# Westinghouse
# Turbines
## for
# Mechanical Drive
## (With Special Governor)

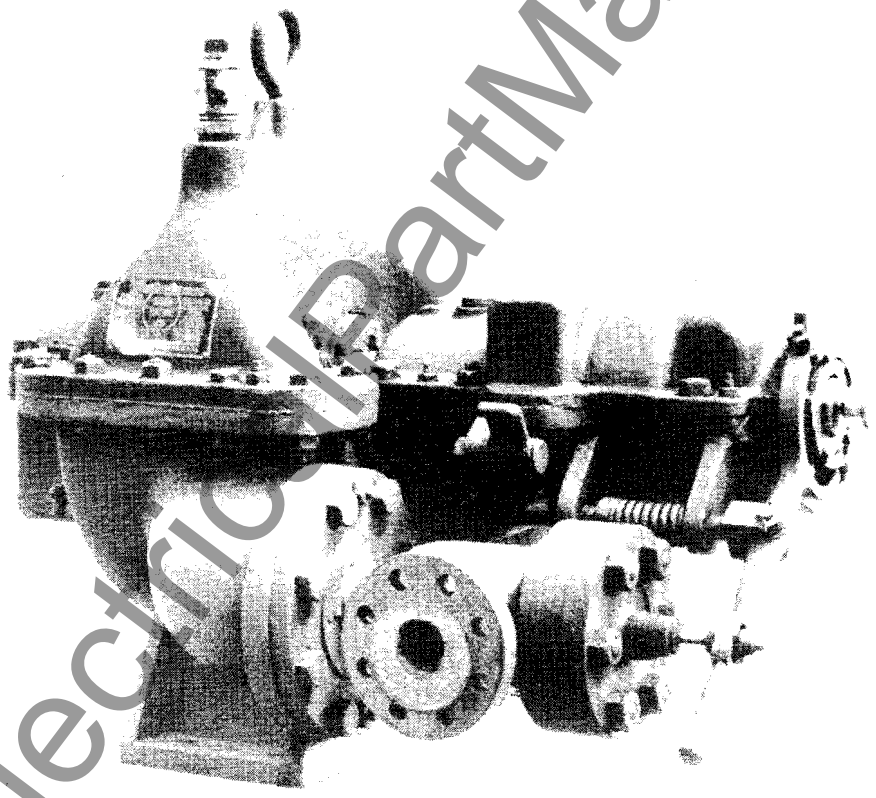


Fig. 1—1-AD Turbine

*In the event that it becomes necessary to return any part of this equipment to the South Philadelphia Works, it should be tagged with the Sender's name and address and the serial number of the unit. Shipments by freight, express or parcel post should be addressed to: Westinghouse E. & M. Co.*
*Essington, Pa.*

**South Philadelphia Works** **Essington, Pa.**

**I. B. 5673**

# I N D E X

# Westinghouse Turbines
# for
# Mechanical Drive—Type AD

## GENERAL DESCRIPTION

The Westinghouse steam turbine of the mechanical drive type consists of a single wheel with blades mounted upon its periphery. Refer to Figure 2. Steam enters the nozzle block through suitable passages in the cylinder casting. The steam expands in the nozzle transforming the heat energy into velocity. Having reached its maximum velocity at the mouth of the nozzle the steam impinges upon the blades, which causes them to move forward, thus revolving the turbine wheel. By the rotation of the wheel the heat energy of the steam is transformed into work at the turbine coupling.

The velocity of the steam at the nozzle mouth is much greater than that of the blades so that after passing through the blades from the nozzle it becomes advantageous to collect the steam in a reversing chamber which redirects the steam against the wheel a second time, thereby adding the energy of another pass through the blades to the turbine shaft before the steam escapes into the exhaust.

## TURBINE CASING

The turbine casing is split horizontally, with all pipe connections attached to the base, so that a complete inspection may be made by raising the cylinder cover. The cylinder base is supported on two legs, cast integral with the cylinder, which are dowelled and bolted to a soleplate. In removing the cover it should be lifted straight up to clear the turbine rotor. Before replacing the cover, the joint should be scraped clean and made up with shellac. Be sure to pull the joint down tight before the shellac hardens.

## ROTATING ELEMENT

The rotating element consists of a shaft carrying the rotor, supported by two ring oiled bearings. The rotor is pressed on and keyed to the shaft and is held in place by nuts "23", (Fig. 2) which in turn are locked by lock washers "22".

One end of the shaft supports the coupling. The automatic trip and the governor are supported on the other end of the shaft overhanging the governor end bearing. The governor hub contains the automatic stop device.

## NOZZLES AND REVERSING CHAMBERS

The nozzle block "3" and the reversing chamber "4" are located in the cylinder base. When assembling the turbine or checking the adjustments, the rotor should be set centrally between the nozzle and the reversing chamber. The thrust bearing should then be adjusted to hold the rotor in this position axially. The nozzle "3" is bolted to the steam chest body "71". The reversing chamber "4" is bolted to the cylinder base "1". The reversing chamber should be flush with the nozzle block and in such a position as to catch all steam emerging from the blades.

## BEARINGS

The bearings are of the single oil ring, horizontally split, babbitted type. The one next to the coupling is known as the coupling end bearing, and the one next to the governor is known as the thrust bearing (or

governor end bearing). Both are of the same general type, the only difference being that the thrust bearing has the ends babbitted and grooved for oil passage. The thrust collars "25" are secured to the shaft by being threaded on the split screw "26" and bear against the ends of the thrust bearing to hold the rotor in its correct axial position. The axial clearance (or end play) of this thrust bearing should be between .002 and .005 of an inch. This clearance can be adjusted by screwing the thrust collars "25" on the thrust screw "26". It is essential that these clearances be set properly in order to obtain the best results.

## GLANDS

The glands which are used to reduce to a minimum the steam leakage at the points where the shaft passes through the cylinder are of the conventional stuffing box type. The packing used is the standard "QP" commercial packing, manufactured by the QP Signal Company. It is held in place by the ring "15" and the plate "14". These glands require no adjustment. If the steam leakage becomes excessive, the packing has, in all probability, lost its life and should be renewed. Each gland requires four rings of packing. Never install more than four rings because the packing must be loose in order to seal properly.

## AUTOMATIC STOP GOVERNOR

The function of the automatic stop governor is to automatically shut down the turbine if the speed increases to approximately 10% above normal. It consists of a plunger (or weight) "50" which is set in the governor hub, perpendicularly to the rotor axis. This weight is placed with its center of gravity slightly off-set so that the centrifugal force exerts an unbalanced pull tending to throw it outward. Normally, it is held in its inner position by the compression spring "52" and retainer "49".

If the speed increases to the tripping point (approximately 10% above normal), the centrifugal force of the weight overcomes the compression of the spring and the weight flies outward about 3/16 inch and strikes the trip lever "53". Movement of this lever disengages the latch between it and the rod "59". When the rod latch plate "55" is released by the trip lever, the compression spring "60" slides the rod inward, which, acting through the pin "57" and governor lever "61", closes the governor valve "69", thus shutting off the steam to the turbine.

