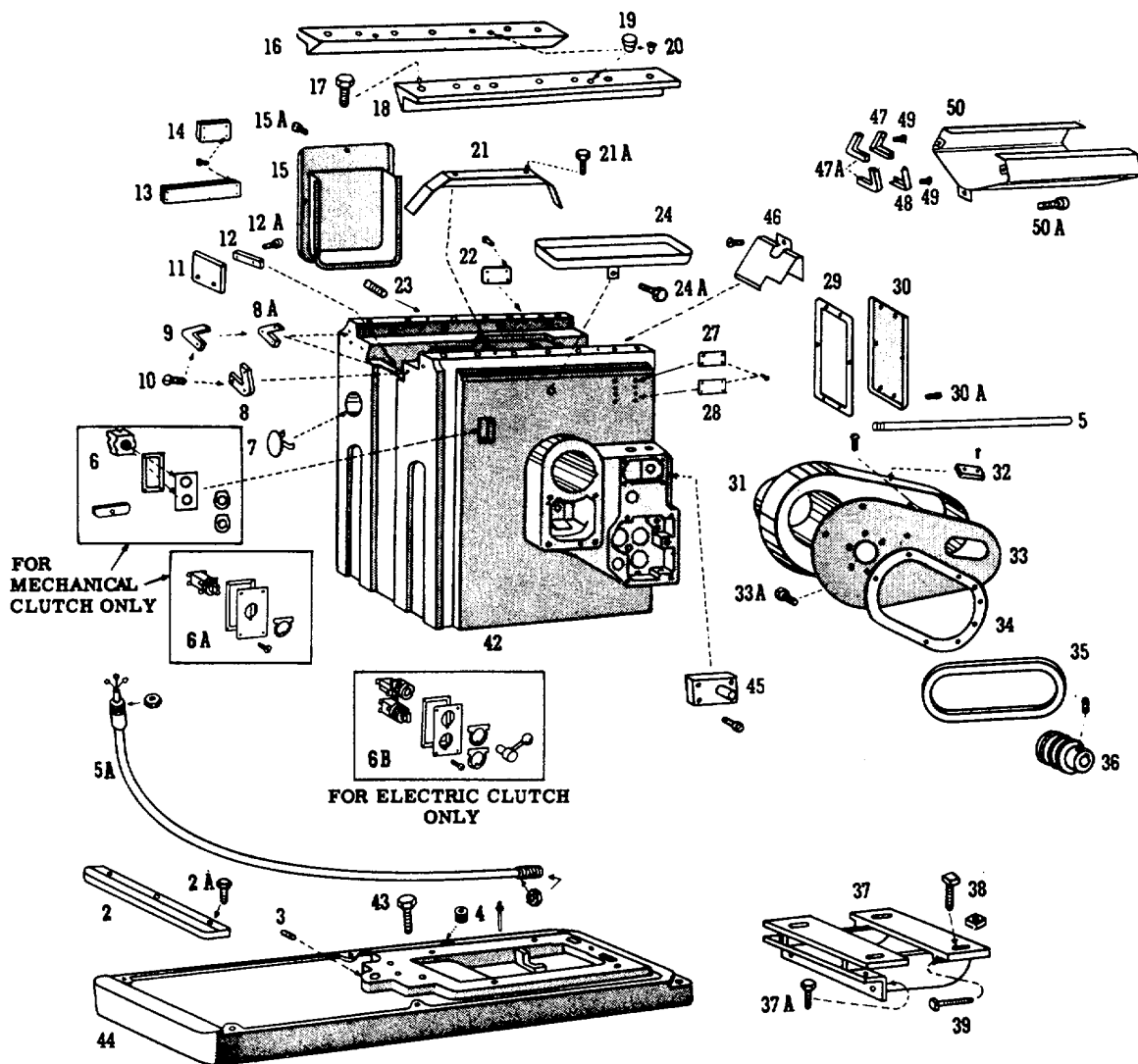
- 1-Catalog number opposite part name
- 2-This sheet number
- 3-Part name
- 4-Quantity required
- 5-Machine Serial Number (See Sheet C1)

