
COMET
TOWERS TO SUIT
8-14' C-PATTERN MILLS
INSTALLATION
GUIDE.

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Before proceeding with the erecting work carefully check the number of bundles and case with the Despatch Advice Note that has been sent to the consignee. A bolt list is also enclosed so that the quantities of bolts and sundry items can be checked. Immediately report any shortages to our Company. Any consignment shortages found by checking the consignment note should already have been reported to the Station master or Carrier.

BUNDLING OF TOWER PARTS

For tower supplied with mill

ANCHOR POSTS

Four Anchor Posts in one bundle.

LEGS

Legs are in sets of four to suit various heights i.e. four top legs in one bundle four middle legs in one bundle and so on.

RAILS

Rails for towers up to 30ft high are wired together in two sets each set being for two opposite tower sides and the two sets are then wired together in one bundle.

BRACES

Braces are bundles in the same way as rails.

*All towers over 30ft high have two or more bundles of rails and braces.

SOLEPLATES & TOWER BOLTS

Soleplates and Tower Bolts are packed in mill case.

TIMBER

The short boards for the platform and short hardwood guide rails are packed in mill case.

The wood mill rods, long platform boards and long guide rails for mill rod are bundled together.

For tower supplied without a mill

The bundling procedure is the same as above excepting that in a case are packed the soleplates, tin of paint, these instructions and bolt list and also a bag containing bolts and sundry items. The platform timber is wired in one bundle and the guide rails are bundles with mill rods.

As the wood mill rod and wood pump rod if any may warp in the sun place them under cover if possible and do not unwire these bundles until required.

Carefully read these instructions and refer to Figs. 1,2 & 3 to make yourself familiar with all the parts. Sort out the legs, rails and braces of the tower on the ground handy to where they will be required when erecting. See that all the steel bars are straight.

GUARANTEE A MOST IMPORTANT CONDITION OF OUR GUARANTEE IS THAT THE TOWER IS ERECTED IN ACCORDANCE WITH THESE INSTRUCTIONS PARTICULARLY IN REGARD TO BEING PLUMB AND THE LEGS BEING SET TO THE CORRECT DEPTH IN GOOD CONCRETE FOUNDATIONS.

1) LEGS:

All Comet Towers have four legs that are divided into sections namely top legs, bottom legs, and middle legs or more (if any). At each joint the bottom end of the higher leg is bolted to the inside of the top end of the leg below it. The corner at the bottom end of the inside leg is cut away to clear the radius in the inner corner of the angle steel leg below – Fig. 2.

2) LADDER:

The ladder is in sections to reach from bottom rail to platform rail.

3) RAILS:

Rails are angle steel and all rails above the platform are bolted to the outside of the legs and rails below platform bolt to inside of the legs, at about 5ft. intervals. The rails with two holes in the top flanges are placed at opposite sides of the tower for fixing hardwood guide rails (if any). The ladder is bolted to those rails that have two holes in their vertical side flanges – Fig. 9. See that the ladder will be on the side of the tower that is away from the prevailing wind.

4) BRACES:

Braces are flat steel bar (all tension loading) and all braces above the platform bolt to the inside of the legs (excepting braces for bottom guide) and all braces below platform bolt to outside of the legs.

The flat steel corner stays bolt across the top of the two adjacent bottom rails near where the latter join the legs.

5) BOLTS:

Care must be taken to put bolts in their right places (as shown on bolt list) to ensure that the bolt ends protrude through the nuts. It is preferable to have the bolt heads on the inside of the legs. A spring lockwasher must be placed under the nut of each bolt above the platform. Try to have the gap in the lockwasher beneath the bolt. A tin of paint is supplied for painting over all the bolts and nuts after the tower has been erected.

