TOWERS

FOR 16FT TO 30FT COMET MILLS

ERECTING INSTRUCTIONS

SIDNEY WILLIAMS & CO. (PTY.) LTD.

SYDNEY ROCKHAMPTON BRISBANE TOWNSVILLE

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TOWERS FOR 16FT. TO 30FT.
"D" PATTERN "COMET" MILLS.

ERECTING INSTRUCTIONS

GUARANTEE. One of the conditions 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 in good and adequate foundations. Therefore, take great care in the erection of the Tower and Mill as it is so important that the work is well done.

CHECK MATERIALS. First of all check over all parts of Mill, Tower, and Plant to make sure that everything is on the site, and while doing so the Packing Lists, Illustrations and Diagrams will have to be referred to frequently. At the same time spread out the rails and braces of each side of the Tower on the ground handy to where they will be required when erecting.

The attached Diagram of your Tower not only shows the names of the parts and where they are placed in the Tower, but also the bundling details to enable you to check the materials. The bolt list shows the parts for which the bolts are used.

As the wood mill rod (and wood pump rods, if any) may warp in the sun, do not unwire their bundles until they are required, and also place them under cover from the sun if possible. Put the pump in a can of water to soak the cup leathers and make sure the plunger works freely and there is no dirt in the pump.

Read carefully through these Instructions and make yourself familiar with all the parts.

TOWER PARTS

LEGS. All "Comet" Towers have four legs which are divided into sections termed top legs, bottom legs, and middle legs, or upper and lower middle legs according to height of Tower. The legs are 10ft. or 15ft. long plus extra for the lap joints. At each joint the bottom end of one leg is bolted to the **inside** of the top end of the leg below it. The corner of the inside leg is cut away to clear the radius of the lower leg.

LADDER is in sections, to reach from bottom rail to platform rail.

RAILS are angle steel and all rails above the platform bolt to the outside of legs, while rails below the platform bolt to the inside of the legs at about 5ft. height intervals. Some of the rails on two opposite sides of the Tower have two holes in the top flanges for taking the hardwood guide rails, and all the rails for one of the other two sides, have two holes in the vertical side flanges for taking the ladder, so that the ladder can be bolted to one side. See that the ladder will be on the side which is away from the prevailing winds.

BRACES are flat steel bars (all tension loading) and all braces above platform bolt to the **inside** of the legs (excepting the braces for bottom guide for main casting), and all braces below platform bolt to the outside of legs.

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

BOLTS. Care must be taken to put the bolts in their right places (see bolt list) to ensure that the bolt ends come through the nuts. A spring lockwasher must be placed under the nut of each bolt above the platform. A tin of paint is supplied for painting over all the bolts and nuts after the Tower has been erected.

SOLEPLATES AND STEADY ANGLES. Soleplates are of steel. The ends of the bottom legs should rest on the support pads on the soleplates and not on the bolts. The short steady angles are bolted on at right angles to the legs (see diagram), but they are unnecessary if the legs are encased in concrete up to the ground level.

TIMBER. The arrangement of the platform is shown on the Tower diagram and it will be noticed that some of the decking boards may have to be cut, depending upon the size of the Tower.

The hardwood guide rails for mill rod may also have to be cut to length.

FOUNDATIONS

HOLES FOR LEGS.

The lengths of diagonal and spread of outside corners of legs at the soleplates are specified on Tower Diagram so that the holes can be marked on the ground, equidistant from the centre of site.

Although "Comet" Tower soleplates are large, they should be set on concrete blocks if the ground is not hard. The size of block shown on the Tower Diagram is for medium firm soil and it would need to be larger for soft marshy soil, or black soil which may become wet, at that depth.

The size and depth of holes, and thickness of concrete blocks vary according to the size of Tower, and depth must be that shown on Diagram (for lowest part of site if ground slopes) so that the bottom tower rails are not more than specified height above lowest ground level.

MARKING OUT

There are various methods, but perhaps the easiest is to scratch on the ground a circle with a radius equal to half the diagonal spread outside the bottom corners of legs at soleplates—see Diagram. For the radius use a length of wire or string with one end looped around either the bore casing, a peg driven in centre of site (for syphon pump) or a nail in plank across the well, as the case may be. On the circle mark the points for the four legs, spacing them at the distance shown on diagram—spread outside bottom corners of legs. From these points mark out the holes, driving pegs in at corners.