## LUBRICATION PUMP and REPLACEABLE ELEMENT TYPE FILTER

(For Serial Numbers 6665A-1 and higher)

SHEET NUMBER

**C16**



Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
2	Plate	10	Screw	18	Gib	28	Plate	35	Belt	45	Cover
2A	Screw	11	Guard	19	Cap		Pin	36	Sheave		Screw
3	Screw	12	Strap	20	Tube	29	Gasket		Screw	46	Guard
4	Plug or Stick	12A	Screw	21	Guard	30	Cover	37	Bracket		Screw
5	Pipe	13	Plate	21A	Screw	30A	Screw	37A	Screw	47	Wiper
*5A	Cable		Pin	22	Plate	31	Guard	38	Screw	*47A	Felt
6	Pushbutton	14	Plate		Pin	32	Plate		Nut	48	Wiper
7	Cap		Pin	23	Screw		Pin	39	Screw	*47A	Felt
8	Wiper	15	Cover	24	Shelf	33	Guard	42	Frame	49	Screw
*8A	Felt	15A	Screw	24A	Screw		Screw	43	Screw	50	Guard
9	Wiper	16	Gib	27	Plate	33A	Screw	44	Base	50A	Screw
*8A	Felt	17	Screw		Pin	† 34	Gasket				

Groups bracketed are sold as units except parts indicated by \*, which can be purchased separately.  
 \* Not available. † Not required for latest design.  
 All felts sold in strip form.

#### WHEN ORDERING PARTS ALWAYS SPECIFY

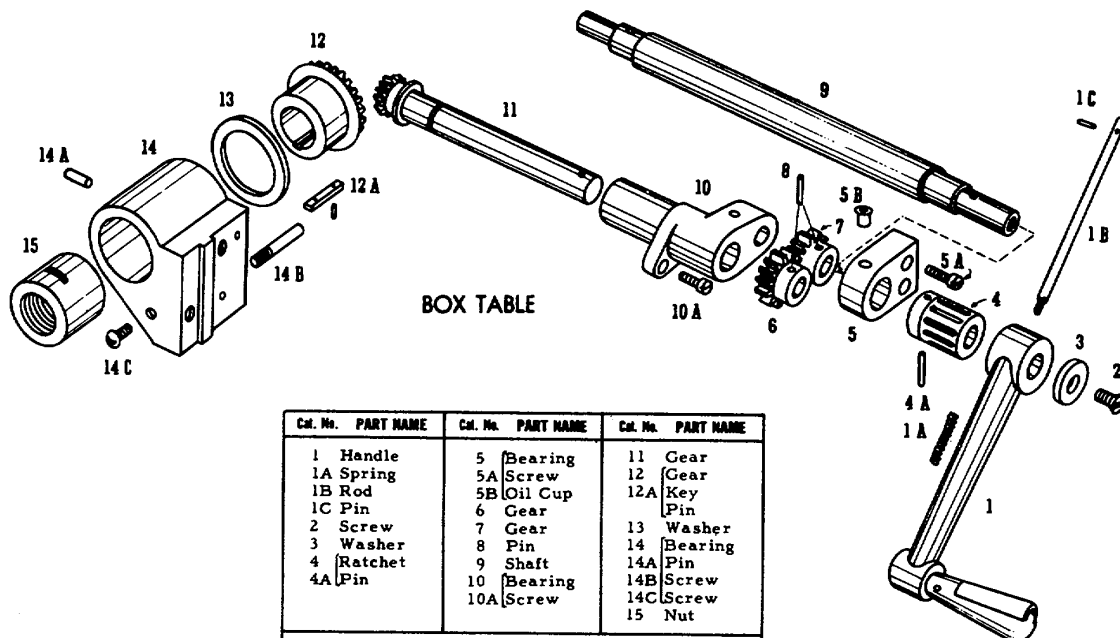
- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