6) MARKING OUT FOUNDATIONS:

Scribe a circle on the ground with a diameter equal to diagonal measurement at soleplates _ Table 1. Level the ground if it slopes more than a couple of inches because the 34in. height of bottom tower rails is for lowest side of ground and is very important. Use a stretched loop of thin wire or strong string to form a radius equal to half the diagonal. For a well firmly fix a board across it partly driving in a stout centering nail where the pump will go down and over which the loop is stretched when scribing circle. For a SYPHON PUMP concrete foundation block drive in a stout peg with a centering nail in its sawn top end a few inches above ground. Read special instructions for installing syphon pumps. For a bore an allowance is made for string to go around casing when determining size of scribed circle.

Mark positions of soleplates on circle by driving in four pegs at spread and diagonal distances in Table 1. Around each peg mark the size of hole. This depends upon type of soil. For ordinary firm soil the hole could be about 18in. dia. or square. For black soil that cracks allowing water to penetrate and soften it the bottom of the blocks must be larger and deeper. For example for 14ft mill towers they may need to

be 6in. deeper (i.e. 12in. thick) and 2ft. square. The bottom position could be undercut to save concrete.

So that the four peg positions will not be lost when excavating some erectors like to locate them by tying four long strings to eight more pegs just outside the holes. The strings cross each other over the centres of pegs on circle. With a large tape measure again check the spreads and diagonals at intersection of strings – Table 1. Before digging temporarily remove ends of strings from two pegs at that hole and replace them when the hole is the correct depth.

TABLE 1: TOWER SPREADS & DIAGONALS @ SOLEPLATES

		TOWER HEIGHTS						
Size of Mill		20'	25'	30'	35'	40'	45'	50'
8-10'	spread	5' 7"	6' 8"	7' 9"	8' 10"	9' 11"	11' 0"	12' 1"
8-10'	diagonal	7' 11"	9' 5"	11' 0"	12' 6"	14' 0"	15' 7"	17' 1"
12-14'	spread	5' 8"	6' 9"	7' 10"	8' 11"	10' 0"	11' 1"	12' 2"
12-14'	diagonal	8' 0"	9' 6"	11' 1"	12' 7"	14' 1"	15' 8"	17' 2"
		TOWER SPREADS @ GROUNDLEVEL						
		TOWER HEIGHTS						
Size of Mill		20'	25'	30'	35'	40'	45'	50'
8-14'	spread	4' 10 ^{3/4} "	5' 11 ^{3/4} "	7' 0 ^{3/4} "	8' 1 ^{3/4} "	9' 2 ^{3/4} "	10' 3 ^{3/4} "	11' 4 ^{3/4} "
8-14'	diagonal	6' 11"	8' 5 ^{1/2} "	9' 11 ^{3/4} "	11' 6"	13' 1"	14' 6 ^{3/4} "	16' 1 ^{1/4} "

TABLE 2: DEPTHS OF SOLEPLATES & HEIGHT OF BOTTOM RAILS ABOVE GROUND

MILL SIZE	8'	10'	12'	14'
DEPTH OF SOLEPLATES	36"	36"	48"	48"
BOTTOM RAIL HEIGHT	34"	34"	34"	34"

7) DEPTH OF HOLES:

Holes must be 6in. to 12in. deeper than depth of soleplates – Table 2 – depending upon type of soil – par. 6. Depth of soleplates must be such that bottom tower rails are not more than 34in. above lowest side of ground (so dig these holes first).

To ensure that bottoms of holes are level with one another select a straight angle steel tower rail and short length of timer or mill rod. Tie a spirit level to rail seeing that it doesn't foul the fillet (radius) in corner of angle steel. Rest one end on centering nail while other end is firmly held against upright mill rod placed on centre of hole and mark mill rod flush with underside of rail. Fig.4 illustrates this method excepting that in bottom of hole it shows a peg but this can only be driven in if the hole is large enough. If levelled pegs can be used, trowel concrete level with their tops and leave them in the concrete.

To more easily trowel the blocks level in the deeper holes for 12/14ft towers some erectors excavate to form a ledge about 2ft above blocks. Dig them inwards towards centre of tower and in line with diagonals.

