

## INSTRUCTIONS No. 2656B

## FOR ERECTING

## Fairbanks-Morse

8-ft., 10-ft. and 12-ft. Type "WG" Steel Eclipse Windmills  
on Wood or Steel TowersRepair  
Orders

1. Retain this instruction book for future reference and in ordering any needed repairs, state that they are for a Fairbanks-Morse type "WG" Steel Eclipse windmill. Refer to the "Instructions for Ordering Repair Parts" on page 12.

## IMPORTANT

Follow  
Instructions

2. Read these instructions carefully before starting to erect the windmill. They have been prepared with great care, and by following them carefully, you will insure proper operation of the windmill.

## GENERAL ERECTING INSTRUCTIONS

Packing  
List

3. Before starting to erect the windmill, see that you have all the parts enumerated in the packing list and also see that any parts which may have become bent in shipping are put back in their proper shape.

**CAUTION**—In erecting this windmill, remember that cast iron is easily broken by sharp blows of a hammer or wrench. You will save yourself time and expense by carefully inserting the bolts rather than by hammering, for cast iron breaks before springing.

## Lockwashers

4. Lockwashers are provided for bolts which might otherwise work loose. In tightening nuts with lockwashers underneath, screw the nut up until the lockwasher is flat and then as an extra precaution rivet each bolt over slightly.

## Pivot

5. As shown in the packing list, the pivot is complete with the various parts in their proper location, when shipped.

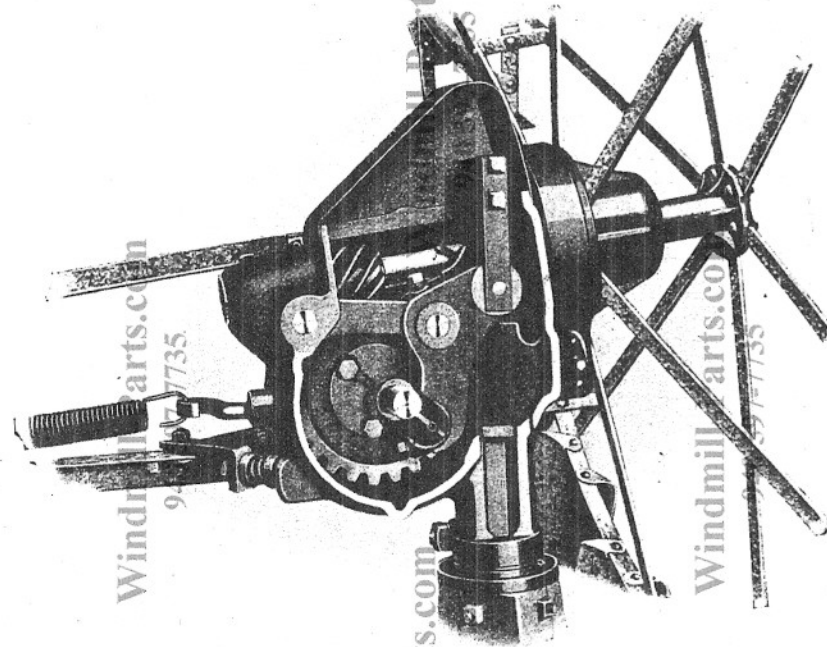
Pivot  
Pipe

6. In erecting, the tower collar 17A and step 18D must be put in place in the tower and the pivot pipe inserted, so it is necessary to take the collar and step from the pivot package, place them on the tower and then proceed with the erection of the windmill. On this account, it will be a great aid to you if you will examine the pivot carefully before removing these parts so you will know how to put them together again later.

Pull-out  
Rod

7. To improve the pivot package for shipping, the pull-out rod is given a long bend at the lower end. Straighten this part of the pull-out rod so it will operate in the piston rod and the swivel freely.

## ERECTING THE WINDMILL



8-FT. TYPE "WG" STEEL ECLIPSE WINDMILL  
(Pivot sectioned to show working parts)

(2677M)

8. Loosen the set screw and take out the carriage bolts of the lower guide 16B and 16D and remove it from the pipe. **Lower Guide**

9. Remove the tower step 18D and the collar 17A and put them in their proper place in the tower. See Page 10 for instructions as to putting collar and step in place in various kinds of towers. After the collar and step are in place in the tower, see that the top of the collar is level, and by means of the bolts for the step 18D, adjust the location of the step so that the hole in the center is directly below the center of the collar. This is very important for if a line through the centers of the holes in the collar and the step is not plumb, the pivot pipe of the windmill will not be plumb when put in place, and the mill will not turn freely on the tower, thus affecting the governing action as well as the general operation of the mill. Now proceed to place the windmill on the tower.