This trip must be reset by hand. When the turbine speed returns to normal (or slightly below), the weight "50" returns to its inner position. The mechanism can then be reset by pulling outward on the hand lever (which is attached to the governor lever "61") until the trip lever "53" again engages the latch plate on the rod "59" so as to hold this rod in its running position.

A turbine should be overspeeded occasionally to check the speed at which the weight flies out and disengages the trip rod. When the driven apparatus, to which the turbine is connected, is such that the load cannot be removed, it may be found difficult (or even impossible) to increase the speed to 10% above normal. In such cases it is advisable to disconnect the driven apparatus when running the overspeed test. In order to increase the speed, gradually pull outward on the lower end of the lever "61" and at the same time push inward on the governor end cover "41". The speed should be watched carefully so that it does not go much above 10 or 12% overspeed.

The trip lever "53" projects outward through the housing and forms a convenient hand trip. By merely striking this lever with the hand, the trip rod latch is released and the governor valve closes instantly, thus shutting down the turbine.

Adjustment:

In order to increase the tripping speed, insert thin liners or washers "51" (.005 or .010 inch thick) between the spring retainer "49" and the end of the spring "52" so as to increase the spring compression.

In order to decrease the tripping speed, remove liners from between the retainer and the spring. In case there are no liners, grind the end of the spring squarely, just enough to obtain the desired decrease in compression.

When making these adjustments, it is important to place the liners between the retainer and the spring and not between the spring and the collar on the end of the weight. Before making any change in the liners, the weight should be examined to see that it works freely in the housing and is not stuck by dirt or excessive wear. The linkage should be inspected to see that all parts work freely. The linkage pins should receive a few drops of oil occasionally to prevent rust and consequent sticking.

## GOVERNOR

The governor is of the horizontal weight, centrifugal type, in which the centrifugal force of the weights is opposed by the compression force of the governor springs. This same principle has been used for many years but the detail construction of this governor differs materially from older types.

Referring to Figure 2, the governor hub "29" is a tight fit on the rotor shaft and is further secured to the shaft by the auto stop governor weight retainer. This hub carries the weight fulcrum blocks "30" which support the governor weights. Each weight "34" is made in a single piece and has machined on it the knife edge about which it pivots and a knife edge seat which works against the knife edge on the strut "31". The other knife edge on the strut works against the strut seat "33". All of these knife edges and seats are properly hardened to withstand the service to which they are subjected.

With the machine at rest, the governor weights are held in their inner position by the force exerted by the compression springs "38". These springs are secured to the shaft at the outer end and exert a force which is transmitted to the toe of each governor weight through the spring seat "45", the bearing retainer sleeve "37", the inner race of the ball bearing "35", the strut seat "33" and the struts "31".

As the speed of the turbine increases, the governor weights move outward due to the increased centrifugal force and, being fulcrumed on the blocks "30", this movement compresses the governor springs and moves the ball bearing "35" outward. As the speed decreases, the spring force moves the sleeve "37" and adjacent parts inward with the weights moving inward a corresponding amount. Therefore, the axial position of the ball bearing "35" varies with the speed. In order to transmit this governor movement to the governor valve, which controls the steam inlet, the sleeve "40" is threaded in the bearing housing so as to clamp the outer race of the ball bearing. The outer end of the sleeve is connected to the governor lever by the pin "44", thus completing the linkage. The ball bearing carries any thrust which may be exerted by the steam valve and transmits the governor movement with a minimum of friction. The governor lever is fulcrumed so that outward movement of the governor weights closes the steam valve while inward movement of the weights opens the steam valve.

Lubrication:

The governor ball bearing is lubricated by oil placed in the sleeve "40". The end cap "41" should be removed and the housing filled up

to the level at which it overflows past the inner ring which holds the end cap snap spring. A good grade of turbine oil should be used. Periodically (say once a week or once a month, depending on the nature of the service) the oil lever should be checked and more added if the level is not up to the overflow point.

To Dismantle Governor:

1. Remove the governor lever "61" by removing the nut "63", pin "57" and pin "44". (Note that the spacer "43" is loose and will fall out when the pin is removed).

2. Remove the bearing and governor cover "28".

3. Loosen the set screw and unscrew the sleeve "40".

4. Remove the stop screws "47".

5. Mark the nut "39" and the shaft, and count the number of threads exposed so the nut can be tightened to the same point when re-assembled.

6. Loosen the nut "39" until all compression of springs "38" is relieved.

7. As the springs "38" become loose, lift out the governor weights "34". (These weights and the hub "29" should be marked so the weights can always be assembled in their original positions).

8. Take the nut "39" all the way off. Then, the springs, sleeve, bearing parts, and strut retainer can easily be taken off the end of the shaft. (Watch the struts "31" so they do not fall out of the retainer and become lost).

To Assemble Governor:

1. Assemble on the end of the shaft in the following order:- the strut seat "33" with struts "31" and retainer "32", the bearing housing "36", the bearing "35", the sleeve "37", the ring "46" and the spring seat "45".

2. Then assemble the springs "38" and start the nut "39".

3. Install the stop screws "47".

4. Place the weights "34" in position and push inward on the spring to hold them.

   To see if these parts operate properly, press inward on the governor spring, and at the same time pull one weight outward. Release the weight suddenly, still maintaining pressure on the spring. If the weight snaps back freely, it is correct. If a rub occurs, it can be felt. Repeat this test for the other weight, and then for both weights.

5. Tighten the nut "39" the same amount as originally found.

6. Install the sleeve "40" and lock it with the set screw.

7. Install the governor lever "61".

Adjustment:

Before making any change in the governor setting, be sure that the governor valve is set correctly according to instructions under "Governor Valve".

The normal speed maintained by the governor is determined by the compression of the springs "38" and can be adjusted by means of the nut "39".

To increase the speed, tighten the nut "39".

To decrease the speed, loosen the nut "39".

One complete turn of the nut "39" will change the speed approximately 70 rpm.

## GOVERNOR VALVE

The steam chest "71" which encloses the governor valve is located below and to one side of the governor and is bolted and doweled to the cylinder base. As shown in the illustration, this steam chest protrudes into the cylinder, thus forming the nozzle chamber to which the nozzle "3" is bolted.

The governor valve "69" is of the double seated, balanced poppet type and operates within the cage "70". The valve is pinned to the stem "62" which is guided by the cage at the inner end, and by the bushings "66" and "67" at the outer end. The spool and nut on the end of the stem engage a yoke on the governor lever so that the valve "69" opens and closes in response to movements of the governor. The valve stem spring "65" tends to eliminate lost motion between the valve and lever by constantly exerting a force in one direction. It also serves to prevent spinning of the valve.

The bushings "66" and "67" serve also to reduce to a minimum the leakage of steam along the stem. A leak-off connection is provided between the two bushings so any steam which does leak past the inner one can be led to a drain where it will not be objectionable. No other form of stem packing is used and excessive leakage should be corrected by installing new bushings.