### FRAME, BASE, and MOTOR DRIVE

26

#### SHEET NUMBER

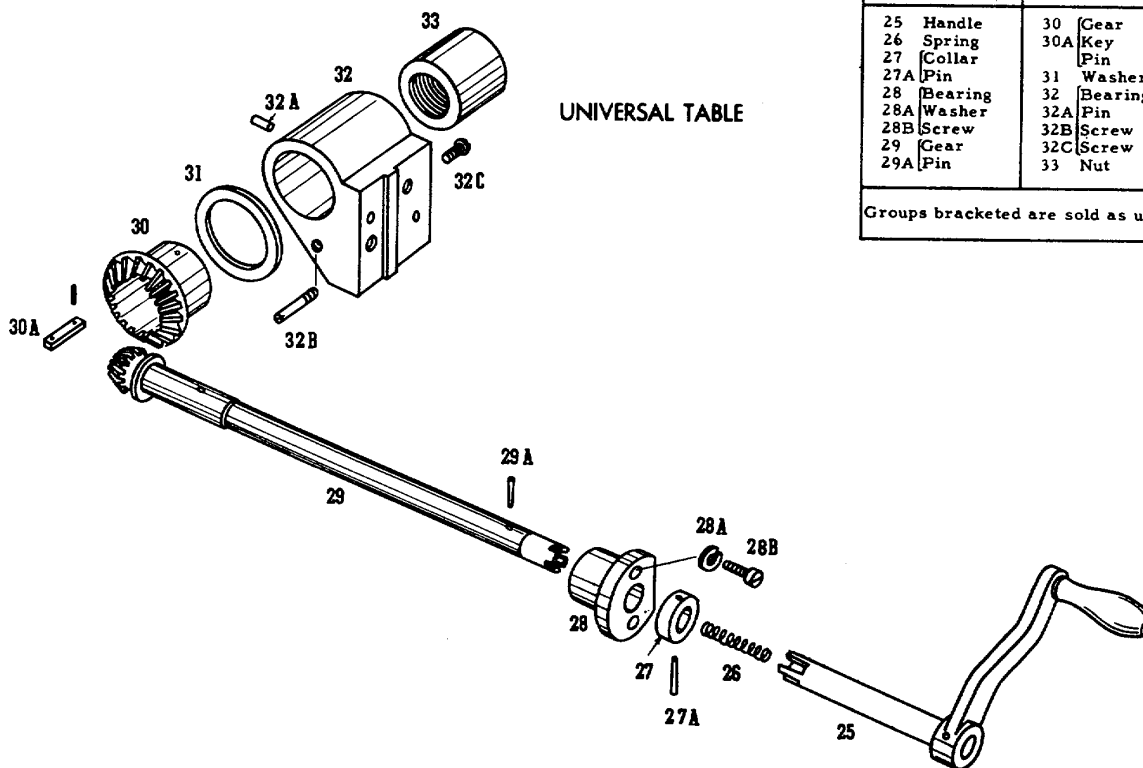
C17



BOX TABLE

Cat. No.	PART NAME	Cat. No.	PART NAME	Cat. No.	PART NAME
1	Handle	5	Bearing	11	Gear
1A	Spring	5A	Screw	12	Gear
1B	Rod	5B	Oil Cup	12A	Key
1C	Pin	6	Gear		Pin
2	Screw	7	Gear	13	Washer
3	Washer	8	Pin	14	Bearing
4	Ratchet	9	Shaft	14A	Pin
4A	Pin	10	Bearing	14B	Screw
		10A	Screw	14C	Screw
		15	Nut		

Groups bracketed are sold as units.



UNIVERSAL TABLE

Cat. No.	PART NAME	Cat. No.	PART NAME
25	Handle	30	Gear
26	Spring	30A	Key
27	Collar		Pin
27A	Pin	31	Washer
28	Bearing	32	Bearing
28A	Washer	32A	Pin
28B	Screw	32B	Screw
29	Gear	32C	Screw
29A	Pin	33	Nut

Groups bracketed are sold as units.