**Placing  
Step and  
Collar**

10. Set the pipe of Pivot 1A-C, with the pivot washer 51A in place on the pipe, down through the collar and the step. Replace the lower guide 16B and 16D, tighten the clamping bolts securely and then screw set-screw up tight to prevent the lower guide from working loose, read paragraph 11.

**Placing  
Pivot**

## Piston Rod

11. If for any reason the piston rod 24B is removed, re-assemble the same as it was received from the factory. See that the chain and pull out rod operate freely and are not twisted around the piston. When properly erected the pull-out rod passes down through the hole in the lower end of the piston rod and therefore the groove in the piston rod must be on the same side of the pivot as the sheaves in the pivot.

## Step Bushing Clearance

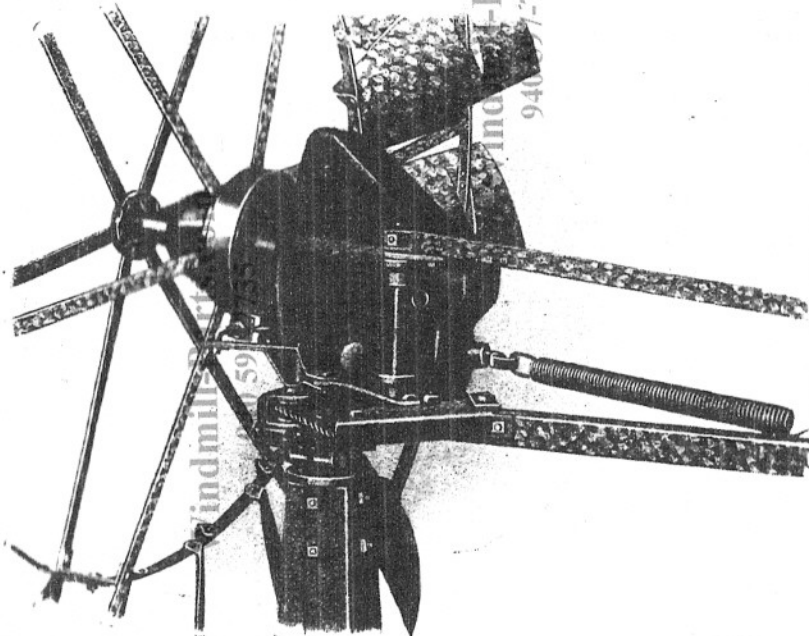
12. Examine the lower guide, being sure that when fastened tightly in place it does not bind on the piston rod. The clearance between the step bushing and the top of the lower guide should be about  $\frac{1}{8}$  inch.

## Pump Pole

13. With the piston rod in position, the eye end of the pull-out rod will extend several inches below the swivel. See that the piston rod will turn freely in the swivel plates and that the pull-out rod is straight and free to move up and down. Bolt the pump pole connections in place, one to each of the swivel box halves. Bolt the lower end of the pump pole connections to the upper end of the pump pole, and connect the pump poles 114A together with the splice plates 38A and bolts; then bolt the pump attachment 34A to the lower end of the pump pole, and connect the pump by means of the pin 50A.

## Pump Attachment

14. When bolting the pump pole connections to the swivel box and the pole to the pump attachment, note that the castings have "V" shaped ledges next to the bolt holes. When tightening the bolts, drive the wood into the socket so that these ledges sink into the wood. This will lessen the strain on the bolts and the parts will not work loose. Be sure to use the plate washers, furnished in the box of parts, against the wood under the bolt nuts, and screw the nuts up tight. In cutting the pump pole to the proper length, before the pump attachment is bolted in place, great care should be taken to see that the length is such that when connected, and in operation, the well cylinder plunger can make a full stroke without interference at either end of the stroke. Put a pump pole guide (furnished with the tower) at or near the tower platform, and one every ten feet from there to the pump, being careful to have the pump pole guided straight, otherwise there will be a great loss of power through undue friction.