When new bushings are being installed, they should be pressed in the cover "68" and the cover bolted in place, but with the valve and stem left out. Then the two bushings and the hole at the inner end of the cage should be reamed together in order to insure correct alignment of the stem. This stem is rather small and may accidently become bent by some external force. It should be inspected occasionally to see that it is perfectly straight. Its surface must be kept smooth and free of galled spots, rust and dirt. Any binding or sticking of this stem will cause unstable governor action. This stem must not be painted.

Valve Adjustment:

The valve travel (or lift) is very important and should never be more than 3/16 inch. In order to check this setting, remove the nut "63" and push the valve stem inward (by hand) until the valve is on its seat. Then measure the distance from the contacting face of the spool "64" to the contacting surface of the governor lever. In order to change the setting, remove the cotter pin and screw the spool "64" inward or outward to give the correct valve travel. As stated above, this travel should never be more than 3/16 inch and may be less, depending on the steam conditions. Each unit is tested and the valve travel set correctly before shipment. Therefore, it is recommended that the travel be checked on each new machine

when first received, and this travel recorded in a permanent record. Then at any future time, the travel can be set to the original factory figure.

It will be noted that the valve and seats form line contacts and not surface contacts. Therefore, this valve cannot be ground in to stop leakage. A test to determine whether or not the valve is leaking too badly for use, may be applied as follows: with the valve held firmly on its seat by hand, turn on full steam pressure. If the turbine starts rotating, it is evident that the valve is leaking too badly for practical use. If the turbine rotor does not start to rotate, the leakage is not sufficient to cause any trouble. If it should be necessary to re-seat the valve, the inner disc must be faced off maintaining a 90° angle, and the bevel on the outer disc faced off the same amount. The seats in the cage must be bored in the same manner, maintaining a 90° angle on the outer seat and a bevel on the inner seat. If this is not done accurately, the areas of the valve discs will be changed, thus throwing the valve out of balance which will undoubtedly cause "hunting" of the governor. It is difficult to do this work without proper facilities and, since the parts are relatively inexpensive, it is recommended that new parts be obtained from the factory when such repairs are necessary. From the above it will be obvious that the cage and valve should be ordered and replaced together because these parts are made in sets and are not furnished separately.

The cage "70" fits in the steam chest with a light press fit. When removing it the steam chest should be heated by turning steam into it, and the cage cooled by pouring water through it. The cage can then be removed without difficulty. Likewise, the steam chest should be heated when installing the cage in order to avoid galling the press fit.

## FOUNDATION

This turbine may be bolted directly to the bedplate supporting the machine it is to drive, or it may be mounted on a separate soleplate. In either case the two legs which are cast integral with the turbine cylinder base are dowelled and bolted to the foundation plate.

## ERECTION

It is most important that the machine be installed properly. Misalignment, distortion of the bedplate, and errors of this kind will, later, bring about serious operating troubles even though the machine seems to run fairly well at first.

In some cases the turbine and driven apparatus are mounted upon a continuous bedplate and in other cases they are on two separate bedplates. In either case, the method of procedure is the same.

There are three steps in erecting a unit. The first is to grout the unit in as nearly correct alignment as possible. The second is to check the alignment after grouting has set and make any changes necessary to bring about accurate alignment by moving the turbine on its bedplate. The third is to dowel the turbine and driven apparatus to the bedplate.

First set the bedplate level, supported upon iron wedges, spaced from 12 to 18 inches apart. Do not depend upon the stiffness of a cast iron bedplate to give or maintain alignment. Care must be exercised to see that the weight is evenly distributed on the wedges to keep the bedplate from springing. Put the turbine in proper position relative to the driven apparatus. Leveling may be done on any finished projecting pads which offer a rest for the level.

If the position of the driven apparatus is to be determined by pipes to which it connects, be sure that this point is checked up at this time. Check also the exhaust and inlet on the turbine and all pipe connections on the driven apparatus to see that they are vertical. If they are not, this would indicate that the preceding work has not been done accurately and should, therefore, be rechecked.

Next check the alignment of the coupling, making any changes necessary to bring about good alignment.

After this is done, a dam of boards or bricks of sufficient height should be built around the bedplate and the grouting poured. It is recommended that the interior of the bedplate be filled solid with grout. Make grouting thin, using a mixture of one part high grade Portland cement and one part clean sharp sand.

Allow grouting to become thoroughly set and then slug up foundation bolts tight.

To set on steel work, set bedplate on shims not over a foot apart, and provide against these shims slipping out by screwing them to the steel work. Level up bedplate as previously described and make sure that it sets level on all shims. After carefully pulling down on all foundation bolts, the final alignment of the outfit should be checked.

Do not run the unit until the final alignment is completed.

## PIPING

When connecting the turbine to steam inlet and exhaust lines, always begin the piping from the connecting line and end at the turbine, making the turbine connection the last one in the line. Never start piping from the turbine, for doing so will undoubtedly distort the casing or spring the turbine out of line, inasmuch as the weight of the piping will hang directly on the turbine.

The steam piping must not impose any strain on the turbine. If screwed fittings are used, the line should be provided with swinging joints. If flanged fittings are used, long radius bends should be put in the piping to take up the expansion of the steam line. Support the piping at a point near the turbine in such a manner that the weight of the piping is taken by this support. The piping should be so arranged that the expansion will not have to be resisted by the turbine. Make sure that the flanges are parallel and that no force is necessary to bring the flanges together to match the bolt holes. After installing the piping, heat it up to full working temperature, and then break joints at the turbine and check.

The exhaust piping should be provided with an expansion joint located next to the turbine exhaust nozzle. Even though an expansion joint is used, the same caution in connecting up should be exercised. Be sure that the expansion joint is light enough to be flexible.

In piping up a turbine, make all pipe supports permanent. Do not expect a block of wood driven under a pipe to take the strain from the turbine. The best method of supporting a pipe is to use an adjustable foot under it as near to the turbine as possible. Another method is to hang it from the building by tie rods which connect to the piping near the turbine. These rods, however, to be satisfactory must be short. Always put in the supports before actually connecting to the turbine.

In all cases where the turbine is to be realigned, disconnect the steam and exhaust piping, and in reconnecting it, be sure that the flanges line up without putting a strain upon the turbine.

## TO OPERATE

Before starting, clean the turbine, taking out the bearings so that all dirt may be taken from the bearing cavities. After replacing the bearings, fill the cavities with a good grade of clean oil. See that the rotor turns freely by hand. Disconnect the governor linkage and make sure that the governor poppet valve can easily be moved in and out without sticking. Clean off all rust and corrosion that may have collected on exposed parts of the governor mechanism. See that the governor sleeve is filled with oil to the correct lever. Pull back governor lever "61" until the edges of the latch plates "54" and "55" are engaged. Trip automatic stop by means of hand tripping device. This accomplished by striking knock-off lever "53" sharply. Reset auto stop as indicated above.