Unless the holes are made unnecessarily large it is too difficult to level the bottoms, or tops of concrete blocks, so erectors usually dig the holes oblong to provide a ledge about a foot above the bottom. The oblongs should be extended about 18 inches inward towards another hole and not outward away from sides of tower.

DEPTH OF HOLES

Measure the height of centreing peg, nail or top of bore casing (if it is level) above the ground level—at lowest parts of tower site if ground slopes. To this height add depth of soleplates below ground, as shown on Diagram, and also thickness of concrete blocks and mark this total dimension on a straight measuring stick. Select a straight rod or angle steel tower rail, tie a spirit level to its centre, support one end on centre peg, and hold other end against side of measuring stick. Carefully excavate each hole until the underside of the levelled rail coincides with mark on the vertical measuring stick.

If concrete is not to be used, firmly ram the bottom of holes dead level and each one to exactly the same depth. So that soleplates will rest on solid ground do not put filling in a hole which is too deep but deepen the other holes to its level and ram hard again.

CONCRETING

Before putting in the concrete, drive a stout sawn peg in centre of each hole and level all their top ends to height of blocks. The concrete "mix" should not be weaker than 5 parts of medium metal, 3 of clean sand and 1 of cement, or 6 of sandy gravel to 1 of cement.

When set sufficiently the concrete blocks must be trowelled flat, and levelled with spirit level. Again use the levelled rail and measuring stick to make sure that tops of blocks are all dead **level** with one another.

If the bottom of holes (when concrete not used) or the tops of four concrete blocks are not exactly level with each other, the tower will not be plumb. If this is discovered when the tower is partly or wholly erected, it will be necessary to dismantle the tower in order to level the foundations accurately. It is impracticable to plumb an erected tower by raising one or two legs and grouting cement under soleplates. Therefore, be most careful to level the foundations accurately.

Allow the concrete blocks to set 24 hours before erecting the tower. In the meantime, lay out on the ground the parts of the four sides of tower in their respective positions. Also clean the mill parts and oilwells, bolt sail brackets to sails, assemble vane, oiling platform, pullout bracket etc., and perhaps the troughing.

FIXING TOWER LEGS IN ROCKY GROUND

If rock, not just a boulder, is struck at less than hole depth, it may be necessary to cut the leg shorter, and hacksaw a few inches up in a corner of the angle steel, heat and bend out two lugs as feet for resting on the rock. Check the bottom tower section for plumbness, and cement in position later. On no account must the height of bottom tower rail be greater than specified on diagram.

METHOD OF ERECTING THE TOWER

As the "Comet" Tower has been designed to be erected vertically, we strongly advise against bolting the Tower together on the ground and hauling it up into position. We recommend that the Tower be erected vertically, section by section, each section consisting of four legs with their rails and braces to provide rigidity. To facilitate putting the next four legs into position, the lapped joints are a couple of feet above the rails. As the latter are five feet apart, the erector and his assistant, standing on planks across the corners, can readily raise a leg into position, the assistant putting the bolts in the joint—the top one first.

If the mill is large and the legs are too heavy to be lifted by two men hauling on a rope, it will be necessary to erect a light derrick (a 20ft. length of 2" or larger pipe would do) on about the centre of the site.

BOTTOM SECTION

To ensure stability during erection, the bottom tower section should be bolted together with at least two sets of rails and one set of braces. As the bottom legs of some Towers have only one set of rails—see Diagram—it is therefore necessary to bolt on the next leg sections before lifting them, with their soleplates, into the holes.

Bolt the soleplates to the bottom legs, making sure that the legs will rest on the support pads of the soleplates, and not on the bolts. Attach the top ends of bottom braces to legs and let them hang loosely so that they can be quickly connected to the other legs later.

Place the leg on the ground in the line in which you intend to raise it, with the soleplate overhanging the edge of the hole. Place a length of 1.2" board in the hole to avoid the possibility of the soleplate scraping the soil down on to the foundation block. If this should occur the loose earth must be brushed away into the corners of the hole. With two light guy ropes attached to the top end of the leg, push up the outer end, propping it at intervals if necessary until a strain can be taken on the ropes. When the leg is in its approximate position, attach the ends of guy ropes to stakes or heavy objects such as bundles of rims. Remove the board and lift the leg bodily so that the soleplate is in its approximate position. Now adjust the guy ropes to allow the leg to lean inwards at the correct slope.