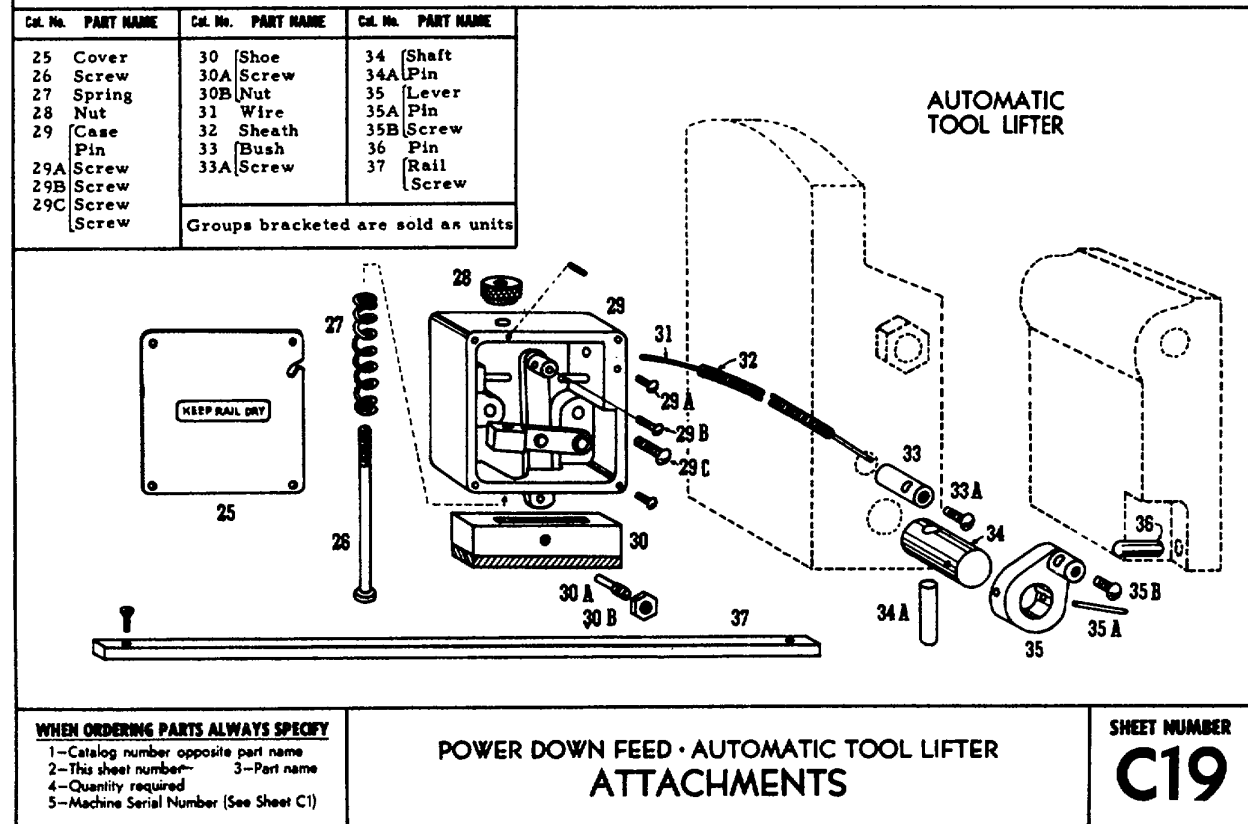
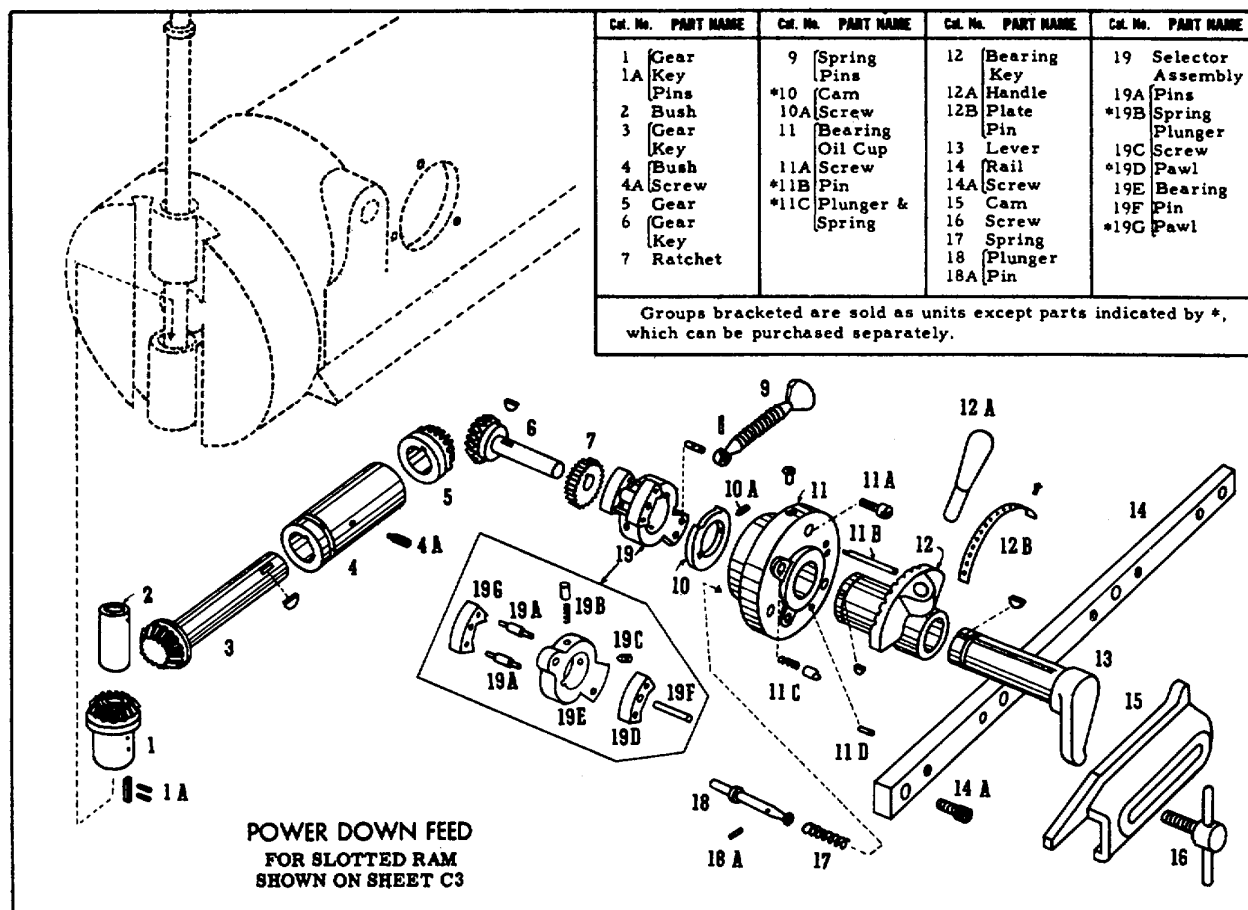
**WHEN ORDERING PARTS ALWAYS SPECIFY**