8) CONCRETE:

Mix a fairly dry batch of concrete using one part of cement, three parts of clean sandy gravel and about six of stone, all by volume- not by weight. Because the fine cement and some sand fill up spaces between the stones and gravel, the volume of the finished concrete will be less than the total volume of ingredients used – perhaps 25% less with a 1:3:6 mix.

Shovel the concrete into the hole and tramp down firmly. Ramming too much weakens it by bringing water to top. If any soil falls in it must be scooped out. When

sufficiently set the blocks must be smoothly trowelled level in all directions and dead level with one another (finally checking with levelled rail again). , to ensure that the soleplates will bear evenly. Unless this is done the accurately fabricated steel tower will not be plumb. If this is not discovered until the tower is erected it will be necessary to dismantle it in order to more accurately level the foundations- so be very careful. It is a bad practice to raise a leg to grout cement under soleplate. Curing of concrete sufficiently before applying loads is vitally important. Curing time depends upon size of block preferably about 24 hours for 8/14ft tower blocks (in firm soil) with a minimum of 15 hours before starting to erect tower.

9) METHOD OF ERECTING THE TOWER:

The Comet tower has been designed to be erected vertically (in sections) – Fig. 1 & 3. It must not be bolted together on the ground and hauled up into position.

If bottom legs are 15ft. 6in. long bolt them to the anchor post but if they are 10ft 6in long bolt them to the anchor post and the next higher legs and be sure to force them all together in the direction of the anchor posts when finally tightening the bolts so that when erected each set of legs will bear downwards on the bolts at lap joints.

When sizes of legs vary the heavier ones go to the bottom. The bottoms of the upper legs bolt inside the tops of the lower legs- Fig.2.

To the first leg assembly loosely bolt one end of each of the rails and top ends of braces which are connected to it for the next two adjacent sides allowing them to hang loosely when raised.

Lift this leg bodily into its hole sliding the soleplates down a platform board to avoid breaking away the earth from sides of hole. Earth that is knocked in must be removed before levelling or squaring up the tower. Temporarily support the inclined leg with a strut or attach two light guy ropes to top end before placing in the hole.

Place and similarly support the next adjacent leg in position and connect rails and braces to it. Do the same with the other leg adjacent to the first one and then finally the fourth leg making the bottom portion of the tower complete. Ladder sections are connected as required. Now bolt the four short steel **corner stays** to the tops of the bottom rails to help bring the tower square and not diamond shape – Fig 1.

After the lower portion of tower has been bolted together it must be carefully centred. When you have the site centering nail for well or syphon pump, wind a couple of long strings around diagonally opposite legs keeping all strings the same distance below bottom rail to suit nail position – Fig 5. For a bore place end of mill rod against nearest side of casing and mark the edges of tower leg flanges all at same level below rails. If one soleplate is too far in or out the tops of legs will be out of position accordingly and rails will not be level. Two men can lift and move a leg of the structure. Now build up the tower by bolting on higher leg sections, rails and ladder (shortest length to platform rail). Make sure rails and braces are all bolted to legs the correct way – Fig. 1 & 3 and pars. 3 & 4. Standing on a plank across two rails near the corner makes it easy to haul each leg up the inside corner of leg below until boltholes are opposite.

If a strong wind is blowing attach guy ropes to top of tower for safety.

10) PLATFORM:

Bolt the two long platform rails on outside of legs and bolt short rails inside the legs and level with long rails – not below as shown in Fig. 1. Mark, drill and bolt four long boards across rails using 1¼ x 3/8 in. cup head bolt with lockwashers and nuts under rails: the two outside boards are flush with ends of rails – Fig. 9. Bolt on all other boards as shown to form a square (4ft. sq. for 8/10ft and 5ft sq. for 12/14 ft mills) using 2 ½ and 3/8 in. cup HD. bolts with plain washers and nuts underneath. Good idea to paint bolts and ends of boards.