Open drains on steam inlet and exhaust lines. Open exhaust valve. Crack the steam valve and when live steam appears at the drains close them. Bring the turbine up to speed slowly and note that the oil rings are turning in the bearings. When the turbine begins to come up to speed watch the governor lever arm to see that the governor is functioning properly. When the turbine is up to speed and under control of the governor, open steam valve wide.

With the unit under way, check the speed by means of a tachometer or speed counter. This may be accomplished at the outboard end of the driven apparatus. If the speed is not correct it should be made so at this time. To decrease the speed, screw back on the governor spring adjusting nut "39"; to increase the speed, tighten up the adjusting nut. Run the turbine under observation until temperature of the bearings has ceased to rise.

## TO SHUT DOWN

Strike the knock-off lever "53" sharply which will close the governor valve and indicate that the automatic closing device is working properly. Close the steam valve and when this is totally closed reset the automatic trip. Close exhaust valve; open steam and exhaust drains.

## CARE OF THE TURBINE

1. Keep machine clean.
2. Keep bearing reservoirs well filled with good quality, clean oil.
3. Keep governor sleeve filled to the proper level with good quality, clean oil.
4. Wash out bearing cavities with kerosene and refill with clean oil every three or four months.
5. If steam is contaminated with boiler compound or sludge, clean off governor valve stem as often as necessary to keep it working freely.
6. Before starting a unit that has been idle for some months, dismantle governor and governor valve linkage to see that all parts are free.
7. Bearings should be inspected occasionally to see that they are not wearing excessively.
8. The automatic stop should be tripped occasionally to see that it is in working order.
9. Inspect coupling frequently.

10. Check speed of machine at least once a week as this is a good indication of possible trouble.

## INSPECTION

A thorough inspection of all parts of the turbine should be made once a year, renewing such parts as may show undue wear. If heavy wear of any part is evidenced, the cause of the wear should be ascertained if possible, and in any case replacement of the part should be made before failure, as this will be cheaper than a future shut down.

## OPERATING TROUBLES

### Governor Hunting

1. Too great a travel of governor valve.
2. Sticking of governor valve stem in bushings.
3. Sticking of governor spindle.
4. Bent valve stem.
5. Broken governor weight knife edge.
6. Distorted or bent governor linkage.
7. Weakening of governor spring.

### Turbine Fails to Come Up to Speed

1. Low boiler pressure.
2. Steam line clogged.
3. Nozzle throat plugged by foreign matter.
4. Governor speed set too low.
5. Too small valve travel.
6. Wet steam.

### Vibration

1. Misalignment.
2. Steam and exhaust pipe straining turbine.
3. Bent shaft.
4. Coupling running out of true.
5. Governor running out of true.
6. Bearings too loose.

## REPAIR PARTS

The list of parts on the following pages are made up for your convenience in ordering repair parts. To order a spare part, give the serial number of turbine, and name and number of the part desired. Due to the necessity of avoiding interruption in service, it is well to carry a number of spare parts on hand. Carrying such a stock will also avoid a delay in shipment at a time when parts are most needed.

We recommend that the following spare parts be carried for each machine:

1 - Set of bearings.
1 - Governor thrust bearing.
1 - Governor valve stem with spools and bushings.
1 - Knock-off lever with latch plates.
1 - Governor valve and cage.
1 - Set of gland packing.

In the event that it becomes necessary to return any part of this equipment to the South Philadelphia Works, it should be tagged with the sender's name and address, and serial number of the unit and shipped by freight, express or parcel post to:

Westinghouse Electric & Manufacturing Company
South Philadelphia Works
Essington, Pa.

LIST OF PARTS

| Item No. | Name |
|---|---|
| 1 | Turbine Cylinder Base |
| 2 | Turbine Bearing Bracket (Governor End) |
| 3 | Turbine Nozzle Block |
| 4 | Turbine Reversing Chamber |
| 5 | Turbine Rotor Shaft Thrower |
| 6 | Turbine Bearing (In Halves) (Coup. End) |
| 7 | Turbine Bearing Bracket (Coup. End) |
| 8 | Turbine Bearing Bracket Oil Gauge with Drain Cock |
| 9 | Turbine Bearing Oiling Ring |
| 10 | Turbine Bearing Bracket Oil Seal Ring (In Halves) (Coup. End) |
| 11 | Turbine Rotor Shaft |
| 12 | Turbine Bearing Bracket Cover |
| 13 | Turbine Bearing Bracket Cover Sight Hole Plug |
| 14 | Turbine Cylinder Gland Packing Plate |
| 15 | Turbine Cylinder Gland Packing Ring |
| 16 | Turbine Cylinder Gland Packing |
| 17 | Turbine Cylinder Cover |
| 18 | Turbine Rotor |
| 19 | Turbine Rotor Blade |
| 20 | Turbine Rotor Blade Pin |
| 21 | Turbine Rotor Shaft Key |
| 22 | Turbine Rotor Shaft Lock Washer |
| 23 | Turbine Rotor Shaft Nut |
| 24 | Turbine Bearing Bracket Oil Seal Ring (In Halves) (Governor End) |
| 25 | Turbine Rotor Shaft Thrust Collar |
| 26 | Turbine Rotor Shaft Thrust Screw |
| 27 | Turbine Bearing (In Halves) (Gov. End) |
| 28 | Turbine Bearing Bracket Cover (Gov. End) |
| 29 | Turbine Governor Hub |
| 30 | Turbine Governor Weight Fulcrum Block |
| 31 | Turbine Governor Weight Strut |
| 32 | Turbine Governor Weight Strut Retainer |
| 33 | Turbine Governor Weight Strut Seat |
| 34 | Turbine Governor Weight |
| 35 | Turbine Governor Thrust Bearing |
| 36 | Turbine Governor Thrust Bearing Housing |
| 37 | Turbine Governor Thrust Bearing Retainer Sleeve |
| 38 | Turbine Governor Spring |