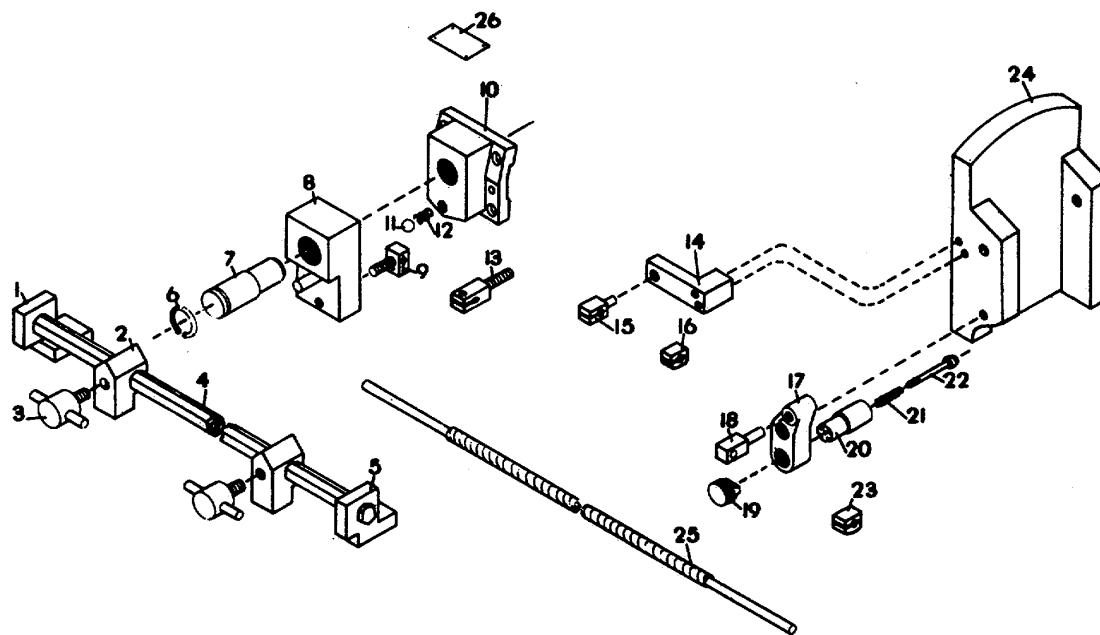
- 1—Catalog number opposite part name
- 2—This sheet number
- 3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