As stated previously for the larger mills it may be advisable to use a derrick to raise the bottom legs into position.

Raise the next leg in a similar manner, using only one guy rope to prevent it falling inwards, the rails and braces being quickly connected to prevent movement in the other directions. When connecting the various parts together, do not tighten the nuts on the bolts firmly, but sufficiently to prevent free movement of the members. This allows the weight of the parts above to be taken directly on the bolts, and reduces errors when checking the tower for being plumb.

Proceed with the leg on the other side of the first leg and attach the last two sets of rails and braces. A guy rope will not be necessary for the fourth leg when it is raised into position and all the rails and braces are attached to it. Now bolt on the four corner stays across the ends of the bottom rails.

Loosen the lower ends of the guy ropes, but leave them attached to the legs in case they are needed for pulling out the top ends when making final adjustments of the leg slopes.

After the bottom section has been bolted together, it should be carefully centred to the bore casing or centreing peg. With one end of a length of Mill rod against the casing, mark the edge of a tower leg flange on the mill rod, and check against the other three tower legs, the measurements being taken all at the same level. Alternatively a length of cord crossed at the centre peg and around two diagonally opposite legs, may be used. If one soleplate is too far in or out, the top end of the leg will be out of position accordingly, and the rails will not be level, even though the section may be central at ground level. It is therefore necessary for two men to lift or drag the soleplates across the concrete, or move the soleplates with a pinch bar if the section is too heavy until the two diagonals are equal at each rail height. When the soleplates are in their correct position, the guy ropes may be used to make the final adjustments to the tops of the legs. Check that the spreads between the outside corners of two legs on each side are all the same at ground level, as specified on the diagram.

The Tower rails should now be horizontal if the concrete blocks or bottoms of the holes (when no concrete is used) have all been carefully levelled. To check this, rest a spirit level on a length of dead straight angle steel rail, which is placed centrally on the bolted tower rails in turn, making sure that the level is in the centre of the rail and is not resting on the radius of the angle. The idea of using a separate length of straight rail on which to place the spirit level, is to reduce levelling errors which should occur if the bolted tower rails were sprung.

If the bottom section is not plumb after having been centred, it could only be the result of the foundation blocks not being at the same level. As grouting concrete under the soleplates is not practicable, there is no alternative but to dismantle the section and again level the blocks by adding another inch or two of concrete on each, or scraping down the bottoms of the shallow holes if concrete is not used.

Do not fill in the holes until the whole tower is erected.

LADDER

The Tower rails which have holes drilled in the vertical flange for the ladder are bolted onto one side of the Tower and at right angles to the rails supporting the hardwood guide rails. It is advisable to place the ladder on the side which is away from the prevailing wind. In erecting the Tower, it will be found convenient to make use of the ladder, which may be bolted on in sections as required.

HIGHER SECTIONS

When the bottom section of the Tower is square, central and level proceed with the erection of the next sections in a similar manner, but using a single guy rope on the tops of each of three legs. As these upper legs are shorter and therefore lighter, it should not be necessary to make use of a derrick even for the larger Towers.

Each section, after the nuts have been nipped up, must be carefully checked for being plumb. If the bottom section is plumb, the completed Tower should now be square and plumb over the centre of the site, as all the parts of the Tower are accurately fabricated. The clearance in the bolt holes will allow some slight adjustments to be made by loosening and re-tightening the bolts.

As previously stated, the rails above the platform bolt on the outside of the Tower legs and the braces above the platform bolt on the inside of the legs excepting the four pairs above the platform guide. A steel spring lockwasher is placed under the nut of each bolt above the platform.

On the Towers for 24ft., 27ft., and 30ft. "D" pattern Mills, a single angle steel rail carrying the chain guide rollers is fixed diagonally to the tower legs with hook bolts, with tapered cast iron packing pieces between the rails and tower legs. Also, two short angle steel rails to which is attached the roller guide casting, are bolted underneath the corresponding tower rails, using thin tapered washers under the bolt head—see Diagram.