PIVOT AND WORKING PARTS FOR TYPE "WG" STEEL ECLIPSE WINDMILL

(2671M)

15. Remove the bolt (cotter pin in 10-ft. and 12-ft. windmills) which passes through the upper end of the vane hinge pin 21A and the vane brace 28A and slip the vane hinge pin, with the vane bar 60A and the gate plate 3A-C attached at the bottom, up through the two hinge bearings on the side of the pivot. Replace the brace end and insert the bolt through the vane hinge pin and brace, being very careful to have the lockwasher under the nut; then screw the nut up tight. (On the 10-ft. and 12-ft. mills, insert the cotter pin through the vane hinge pin and spread the ends so it cannot come out.)

Vane Bar  
Gate Plate  
and Vane  
Brace

16. Bolt the vane blade 27A-C in place on the vane bar and the brace. Three bolts (four on 12-ft. mill) fasten the vane cross bars on the vane bar, the center one also passing through the outer end of the brace. Another bolt passes through the brace and the short cross bar 63A of the vane on 8-ft. mill.

Vane

17. Attach the end link of the pull-out chain 67A to the bolt in the gate plate. Just before making the connection, pull the chain out as far as it will go, to see that it is not kinked or twisted. In connecting the chain link on the bolt, the link must be in the middle of the formed buffer of the gate plate. A lockwasher is provided for the bolt; be careful to put this lockwasher between the plate and the nut, then screw the nut up securely. Swing the vane bar around to see that the chain feeds down properly over the sheaves 9A, and that the buffers strike the stops on the pivot squarely.

Pull-out  
Chain

18. Connect the free end of the brake link 33A, one end of which hinges on the rivet in the gate plate, to the brake lever by means of the cottered pin 168A which will be found in place in the brake lever 19A. The link should be hinged between the two halves of the brake lever, and when in place, the cotter pins should be spread carefully so they cannot come out.

Brake

19. The brake band 7A and parts are set in proper adjustment when they leave the factory, but may become displaced slightly in shipping. The brake band should not touch the wheel spider when the windmill is running. Its tension on the spider, when the windmill is "out of gear" can be regulated by means of the adjusting nuts on the adjusting ell bolt 20A.

Brake  
Adjustment

20. Insert the hook end of the governor spring 55A in one of the series of holes in the vane bar. With the vane bar parallel to the wheel shaft, hook the loop end of the governor spring in the eye of the attachment stud 166A, which is screwed into the pivot. In this position, the stretch in the spring, when in place, should be about  $1\frac{1}{2}$  inches on 8-ft. mill, 2 inches on 10-ft. mill, and  $2\frac{1}{2}$  inches on 12-ft. mill. If this initial tension is much less, the vane will not be held perpendicular to the windwheel except in very light winds, and if this initial tension is very much greater, the windmill will not start to govern until the wind is too high. In this case, before the windmill can govern entirely out of the wind, the speed and force of the wind may be too great for the safe operation of the windmill. With an initial tension, as stated above, in the governor spring, the windmill will automatically control its operation, so it will be "out of gear" when the wind reaches a speed of 25 miles per hour.

Governor  
Spring

Adjustment

21. Select the corner of the tower from which you wish to control the operation of the windmill. Attach the pull-out lever 37A to the tower corner post at a point about four feet from the ground. It should be on the inside of the tower, with the bend in the lever down. The attachment of lever fulcrum is made by means of a set screw which clamps a leg of the fulcrum to one leg of the corner post angle of a steel tower or on a wood tower to a small angle clip which in turn is fastened to the corner post of a wood tower by means of two lag screws. The parts for this optional installation are furnished with every mill.

Pull-out  
Lever

22. Attach one end of the pull-out wire to the lower, or eye end of the pull-out rod, so that the wire comes out between the pair of wood pole connections on the side toward the corner of the tower to which the pull-out lever is attached.

Pull-out  
Wire

23. With the pull-out lever up, fasten the pull out wire to the pin on one side of the lever. When the lever is pulled down so it strikes the inside of the post, the windmill should be "out of gear"; that is, with the vane parallel to the wheel.