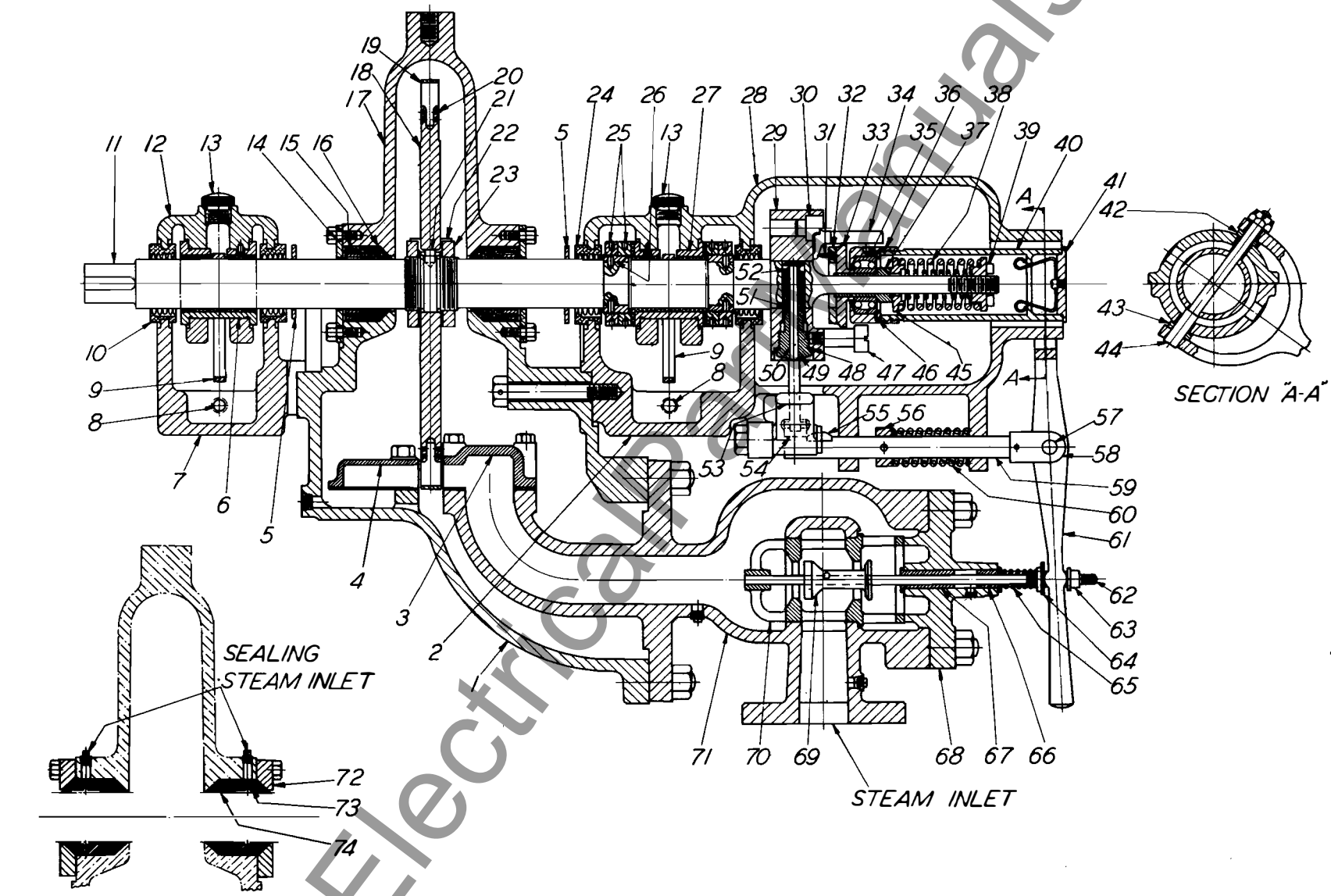
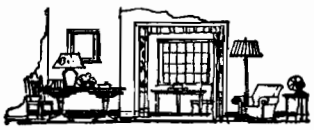



Fig. 1

LIST OF PARTS - Continued

| Item No. | Name |
|---|---|
| 39 | Turbine Governor Spring Adj. Nut |
| 40 | Turbine Governor Sleeve |
| 41 | Turbine Governor End Cover |
| 42 | Turbine Governor Lever Fulcrum Pin Spacer |
| 43 | Turbine Governor Lever Fulcrum Pin Spacer Ring |
| 44 | Turbine Governor Lever Fulcrum Pin |
| 45 | Turbine Governor Spring Seat |
| 46 | Turbine Governor Thrust Bearing Retainer Ring |
| 47 | Turbine Governor Stop Stud |
| 48 | Turbine Auto Stop Governor Retainer Lock |
| 49 | Turbine Auto Stop Governor Retainer |
| 50 | Turbine Auto Stop Governor Weight |
| 51 | Turbine Auto Stop Governor Spring Adjusting Liners |
| 52 | Turbine Auto Stop Governor Spring |
| 53 | Turbine Auto Stop Governor Trip Lever |
| 54 | Turbine Stop Governor Trip Lever Latch Plate |
| 55 | Turbine Auto Stop Governor Lever Rod Latch Plate |
| 56 | Turbine Auto Stop Governor Lever Rod Collar |
| 57 | Turbine Auto Stop Governor Lever Rod Fulcrum Pin |
| 58 | Turbine Auto Stop Governor Lever Rod Clevis |
| 59 | Turbine Auto Stop Governor Lever Rod |
| 60 | Turbine Auto Stop Governor Lever Rod Spring |
| 61 | Turbine Governor Lever |
| 62 | Turbine Governor Valve Stem |
| 63 | Turbine Governor Valve Stem Nut |
| 64 | Turbine Governor Valve Stem Spool |
| 65 | Turbine Governor Valve Stem Spring |
| 66 | Turbine Steam Chest Body Cover Bushing (Outer) |
| 67 | Turbine Steam Chest Body Cover Bushing (Inner) |
| 68 | Turbine Steam Chest Body Cover |
| 69 | Turbine Governor Valve |
| 70 | Turbine Governor Valve Cage |
| 71 | Turbine Steam Chest Body |
| 72 | Turbine Cylinder Gland Packing Plate |
| 73 | Turbine Cylinder Gland Packing Ring |
| 74 | Turbine Cylinder Gland Packing |

# Westinghouse Products



### Homes—Farms

- Air Heaters
- Auto Engine Heaters
- Automatic Irons
- Automatic Percolators
- Automatic Ranges
- Cozy Glow Heaters
- Curling Irons
- Fans
- Hot Plates
- Light and Power Plants
- Lighting Equipment
- Mazda Lamps
- Motors for
  - Buffers and Grinders
  - Ice Cream Freezers
  - Ironers and Washers
  - Refrigerators
  - Sewing Machines
  - Vacuum Cleaners
- Newel Posts
- Panelboards
- Radio Equipment
- Rectigon Chargers for Automobiles and Radio Batteries
- Rectox Trickle Charger
- Refrigerators, Electrical
- Safety Switches
- Sollaire Luminaires
- Sol-Lux Luminaires
- Solar Glow Heaters
- Table Stoves
- Tumbler Water Heaters
- Turnover Toasters
- Vacuum Cleaners
- Wall-Type Heaters
- Waffle Irons
- Warming Pads
- Water Heaters

### Buildings

- Arc Welding Equip.
- Circuit-Breakers
- Elevators and Control
- Glue and Solder Pots
- Instruments and Relays
- Kitchen Equipment
  - Bake Ovens
  - Hot Plates, Ranges
- Lighting Equipment
  - Brackets, Newels and Lanterns
  - Reflectors & Lamps
  - Sol-Lux Luminaires
- Lightning Arresters
- Micarta Trays
- Meters
- Meter Service Switches
- Motor Generators
- Motors and Control for:
  - Coal and Ash-Handling Equipment
  - Compressors
  - Elevators
  - Fans and Blowers
  - Laundry Equipment
  - Refrigerating Equip.
  - Vacuum Cleaners
  - Water & Sump Pumps
- Panelboards
- Radio Equipment
- Synchronous Converters
- Safety Switches
- Solar Glow Heaters
- Stokers
- Switchgear
- Transformers