PLATFORM

Depending upon the size of Tower, some decking boards have to be sawn in halves and also sawn to clear the tower legs. It is preferable to lay out the platform decking on the ground, mark the centre line of the joists—see Diagram—and hammer in the nails barely through the boards. Use two nails where each board crosses each hardwood joist, and where the nails have to be within 1-1/2" of the ends of the boards, it is advisable to bore the nail holes to avoid splitting. Where the two outside decking boards cross the outer joists at each corner, attach the boards to the joists with 3/8" dia. cuphead bolts.

Clamp the 3" x 2" hardwood platform joists centrally over holes in the angle steel platform rails and parallel with one another, and bore them with 7/16" dia. bit. On tops of the joists cut 1/4" deep recesses for heads of 3/8" dia. cuphead bolts. Paint the bolts and bolt up with spring lockwashers and nuts under platform angles.

TOWER CAP

As the weight of the complete Mill is transferred through the tower cap to the top of the four tower legs, it is very important that the support pads inside the tower cap casting bear evenly on the top ends of the legs. Try on the tower cap, and if necessary, chip or file the legs or pads. When correct, put in the tower bolts with lockwashers, and half tighten the nuts. Now bolt on the bottom part of ball-bearing turntable making sure that it seats down evenly on the support pads of the tower cap. Check the ball-race for being level by resting each end of a spirit level on two steel balls placed on opposite sides of the ball-race (one ball each side would allow the spirit level to tilt.) Try the level in various positions around the ball-race and file or chip the top of the legs until satisfactory.

It is most essential that the ball-race should be dead level as otherwise the Mill will not govern properly.

TIGHTEN BOLTS

Starting at the tower cap, carefully and finally tighten every nut in the Tower, down to ground level, remembering to use a spring Lockwasher under the nut of each bolt above the platform.

FILL IN POST HOLES

If sufficient cement and aggregate are available, it is strongly recommended that the bottom ends of the tower legs be encased in concrete. As it is unnecessary to completely fill the holes with concrete, we recommend using a temporary wooden form about a foot square or perhaps five gallon oil drums with tops and bottoms cut out, placed around the legs and later removed when the concrete has set. These forms should be placed so they allow for about a foot depth of concrete above the soleplates, but be sure to brush away any loose soil which may have fallen on the concrete blocks. After the concrete casing has set sufficiently, fill in the soil 6" or 9" at a time, ramming well each layer.

To prevent corrosion of the Tower legs at ground level, we recommend placing a concrete cap around the leg and a few inches above and below ground level with the top sloping away to allow the water to run off.

If the holes are to be filled with soil, bolt the short steady angles at right angles to the legs as shown on the Diagram and carefully ram each 6" or 9" layer of soil placed in the holes. It is advisable to place a concrete cap around each leg at ground level.

GUIDE RAILS FOR MILL ROD

The hardwood guide rails for the mill rod are bolted to the Tower rails in pairs at 10" centres. Check their lengths (cutting if necessary) and bolt across tower rails at not more than 10ft. between each pair commencing from the rails immediately below the platform. Should the lowest pair foul a discharge tee, syphon pump, etc., place them on the tower rails immediately above the mill rod connection, using hook bolts if these tower rails are not drilled.

BOTTOM GUIDE FOR MASTPIPE

Remove the pair of diagonal braces immediately above the tower rails for bottom guide and bolt the latter in position, putting the bolts in from the top. The pullout chain holes in the bottom guide castings for the 24ft., 27ft., and 30ft. Mills must be in line with, that is immediately above, the diagonal rail supporting the chain guide rollers—see Diagram. It is advisable to check the level of the bottom guide casting by placing the spirit level across the top machined edge, and if necessary moving the tower rails to the extent of the bolts hole clearances, or placing galvanised iron strips under the casting. Do not forget to use lock-washers under the nuts.

PAINTING BOLTS

Paint every bolt head, nut and lockwasher and any parts of the Tower where the paint may have been scratched off. It is a good idea to paint the whole of the Tower again after the Mill has been erected.

PULLOUT WINCH

It is advisable to wait until the Mill has been erected before attaching the pullout winch to the inside of a tower leg just above the bottom rails, as it can be seen on which leg to place the winch.


COMET
Australia's
Leading mill