"Out of Gear"

### "In Gear"

24. To get this result, move the lever up or down on the post to the desired position or adjust the length of the wire. When properly put on (with the bend down), the lever locks in position when the handle is down and against the post, preventing the windmill from going "in gear" until the lever is thrown up by hand. (An out-gear reel is provided for 12-inch mill and is provided with L-bolts for fastening to steel tower and lag screws for fastening to wood tower.)

## Wheel Assembly

25. Bolt the wheel arms 39A in place, the short ends of the arms being bolted to the large end of the spider 4A and the long ends to the hub end of the spider. Put the steel spider bolt plate 103A over the hub end of the spider so that the wheel arm ends are between the spider and this plate. All of the bolts must pass through this plate as well as through the spider and the arms, with the lockwasher and nuts on the outside of the plate. Bolt the outer girts 151A of two sections to the end of one arm (the heads of the bolts toward the center of the wheel) and the inner girts 156A to the outside of the cross piece of the arm (the heads of the bolts toward the center of the wheel). The convex side of the sails should be toward the tower, and when looking at the lower half of the wheel, from the tower side, the bolt, passing through the end of the arm and the outer girt, should pass through the left hand hole of the two holes in the outer girt. The free ends of the girts should be in the same relation on all of the arms, that is, one end of the inner and one end of the outer girts of each section should lap over the next set in the same manner all around the wheel. All of the bolts should be in place loosely, with lockwasher and nut on, before any of the wheel bolts are tightened. This will enable you to put the wheel together with greater ease, and the wheel will run truer, especially if you tighten each bolt nut slightly, giving every part of the wheel a chance to take its correct position; then be very careful to tighten every nut securely.

## Wheel Sails

True the  
Wheel

### Lubrication

## Renew Lubricating Oil

## LUBRICATION INSTRUCTIONS

26. After the windmill is completely erected on the tower, that is, ready to run, except for lubrication, remove the pivot cover 23A, and revolve the wind-wheel until the piston rod of the windmill is at the lowest point of its stroke. While in this position, fill the pivot gear case with a good **Medium Zero Test Lubricating Oil** until the oil is level with the upper  $\frac{1}{4}$  inch pipe plug, screwed in the side of the pivot gear case. This will require about two-thirds of a gallon of oil on the 8-ft. mill, one and one-third gallons on the 10-ft., and two and one-third gallons on the 12-ft. mill. Replace the pivot cover, being sure to screw the cover screws up tightly with the lockwashers under the heads of the screws.

27. Thereafter, once each year, preferably in the Fall, when the weather is still warm, renew the oil, after draining out all of the old oil by unscrewing the  $\frac{1}{4}$  inch pipe plug at the bottom of the pivot gear case. If this oil is drained into a bucket and filtered, it can be used again on other machinery that requires frequent oiling.

## CAPACITY

28. The stroke of the 8-ft. type "WG" windmill is 6 inches long, therefore a well cylinder at least 12 inches long should be used so that there will be ample clearance at the top and bottom of the stroke. On 10-ft. windmill, stroke is 7½ inches and well cylinder should be 16 inches long; on 12-ft. windmill, stroke is 9 inches and well cylinder should be 18 inches long.

\*CAPACITY OF 8-FT., 10-FT. AND 12-FT. "WG" WINDMILL

Size of Type, Wg. Steel Eclipse Whinnill	Actual Useful Horse-Power	Approx. R.P.M.	Length of Stroke in inches	25' Head or 10.8 lbs. Pressure		50' Head or 21.7 lbs. Pressure		75' Head or 32.5 lbs. Pressure		100' H.d. or 43.4 lbs. Pressure		125' H.d. or 54.2 lbs. Pressure		150' H.d. or 65.1 lbs. Pressure		200' H.d. or 86.7 lbs. Pressure		250' H.d. or 108.25 lbs. Pressure	
				Inside Diam. of Cylinder in inches	Gals pumped per hour	C	Gals	C	Gals	C	Gals	C	Gals	C	Gals	C	Gals	C	Gals
8 foot	.08	30	6	3¾	516	2¾	378	2¼	186	2	147	1½	129	1¾	112				
10 Foot	.12	24	7½	4½	743	3¾	278	2¾	278	2¼	186	2	147	1½	130				
12 Foot	.18	20	9	5½	1306	4	692	3¼	457	2¾	326	2½	270	2¼	219	2	173	1¾	132

\*Based on a wind velocity of 15 miles per hour or 30 strokes per minute.