### City Improvements

- Airport Floodlights
- Automatic Substations
- Constant Current Regulators
- Control Apparatus
- Elec. Railway Equip.
- Lighting Units
- Mazda Lamps
- Ornamental Standards
- Parkway Cables
- Street Brackets
- Streethoods

### Offices and Stores

- Air Heaters
- Bread-baking Oven
- Elevators and Control
- Fans, Desk and Exhaust
- Fuses
- Lighting Equipment
- Mazda Lamps
- Meters
- Micarta Desk Tops
- Motors for
  - Adding Machines
  - Addressing Machines
- Motors for
  - Coffee and Meat Grinders, etc.
  - Dictaphones
  - Envelope Sealers
  - Fans and Blowers
  - Pumps
  - Refrigerating Machines
- Panelboards
- Safety Switches
- Switches
- Tumbler Water Heaters

### Aviation

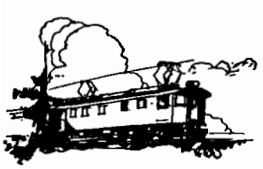
- Approach, Boundary, Hangar, and Obstruction Lights
- Arc Welding Equip.
- Floodlight Projectors
- Motor-Generators
- Reflectors
- Transformers
- Mazda Lamps
- Micarta
  - Cabin lining Plate
  - Fairleads
  - Hinge Bearings
  - Propellers
  - Pulleys
  - Tailwheels
- Radio Equipment

### Ships

- Circuit-Breakers
- Condensing Equipment
- Deck Winch Motors
- Elec. Heating Appar.
- Eng. Room Auxiliaries
- Fans and Blowers
- Fuses
- Generating Equipment
- Instruments
- Light and Power Plants
- Lighting Equipment
- Micarta Trays
- Motors and Controllers
- Ovens, Ranges and Galley Equipment
- Panelboards
- Propulsion Equipment
  - Diesel-Electric
  - Geared Turbine
  - Turbine Electric
- Radio Equipment
- Safety Switches
- Switchgear

### Electric Railways

- Arc Welding Equip.
- Automatic Substations
- Babbitt, Solder & Pots
- Baking Ovens
- Circuit-Breakers
- Elec. Trolley Coaches
- Fans
- Gas Electric Coaches
- Gears and Pinions
- Generators
- Insulating Material
- Insulators
- Lighting Fixtures
- Lightning Arresters
- Line Material
- Manual Substations
- Mazda Lamps
- Meters
- Motors and Control
- Panelboards
- Portable Substations
- Relays
- Signal Equipment
- Supervisory Control
- Switchgear
- Synchronous Convert's
- Transformers
- Trolley Poles



### Railroads

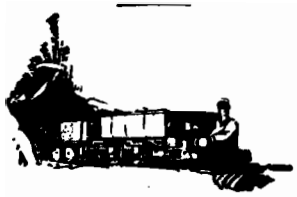
- Arc Welding Equipment
- Automatic Substations
- Babbitt, Solder & Pots
- Baking Ovens
- Battery Charging Equip.
- Cars—Multiple-Unit, Gas-Elec., Oil-Elec.
- Circuit-Breakers
- Control Apparatus
- Elec. Heating Apparatus
- Fans
- Gears and Pinions
- Generators
- Headlight Equipment
- Instruments
- Insulating Materials
- Insulators
- Lighting Equipment
- Lightning Arresters
- Line Material
- Locomotives—Electric Gas-Elec., Oil-Elec.
- Manual Substations
- Mazda Lamps
- Micarta Gears
- Motors and Control
- Outdoor Substations
- Panelboards
- Power House Apparatus
- Radio Equipment
- Safety Switches
- Signal Equipment
- Stokers
- Supervisory Control
- Switchgear
- Transformers
- Yard Lighting Equip.

### Electric Service Companies

- Automatic Switching Equipment
- Circuit breakers
- Condensers
- Cutouts
- Fans
- Frequency-converters
- Fuses
- Generators
- Instruments & Meters
- Insulating Material
- Insulators
- Line Material
- Lighting Equipment
- Lightning Arresters
- Micarta
- Motors and Control
- Motor-Generators
- Network Protectors
- Network Transformers
- Oil Testing and Purifying Equipment
- Outdoor Substations
- Panelboards
- Porcelain Insulators
- Relays
- Safety Switches
- Steam Turbines
- Stokers
- Supervisory Control
- Switchgear
- Synchronous Conden'rs
- Synchronous Conv'ters
- Transformers
- Turbine Generators
- Voltage Regulators

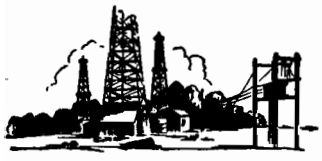
### Mills and Factories

- Arc Welding Equip.
- Automatic Starters and Controllers
- Babbitt & Babbitt Pots
- Capacitors
- Circuit-Breakers
- Condensers
- Fans, Desk and Exhaust
- Furnaces and Ovens
- Fuses
- Generating Equipment
- Insulating Materials
- Knife Switches
- Larry Car Equipment
- Lighting Equipment
- Lightning Arresters
- Locomotives—Electric Gas-Elec., Oil Elec.
- Mazda Lamps
- Meters and Relays
- Micarta Gears
- Motors and Controllers
- Panelboards
- Pipe Fittings (Struct'al)
- Power House Apparatus
- Safety Switches
- Solder & Glue Pots
- Space Heaters
- Stokers
- Switchgear
- Transformers
- Turbines



### Mines

- Arc Welding Equip.
- Auto. Feeder Equip.
- Automatic Starters and Controllers
- Automatic Substations
- Battery Charging Equip.
- Circuit-Breakers
- Clamps
- Elec. Heating Apparatus
- Fans
- Gears and Pinions
- Headlights
- Insulating Materials
- Insulators
- Larry Car Equipment
- Lightning Arresters
- Line Material
- Locomotives
- Manual Substations
- Mazda Lamps
- Meters & Instruments
- Micarta
- Motor Generators
- Motors for Hoists, Pumps, Tipples, and Breakers
- Panelboards
- Portable Substations
- Relays
- Safety Switches
- Switchgear
- Synchronous Conv'ters
- Transformers
- Ventilating Outfits



### Oil Fields

- Arc Welding Equip.
- Change House Heaters
- Floodlight Projectors
- Gear Units
- Insulators
- Mazda Lamps
- Motors and Control
- Panelboards
- Reflectors
- Rig Lighters
- Safety Switches
- Small Light Plants
- Transformers
- Vapor Proof Fixtures

# WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

## Business Addresses

### Headquarters, East Pittsburgh, Pa.

*AKRON, OHIO, 106 South Main St.
①*ALBANY, N. Y., 456 No. Pearl St.
§ALEXANDRIA, VA., 121 Frazier Ave.
*ALLENTOWN, PA., 522 Maple St.
*APPLETON, WISC., # 1 Bellaire Court
†APPLETON, WISC., 1029 So. Outagamie St.
# †*ATLANTA, GA., 426 Marietta St., N. W.
xATTICA, N. Y.
*BAKERSFIELD, CALIF., 2224 San Emedio St.
*BALTIMORE, MD., 118 E. Lombard St.
†BALTIMORE, MD., 501 East Preston Road
§BALTIMORE, MD., 40 S. Calvert St.
*BEAUMONT, TEXAS, 2293 Broadway Ave.
*BINGHAMTON, N. Y., Suite 704, Marine Midland Bldg., 86 Court St.
*BIRMINGHAM, ALA., 2030 Second Ave.
*BLUEFIELD, W. VA., 208 Bluefield Avenue
§BOISE, IDAHO, P. O. Box 1597
*BOSTON, MASS., 10 High St.
† #BOSTON, MASS., 12 Farnsworth St.
*†BRIDGEPORT, CONN., Bruce Ave. & Seymour St.
*BUFFALO, N. Y., 814 Ellicott Square
† #BUFFALO, N. Y., 1132 Seneca St.
*BURLINGTON, IOWA, 1708 River St.
*BURLINGTON, VER., 208 Park Ave.
①*BUTTE, MONTANA, 129 West Park St.
#BUTTE, MONTANA, 742 Bryant Ave.
*CANTON, OHIO, Market & Tuscarawas Sts.
*† #CHARLOTTE, N. C., 210 East Sixth St.
*CHARLESTON, W. VA., P. O. Box 865
*CHATTANOOGA, TENN., 536 Market St.
*CHICAGO, ILL., 20 N. Wacker Drive
† #CHICAGO, ILL., 2211 W. Pershing Road
xCHICOPEE FALLS, MASSACHUSETTS
*† #CINCINNATI, OHIO, 207 West Third St.
*†x #CLEVELAND, OHIO, 1216 West Fifty-Eighth St.
§COLUMBIA, S. C., 912 Lady Sr.
*COLUMBUS, OHIO, Gay & Third Sts.
*DALLAS, TEXAS, 209 Browder St.
#DALLAS, TEXAS, 1712 Carter St.
*DAVENPORT, IOWA, 206 E. Second St.
*DAYTON, OHIO, 30 North Main St.
①*DENVER, COLORADO, 910 Fifteenth St.
#DENVER, COLORADO, 1700 Sixteenth St.
①†DENVER, COLORADO, 988 Cherokee St.
xDERRY, PA.
*DES MOINES, IOWA, 523 Sixth Ave.
*† #DETROIT, MICH. 5757 Trumbull Ave.
*DULUTH, MINN., 10 East Superior St.
*EL PASO, TEXAS, 303 N. Oregon St.
#EL PASO, TEXAS, 450 Canal St.
§EL PASO, TEX., % Zork Hdwe. Co., 309 N. El Paso St.
# *EMERYVILLE, CALIF., 5815 Peladeau St.
†EMERYVILLE, CALIF., 1466 Powell St.
xEMERYVILLE, CALIF., 6161 Green St.
*ERIE, PA., 1003 State St.
*EVANSVILLE, IND., 201 N. W. First St.
*†FAIRMONT, W. VA., 602 Cleveland Ave.
§FARGO, N. D., 319—12 Ave. N.
*FORT WAYNE, IND., 1010 Packard Ave.
*FORT WORTH, TEXAS, 501 Jones St.
*GARY, IND., 701 Washington St.
*GRAND RAPIDS, MICH., 507 Monroe Ave. N. W.
*GREENSBORO, N. C. { P.O. Box 1828 (Mail) 108 S. Park Drive (Telegrams)
*GREENVILLE, S. C., West Earle St.
*HAMMOND, IND., 235 167th St.
*HARTFORD, CONN., Main & Pearl Sts.
*HONOLULU, T. H., Hawaiian Elec. Co. Agt.
*HOUSTON, TEXAS, 1314 Texas Ave.
#HOUSTON, TEXAS, 2313 Commerce Ave.
†HOUSTON, TEXAS, 2315 Commerce Ave.
①*† #HUNTINGTON, V. VA., 1029 Seventh Ave.
*INDIANAPOLIS, IND., 137 S. Penna. Ave.
†INDIANAPOLIS, IND., 551 West Merrill St.
*ISHPEMING, MICH. 433 High St.
*JACKSON, MICH., 212 West Michigan Ave.
*†JOHNSTOWN, PA., 47 Messenger St.
①*JOPLIN, MO., 420 School St.
①*KANSAS CITY, MO., 101 W. Eleventh St.
①†KANSAS CITY, MO., 2124 Wyandotte St.
*KNOXVILLE, TENN., Gay & Clinch St.
xLIMA, OHIO
*LITTLE ROCK, ARK., 1115 West 24th St
§LITTLE ROCK, ARK., % Fones Bros. Hdwe., 2nd & Rock Sts.
*† #LOS ANGELES, CALIF., 420 So. San Pedro St.
*LOUISVILLE, KY., 332 West Broadway
*MADISON, WISC., 508 Edgewood Ave.
xMANSFIELD, OHIO, 200 East Fifth St.
①*MARSHALL, TEXAS, 504 Nathan St.
*MEMPHIS, TENN., 130 Madison Ave.
*MIAMI, FLA., 1036 N. Miami Ave.
*MILWAUKEE, WISC., 546 North Broadway
†MILWAUKEE, WISC., 1669 N. Water St.
*† #MINNEAPOLIS, MINN., 2303 Kennedy St., N. E.
*MONROE, LA., 1301 N. Fourth St.
*NASHVILLE, TENN., 219 N. Second Ave.
*NEWARK, N. J., 1180 Raymond Blvd.
† #NEWARK, N. J., Haynes Ave. & Lincoln Highway
xNEWARK, N. J., Plane & Orange St.
*NEW HAVEN, CONN., 42 Church St.
†*NEW ORLEANS, LA., 333 St. Charles St.
#NEW ORLEANS, LA., 527 Poydras St.
*NEW YORK, N. Y., 150 Broadway
†NEW YORK, N. Y., 460 West Thirty-Fourth St.
*NIAGARA FALLS, N. Y., 205 Falls St.
*NORFOLK, VA., 254 Tazewell St.
*OKLAHOMA CITY, OKLA., 10 E. California St.
#OKLAHOMA CITY, OKLA., Third & Alic Sts.
*OMAHA, NEB., 409 South Seventeenth St.
§OMAHA, NEB., 117 N. 13th St.
*PEORIA, ILL., 104 E. State St.
*† #PHILADELPHIA, PA., 3001 Walnut St.
*PHOENIX, ARIZONA, 11 West Jefferson St.
xPITTSBURGH, PA., Nuttall Works, 200 McCandless Ave.
①*PITTSBURGH, PA., 306 4th Ave., Box 1017
① # †PITTSBURGH, PA., 543 N. Lang Ave.
①*PORTLAND, MAINE, 142 High St.
*PORTLAND, OREGON, 309 S. W. Sixth Ave.
†PORTLAND, OREGON, 2138 N. Interstate Ave.
#PORTLAND, OREGON, 720 N. Thompson St.
*†PROVIDENCE, R. I., 16 Elbow St.
*RALEIGH, N. C., 803 North Person St.
§RALEIGH, N. C., 322 S. Harrington St.
§READING, PA., 619 Spruce St.
*RICHMOND, VA., Fifth & Byrd
*§ROANOKE, VA., 726 First St., S. E.
*†ROCHESTER, N. Y., 410 Atlantic Ave.
*ROCKFORD, ILL., 130 South Second St.
①*SACRAMENTO, CALIF., 1805 20th St.
*SALT LAKE CITY, UTAH, 10 West First South St.
† #SALT LAKE CITY, UTAH, 346 A Pierpont Ave.
§SALT LAKE CITY, UTAH. 235 W. S. Temple
①*SAN ANTONIO, TEXAS, 115 W. Travis St.
*SAN FRANCISCO, CALIF., 1 Montgomery St.
*SEATTLE, WASH., 603 Stewart St.
† #SEATTLE, WASH., 3451 East Marginal Way
xSHARON, PA., 469 Sharpsville Ave.
*SIOUX CITY, IOWA, 2311 George St.
*SOUTH BEND, IND., 216 East Wayne St.
§SOUTH BEND, IND., 107 E. Jefferson St.
xSOUTH PHILA. WKS., Essington, Pa.
*SOUTH PHILA. WKS., P. O. Box 7348, Philadelphia, Pa.
*SPOKANE, WASH., So. 158 Monroe St.
①*SPRINGFIELD, ILL., 601 E. Adams St., Box 37
*†SPRINGFIELD, MASS., 395 Liberty St.
xSPRINGFIELD, MASS., 653 Page Boulevard
*ST. LOUIS, MO., 411 North Seventh St.
† #ST. LOUIS, MO., 717 South Twelfth St.
xST. LOUIS, MO., 3850 Bingham Ave.
*SYRACUSE, N. Y., 420 N. Geddes St.
*TACOMA, WASH., 1023 "A" St.
*TAMPA, FLA., 417 Ellamae Ave., Box 230
*TOLEDO, OHIO, 245 Summit St.
*TULSA, OKLA., 303 East Brady St.
*† TICA, N. Y., 113 N. Genesee St.
*WASHINGTON, D. C., 1434 New York Ave., N. W.
*WATERLOO, IOWA, 328 Jefferson St., P. O. Box 598.
*WICHITA, KAN., 233 So. St. Francis Ave.
*†WILKES-BARRE, PA., 267 N. Pennsylvania Ave.
*†WORCESTER, MASS., 32 Southbridge St.
*YORK, PA., 143 So. George St.
*YOUNGSTOWN, OHIO, 25 E. Boardman St.

