Fig. 350. Simple gearing

Fig. 351. Compound gearing

How to Calculate Change Gears for Thread Cutting

If it is necessary to cut a special thread that does not appear on the index chart of a lathe or if no index chart is available, the gears required can easily be calculated. All South Bend Lathes are even geared; that is, the stud gear revolves the same number of revolutions as the head-stock spindle, and when gears of the same size are used on both the lead screw and stud, the lead screw and spindle revolve the same number of revolutions, so it is not necessary to consider the gearing between the headstock spindle and the stud gear when calculating change gears.

If simple gearing is to be used, as shown in Fig. 350, the ratio of the number of teeth in the change gears used will be the same as the ratio between the thread to be cut and the thread on the lead screw. For example, if 10 threads per inch are to be cut on a lathe having a lead screw with 6 threads per inch, the ratio of the change gears would be 6 to 10. These numbers may be multiplied by any common multiplier to obtain the number of teeth in the change gears that should be used.

Rule—To calculate change gears, multiply the number of threads per inch to be cut and the number of threads per inch in the lead screw by the same number.

Example: Problem—To cut 10 threads per inch on lathe having lead screw with 6 threads per inch.

Solution— 6 x 8 = 48 — No. of teeth in gear on stud.
10 x 8 = 80 — No. of teeth in gear on lead screw.

If these gears are not to be found in the change gear set, any other number may be used as a common multiplier, such as 3, 5, 7, etc.

When compound gearing, as shown in Fig. 351, is used, the ratio of the compound idler gears must also be taken into consideration, but otherwise the calculations are the same as for simple gearing. Usually, the compound idler gear ratio is 2 to 1, so that the threads cut are just twice the number per inch as when simple gearing is used.
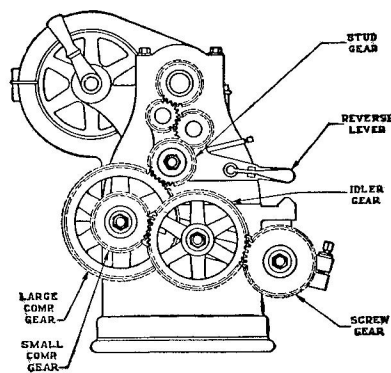
DECIMAL EQUIVALENTS OF FRACTIONAL PARTS OF AN INCH

$\frac{1}{64}$ =	.015625	$\frac{11}{32}$ =	.34375	$\frac{11}{16}$	.6875
$\frac{1}{32}$ =	.03125	$\frac{23}{64}$ =	.359375	$\frac{45}{64}$ =	.703125
$\frac{3}{64}$ =	.046875	$\frac{3}{8}$	.375	$\frac{23}{32}$ =	.71875
$\frac{1}{16}$	.0625	$\frac{25}{64}$ =	.390625	$\frac{47}{64}$ =	.734375
$\frac{5}{64}$ =	.078125	$\frac{13}{32}$ =	.40625	$\frac{3}{4}$	.75
$\frac{3}{32}$ =	.09375	$\frac{27}{64}$ =	.421875	$\frac{49}{64}$ =	.765625
$\frac{7}{64}$ =	.109375	$\frac{7}{16}$	.4375	$\frac{25}{32}$ =	.78125
$\frac{1}{8}$	.125	$\frac{29}{64}$ =	.453125	$\frac{51}{64}$ =	.796875
$\frac{9}{64}$ =	.140625	$\frac{15}{32}$ =	.46875	$\frac{13}{16}$	.8125
$\frac{5}{32}$ =	.15625	$\frac{31}{64}$ =	.484375	$\frac{53}{64}$ =	.828125
$\frac{11}{64}$ =	.171875	$\frac{1}{2}$	.5	$\frac{27}{32}$ =	.84375
$\frac{3}{16}$	.1875	$\frac{33}{64}$ =	.515625	$\frac{55}{64}$ =	.859375
$\frac{13}{64}$ =	.203125	$\frac{17}{32}$ =	.53125	$\frac{7}{8}$	.875
$\frac{7}{32}$ =	.21875	$\frac{35}{64}$ =	.546875	$\frac{57}{64}$ =	.890625
$\frac{15}{64}$ =	.234375	$\frac{9}{16}$	.5625	$\frac{29}{32}$ =	.90625
$\frac{1}{4}$	.25	$\frac{37}{64}$ =	.578125	$\frac{59}{64}$ =	.921875
$\frac{17}{64}$ =	.265625	$\frac{19}{32}$ =	.59375	$\frac{15}{16}$	.9375
$\frac{9}{32}$ =	.28125	$\frac{39}{64}$ =	.609375	$\frac{61}{64}$ =	.953125
$\frac{19}{64}$ =	.296875	$\frac{5}{8}$	.625	$\frac{31}{32}$ =	.96875
$\frac{5}{16}$	.3125	$\frac{41}{64}$ =	.640625	$\frac{63}{64}$ =	.984375
$\frac{21}{64}$ =	.328125	$\frac{43}{64}$ =	.671875	1	1.

METRIC AND ENGLISH LINEAR MEASURE

The measuring rules shown below are graduated, in the Metric system and in the English system. This shows at a glance the comparison of the fractions of the Metric and English units, the meter and the inch. It will be noticed that one inch is equal to 25.4001 + mm.

Fig. 352. Comparison of English and Metric Scales, Actual Size

TABLE OF METRIC LINEAR MEASURE

10 Millimeters	= 1 Centimeter	1 Centimeter	=	.3937 inch
10 Centimeters	= 1 Decimeter	1 Decimeter	=	3.937 inches
10 Decimeters	= 1 Meter	1 Meter	=	39.37 inches

Equivalents of Millimeters in Decimals of Inches

$\frac{1}{10}$ mm	.00394 in.	8 mm =	.31496 in.	18 mm =	.70866 in.
$\frac{2}{10}$ mm	.00787 in.	9 mm =	.35433 in.	19 mm =	.74803 in.
$\frac{1}{2}$ mm	.01969 in.	10 mm =	.39370 in.	20 mm =	.78740 in.
1 mm	.03937 in.	11 mm =	.43307 in.	21 mm =	.82677 in.
2 mm	.07874 in.	12 mm =	.47244 in.	22 mm =	.86614 in.
3 mm	.11811 in.	13 mm =	.51181 in.	23 mm =	.90551 in.
4 mm	.15748 in.	14 mm =	.55118 in.	24 mm =	.94488 in.
5 mm	.19685 in.	15 mm =	.59055 in.	25 mm =	.98425 in.
6 mm	.23622 in.	16 mm =	.62992 in.	26 mm =	1.02362 in.
7 mm	.27559 in.	17 mm =	.66929 in.	27 mm =	1.06299 in.