**FRONT HAND FEED ATTACHMENTS**

**SHEET NUMBER**

**C18**





NO.	REQ'D	CODE NO.	PART NAME
1	1		Bracket
1	2		Dog
2	3		Handle
1	4		Rod
1	5		Bracket
1	6		Ret. Ring
1	7		Shaft
1	8		Lever
1	9		Pin
1	10		Bearing
1	11		Steel Ball
1	12		Spring
1	13		Pin
1	14		Bracket
1	15		Pin
2	16		Block
1	17		Lever
1	18		Pin
1	19		Knob
1	20		Bushing
1	21		Spring
1	22		Plunger
1	23		Block
1	24		Clapper Box Alt.
1	25		Flexible Cable
1	26		Instruction Plate

**WHEN ORDERING PARTS ALWAYS SPECIFY**

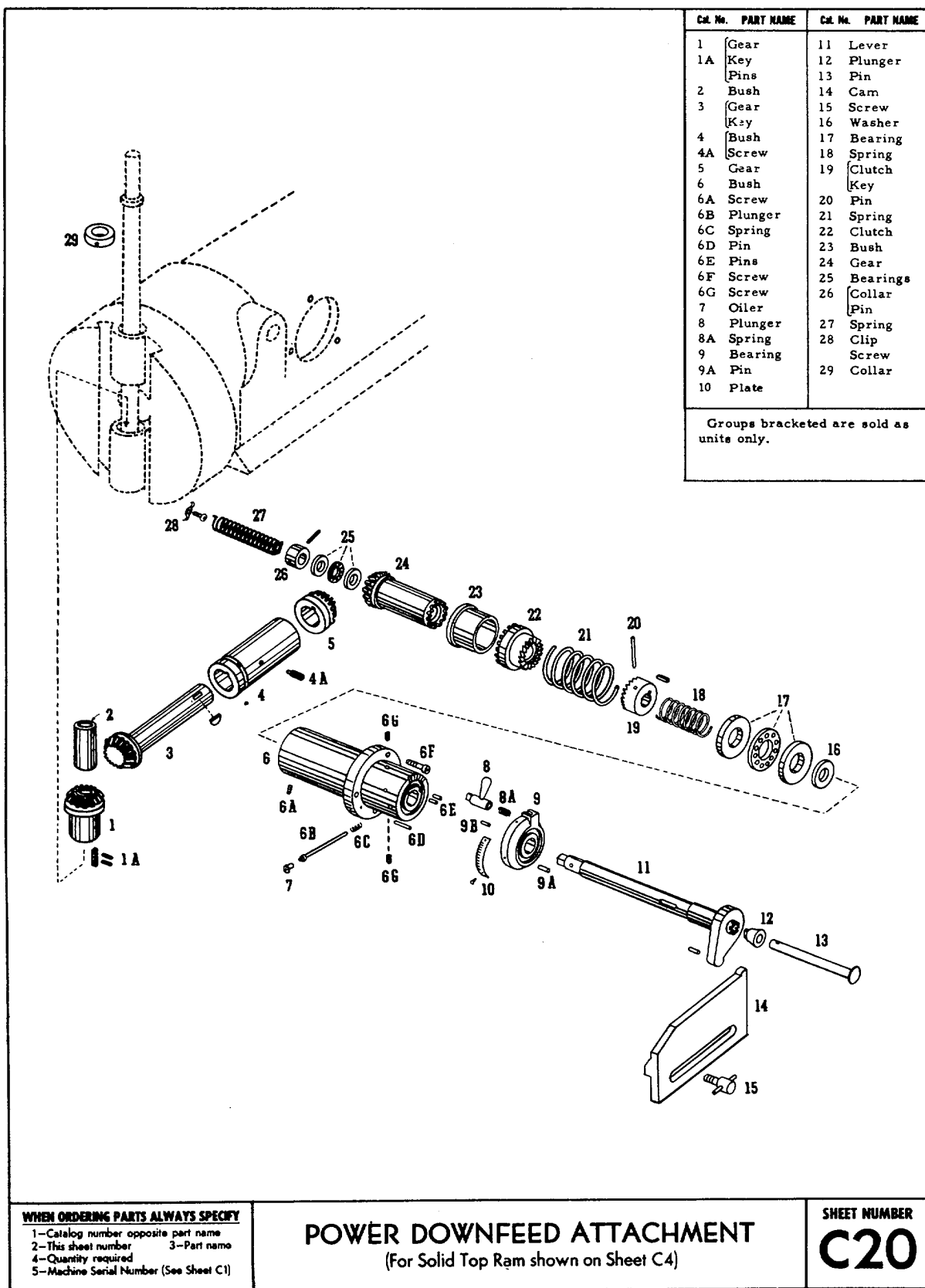
- 1—Catalog number opposite part name
- 2—This sheet number      3—Part name
- 4—Quantity required
- 5—Machine Serial Number (See Sheet C1)