\*\*This is the depth below ground to water plus height above ground at which water is discharged.

Erecting the Windmill on Fairbanks-Morse Steel Towers, Wood Towers,  
and on steel towers of other makes.

### Erecting the Windmill on Fairbanks-Morse Towers.

29. For erecting Fairbanks-Morse Steel Towers, see Instructions No. 2110 (Latest edition). The top parts of these towers are bolted together as shown in cuts 465WT and 464WT. (The top of No. 3 tower for 12-ft. is similar to that shown in cut 465WT except on a larger scale—having heavier angles, plate, and bolts.)

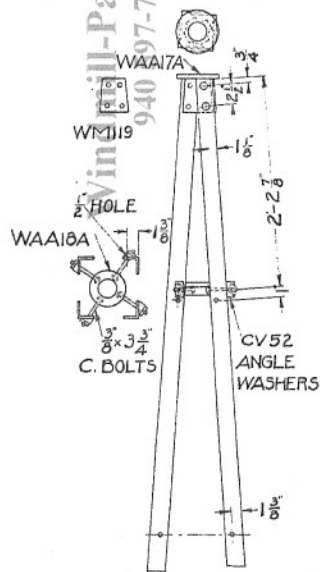
Tower  
Tons

30. Note that each post has one flange outside and one flange inside. Put the top bolts in the posts with the heads inside and rivets outside, but leave the nuts loose until collar is in place. Place the collar 17A inside of the square formed by the top of the corner posts. This is easily done if the top bolts are in place (loose) before the bottom bolts are inserted.

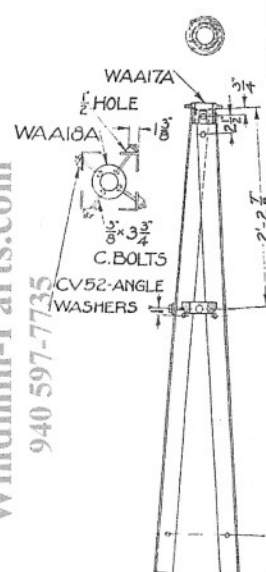
### Flanges

31. Next bolt the step 18D in place. This step is made with slots to take the shanks, and sockets to take the heads of carriage bolts which pass through holes provided for them in one leg of each of the tower corner posts. Angle washers are also furnished to place under the nuts of these step centering bolts next to the tower corner posts. See Paragraph 9 on alignment of step plumb with collar.

### Universal Step



(465WT)  
TOWER TOP FOR NO. 1  
STEEL TOWER



(464WT)  
TOWER TOP FOR NO. 2  
STEEL TOWER

## ERECTING THE WINDMILL ON OTHER MAKES OF TOWERS

## Erecting

32. The Fairbanks-Morse Steel Eclipse Windmill is regularly equipped with collar and step which are easily adapted to any make of tower as follows:

For 8-ft. or 10-ft. mills on other makes of steel towers having corner posts 2 inches wide or less, arrange the top of the tower the same as shown in cut 465WT which shows location and spacing of necessary holes in corner posts.

Note that in placing the top plate WM119 on the angles, each angle should have one flange outside and one inside. Put the  $\frac{3}{8}$ " x  $\frac{3}{4}$ " bolts in place with nuts on outside. To put collar and step in place proceed as described in paragraph 30 and 31. (On Page 9.)

## Top Plate

Top Plate WM119 and the 16 bolts for same are furnished only when ordered as an extra.

FOR 8-FT. AND 10-FT. MILLS ON OTHER MAKES OF STEEL TOWERS HAVING CORNER POSTS  $\frac{1}{2}$  INCHES WIDE OR MORE.

Arrange the top of the tower the same as shown in cut 464WT which shows location and spacing of necessary holes in corner posts. Except for the bolts for the top of the tower no extra parts are required.

To put collar and step in place, proceed as described in Paragraph 30 and 31. (On Page 9.)