11) TOWER CAP:

As stated in Mill Erecting Instructions make sure that the tower cap is level. Place four steel balls in position (two each on opposite sides). Put a spirit level on the balls across the diameter of the opening and test for level in different positions. THIS IS IMPORTANT because the mill weight and pumping load are taken on the ball race and if it is not level the mill will not govern properly. It may be necessary to remove the highest leg or legs to file them on the tops. Or to chisel a little off the corresponding pads inside the tower cap casting – Fig 6 in order that the load is evenly distributed on each of the four legs.

If it is a calm day check tower for being plumb by dropping a thin plumb line on a stick from centre of tower cap and seeing that it hangs directly over the centering nail.

Now oil ball race, place all balls in position – 29 for 8/10ft and 38 for 12/14 ft mills i.e. one less than number required to fill races – and put on top part of turntable temporarily wiring it on in two opposite places to prevent balls falling out. If any are lost replacements **must** be obtained before mill head is placed in position.

12) TIGHTEN BOLTS:

Starting at top of tower carefully tighten every nut down to ground level seeing that a spring lockwasher is under each nut **above** the platform. Gaps in lockwashers are best below bolts (to shed the rain). If in doubt about weights of legs being taken on tops of bolts – Par. 9- it is advisable to first loosen all bolts in each upper leg section at a time. Any slight buckling of braces may be then corrected by forcing legs sideways. If this cannot be done the tower is not plumb. Test by trying spirit level on lower rails and again check diagonals.

13) CONCRETING FOUNDATIONS:

The tower now being plumb central and square and the tower cap level place about 6 in. of 1:3:6 mix concrete on soleplates after being sure that tops of blocks have no soil on them. Lightly ram concrete and then add more to fill in holes, bringing the tops a couple of inches above ground and sloping it away from legs to shed rainwater – Fig 8.

If you have provided ledges for trowelling – end of par.7 – save concrete by temporarily fixing form boards above ledges removing them next day to ram soil above ledges several inches at a time.

Also less concrete is needed if you have the timber to wire together wooden forms – Fig 7 – that is if holes are large enough. **Note:** There are only 12 packing case boards for 8ft or 10ft mills. Boards must be removed before ramming in soil. This idea should not be used in black soil.

Some erectors save concrete by cutting tops and bottoms out of drums and cutting down one side to allow them to be sprung around anchor posts, and fixed at necessary heights- again not good for black soil that cracks and lets water down to blocks. It is best to fill holes with concrete completely.

14) GUIDES FOR WOOD MILL ROD:

The mill rod should be straight and guided at not more than 10ft intervals at which distances tower rails have two holes for bolting the hardwood guide rails at 10in centres

For each guide select four pine boards (not hardwood). Two of the boards are nailed or bolted to the two hardwood guide rails and the other two are placed across them. The clearance all around the mill rod should be about 1/16 in. Where the mill rod passes through the guide scrape off the paint and grease both.

If our splendid angle steel guide plates (with grease lubricated H.W. guides) are supplied, their rail position will be indicated on the Copy of Order and Advice Note.

NOTE A small tin of Comet Red Oxide Windmill Paint is supplied for painting bolts and nuts, and over scratches after mill and tower have been erected. Paint from top down.

TOWERS FOR 8 FT. TO 14 FT. COMET MILLS

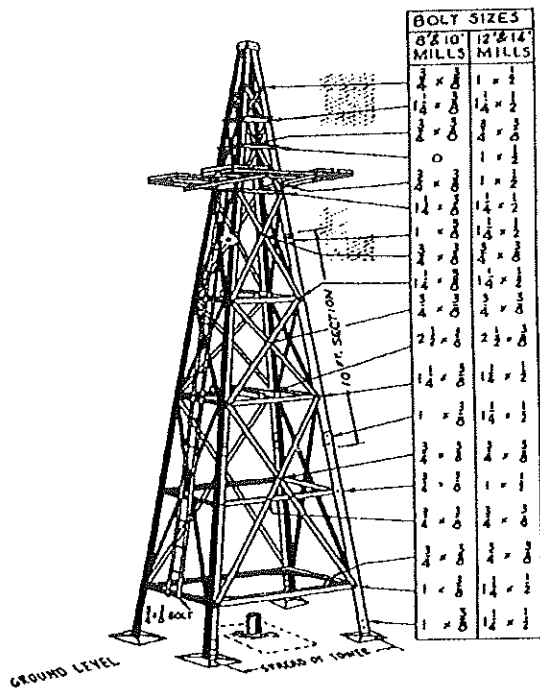


FIG. 1 SHOWING CONSTRUCTION OF 30 FT. TOWER AND SIZES OF BOLTS FOR 8/10 FT. AND 12/14 FT. MILLS.