**TOOL LIFTER**

**SHEET NUMBER**

**C19-A**





**By Order of the Secretary of the Army:**

E. C. MEYER  
*General, United States Army*  
*Chief of Staff*

Official:

J. C. PENNINGTON  
Major General, United States Army  
*The Adjutant General*

Distribution:

To be distributed in accordance with Special List.

\* U.S. GOVERNMENT PRINTING OFFICE : 1992 - 311-831 (60969)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



THEN... JOT DOWN THE  
DOPE ABOUT IT ON THIS  
FORM, CAREFULLY TEAR IT  
OUT, FOLD IT AND DROP IT  
IN THE MAIL!

**SOMETHING WRONG** WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER

PUBLICATION DATE

PUBLICATION TITLE

BE EXACT... PIN-POINT WHERE IT IS

PAGE  
NO.

PARA-  
GRAPH

FIGURE  
NO.

TABLE  
NO.

IN THIS SPACE TELL WHAT IS WRONG  
AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 2028-2  
1 JUL 79

PREVIOUS EDITIONS  
• ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR  
RECOMMENDATION MAKE A CARBON COPY OF THIS  
AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE



This fine document...

Was brought to you by me:



### [Liberated Manuals -- free army and government manuals](#)

Why do I do it? I am tired of sleazy CD-ROM sellers, who take publicly available information, slap “watermarks” and other junk on it, and sell it. Those masters of search engine manipulation make sure that their sites that sell free information, come up first in search engines. They did not create it... They did not even scan it... Why should they get your money? Why are not letting you give those free manuals to your friends?

I am setting this document FREE. This document was made by the US Government and is NOT protected by Copyright. Feel free to share, republish, sell and so on.

I am not asking you for donations, fees or handouts. If you can, please provide a link to [liberatedmanuals.com](http://liberatedmanuals.com), so that free manuals come up first in search engines:

<A HREF=<http://www.liberatedmanuals.com/>>Free Military and Government Manuals</A>

- Sincerely  
Igor Chudov  
<http://igor.chudov.com/>
- [Chicago Machinery Movers](#)