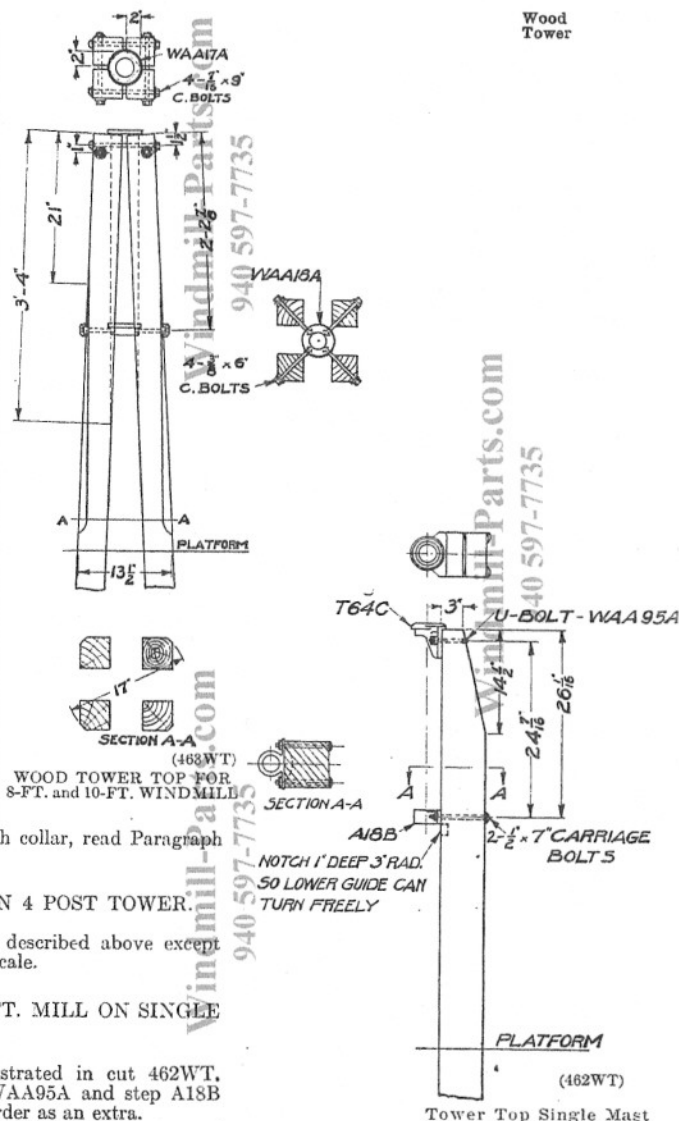
FOR 12-FT. MILL ON OTHER MAKES OF STEEL TOWERS HAVING CORNER POSTS  $2\frac{1}{2}$  INCHES WIDE OR MORE.

For this case the arrangement is similar to that illustrated in cut 465WT except on a larger scale and 4-inch plates WM120 and 16  $\frac{1}{2}$ " x 1" bolts are required which are furnished only on order, as an extra.

To put collar and step in place, proceed as described in Paragraph 30 and 31.

## FOR 8-FT. AND 10-FT. MILLS ON 4 POST WOOD TOWER

33. In building a wood tower for this windmill, make the tower top according to Cut 463WT. Refer to instructions under the heading "Pivot" for the method of taking the collar 17A and the step 18D from the pivot package in the shipment of the mill. Now proceed to fit the Tower Collar 17A in place on the tower top by cutting off the inner edges of the posts and boring holes for the collar bolts. Tighten the nuts on the collar bolts securely. Insert the step 18D and tighten the four step bolts securely. Slots in under side of 18D are so arranged that the carriage bolts can be put in the corner posts loosely with the heads of the bolts close to the center of the tower and then putting step 18D in place by dropping it down so that the slots in the step engage the bolt shanks and then pulling the bolts outward so that the bolt heads fit in the sockets for same in step 18D. For method of aligning step so it is plumb with collar, read Paragraph 31 (on Page 9).



FOR 12-FT. MILL ON 4 POST TOWER.

Method is same as described above except tower top is on larger scale.

FOR 8-FT. AND 10-FT. MILL ON SINGLE MAST TOWER.

This is clearly illustrated in cut 462WT. Collar T64C, U-bolt WAA95A and step A18B are furnished only on order as an extra.

It is necessary to cut away the upper portion of the mast as shown, so the windmill wheel will have proper clearance. Especial care must also be taken to see that a line through center of collar and step is plumb. See Paragraph 30 (on Sheet 9).