INSTRUCTIONS No. 2656B
FOR ERECTING
Fairbanks-Morse
8-ft., 10-ft. and 12-ft. Type "WG" Steel Eclipse Windmills
on Wood or Steel Towers

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

IMPORTANT
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 those 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. Loosen the set screw and take out the carriage bolts of the lower guide 16B and 16D and remove it from the pipe.

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.

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.
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11. If for any reason the piston rod 24B is removed, reassemble 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.

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 1/4 inch.

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 plate and that the pullout 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 to the upper end of the pump pole, and connect the pump pole 11A together with the splice plates 36A and bolt the pump pole and connect the pump by means of the pin 50A.

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 to guide 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. If 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.

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 vane hinge on the side of the pivot. Replace the brace end and insert the bolt through the vane hinge pin hole 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.)

16. Bolt the vane blades 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 going through the outer end of the vane bar. The other two bolts pass through the brace and the short cross bar 63A of the vane 84A mill.

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 bolt 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.

18. Connect the free end of the brake link 35A, one of which hinges on the vane in the gate plate, to the brake lever by means of the cotter pin 168A which will be found in place in the brake lever 10A. The link should be hinged between the two halves of the brake lever, and when in place, the cotter pins should be spindled carefully so they cannot come out.

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. The brake spring tension on the spider, when the windmill is 'out of gear', can be regulated by means of the adjusting nuts on the adjusting link bolt 20A.

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 168A, which is screwed into the pivot. In this position, the stretch in the spring, when in place, should be about 1 1/4 inches on 8-ft. mill, 1 1/4 inches on 10-ft. mill, and 2 3/4 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 go until the wind is too high. In this case, before the windmill can go, the entire body of the windmill is moved with the wind, and with a speed and force of the wind may be too great for the brake 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 20 miles per hour.

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 the lower 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 tube or on a wood tower to a small angle clip which is in turn 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.

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 sides of the bicycle to the tower which the pull-out lever is attached.

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.
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"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 looks 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-of-door reel is provided for 12-inch mill and is provided with bolts for fastening to steel tower and lag screws (for fastening to wood tower.)

25. Bolt the wheel arms 30A 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 101A over the hub end of the spider so that the wheel arms 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 lock washers and nuts on the outside of the plate. Bolt the outer girts 10A of two sections to the end of one arm (the heads of the bolts toward the center of the wheel) and the inner girts 15A 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 arms should be toward the tower and when looking at the lower half of the wheel from the side, the bolt passing through the arm and the outer girt, should pass through the left hand hole of the two holes in the outer girt. The free side of the girts should be in that relation on all of the arms, that is, one end of the inner and one end of the outer girts of each section should line up over the next set in the same manner all around the wheel. All of the bolts should be in place loosely, with lock washers and nuts 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 snugly, giving every part of the wheel a chance to take its correct position; then be very careful to tighten every nut securely.

LUBRICATION INSTRUCTIONS

26. After the windmill is completely erected on the tower, that is, ready to run, except for lubrication, remove the pivot cover 24A 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 level in the upper half of the gear case is even with the side of the pivot gear case. This will require about two-thirds of a gallon of oil on the 8-ft. mill, and one and one-third gallons on the 10-ft. mill, and two and one-third gallons on the 12-ft. mill. Replace the pivot cover, being sure to screw the pivot screws snugly with the lock washers 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 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. windmills, stroke is 7½ inches and well cylinder should be 16 inches long; on 12-ft. windmill, stroke is 8 inches and well cylinder should be 18 inches long.

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

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<tr>
<th>Diameter, Inches</th>
<th>Length of Stroke, Inches</th>
<th>30° Head</th>
<th>32° Head</th>
<th>32° Head</th>
<th>100° Head</th>
<th>120° Head</th>
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*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 makers.

Erecting the Windmill on Fairbanks-Morse Steel 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 cut 486WT and 484WT. (The top of No. 7 tower for 1241 is similar to that shown in cut 485WT except on a larger scale, having heavier angles, plates, and bolts.)

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 of top post is in place. Place the collar of the square formed by the top of the corner posts. This is counterbolted if the top bolts are in place (loose) before the bottom bolts are inserted.

31. Next bolt the step 12D 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. The washers are also furnished to place under the heads of these step centering bolts next to the tower corner posts. See Paragraph 9 on alignment of step plaza with collar.
ERECTING THE WINDMILL ON OTHER MAKES OF TOWERS

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. of 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 3/8" x 3/4" bolts in place with nuts on outside. To put collar and step in place proceed as described in Paragraphs 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 2 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 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 18 3/8" 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

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

FOR 12-FT. MILL ON SINGLE MAST TOWER.

This is clearly illustrated in cut 462WT. Collar T64C, U-bolt WAA86A 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. Special care must also be taken to see that a line through center of collar and step is plumb. See Paragraph 30 (on Sheet 9).