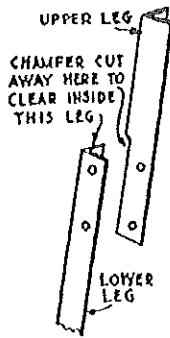


FIG. 2 LAP JOINT IN LEGS

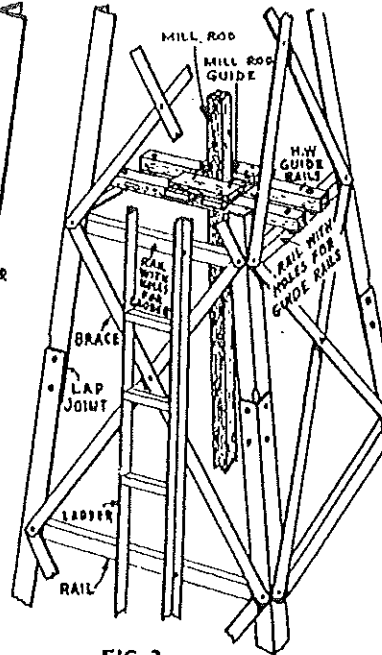


FIG. 3 SHOWING RAILS WITH HOLES FOR BOTH LADDER & H.W. GUIDE RAILS

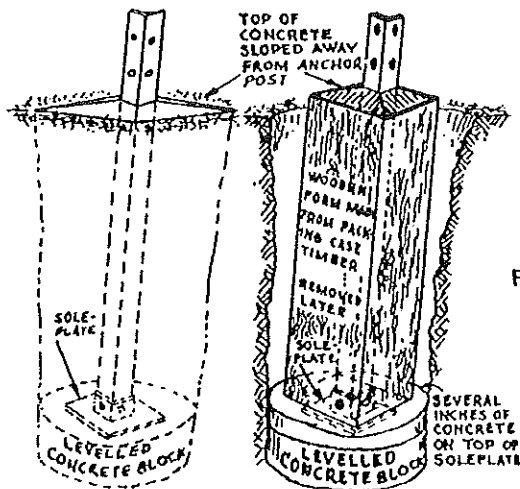


FIG. 6 TOWER CAP

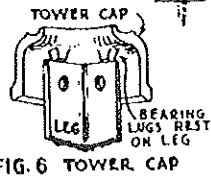


FIG. 7 SOLEPLATE & ANCHOR POST SET IN CONCRETE

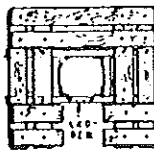


FIG. 8 PLAN OF PLATFORM

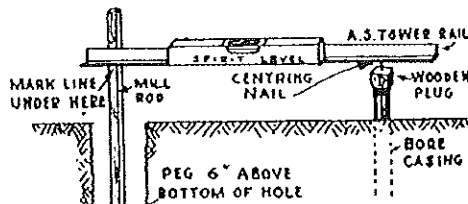


FIG. 9 METHOD OF CENTRING & SQUARING TOWER BASE

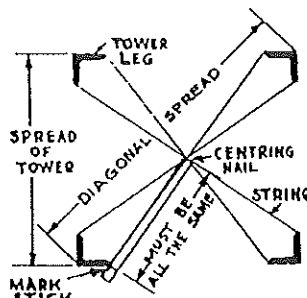


FIG. 4 METHOD OF LEVELLING BOTTOMS OF HOLES