* Sales Office † Service Shop x Works # Warehouse ° First Class Mail Only § Merchandising Products Only z Headquarters

# WESTINGHOUSE ELECTRIC SUPPLY COMPANY AND AGENT JOBBERS

**Fully equipped sales offices and warehouses are maintained at all locations**

ABILENE, KAN., Union Electric Co.
AKRON, OHIO, The Moock Electric Sup. Co.
①ALBANY, N. Y., 456 No. Pearl St.
ALLENTOWN, PA., 522 Maple St.
ATLANTA, GA., 96 Poplar St., N. W.
AUGUSTA, MAINE, 90 Water St.
BALTIMORE, MD., 40 South Calvert St.
BANGOR, MAINE, 175 Broad St.
BINGHAMTON, N. Y., 87 Chenango St.
BIRMINGHAM, ALA., Moore-Handley Hdwe. Co.
BLUEFIELD, W. VA., Superior-Sterling Co.
BOSTON, MASS., 76 Pearl St.
BUFFALO, N. Y., McCarthy Bros. & Ford
BURLINGTON, VT., 208 Flynn Ave.
BUTTE, MONTANA, 50 East Broadway
CANTON, OHIO, The Moock Electric Sup. Co.
CHARLOTTE, N. C., 210 East Sixth St.
‡CHATTANOOGA, TENN., Mills & Lupton Sup. Co.
CHICAGO, ILL., 113 North May St.
CHICAGO, ILL., Hyland Electrical Sup. Co.
CINCINNATI, OHIO, The Johnson Electric Sup. Co.
CLEVELAND, OHIO, 3950 Prospect Ave.
COLUMBIA, S. C., 915 Lady St.
§COLUMBUS, OHIO, The Hughes Peters Elec. Corp.
COLUMBUS, OHIO, Pixley Electric Sup. Co.
DALLAS, TEXAS, 409 Browder St.
‡DENVER, COL., The Mine & Smelter Sup. Co.
①DES MOINES, IOWA, 218 W. Second St.
①DETROIT, MICH., 547 Harper Ave.
DULUTH, MINN., 308 W. Michigan St.
EL PASO, TEX., Zork Hardware Co.
ERIE, PA., Stat Electrical Co.
EVANSVILLE, IND., 201 N. W. First St.
FLINT, MICH., 1314 N. Saginaw St.
FORT WORTH, TEXAS, 501 Jones St.
GRAND RAPIDS, MICH., 507 Monroe Ave., N. W.
GREENVILLE, S. C., 200 River St.
HOUSTON, TEXAS, 1903 Ruiz St.
HUNTINGTON, W. VA., Banks-Miller Sup. Co.
INDIANAPOLIS, IND., 137 So. Pennsylvania Ave.
JACKSONVILLE, FLA., 37 South Hogan St.
KANSAS CITY, MO., Columbian Elec'l Co.
①KANSAS CITY, MO., Continental Elec. Co.
LOS ANGELES, CALIF., 905 East Second St.
LOUISVILLE, KY., Tafel Electric Co.
MADISON, WISC., 1022 E. Washington Ave.
MIAMI, FLA., 1036 North Miami Ave.
MEMPHIS, TENN., 366 Madison Ave.
MILWAUKEE, WISC., 546 N. Broadway
MINNEAPOLIS, MINN., 215 South Fourth St.
MONROE, LA., Monroe Hardware Co.
‡NASHVILLE, TENN., Tafel Electric Co.
NEWARK, N. J., 49 Liberty St.
NEW HAVEN, CONN., 240 Cedar St.
NEW ORLEANS, LA., Electrical Sup. Co.
NEW YORK, N. Y., 150 Varick St.
NEW YORK, N. Y., Times Appliance Co., Inc.
NORFOLK, VA., 254 Tazewell St.
OAKLAND, CALIF., Tenth & Alice Sts.
OKLAHOMA CITY, OKLA., 10 E. California St.
OMAHA, NEB., 117 North Thirteenth St.
PEORIA, ILL., 104 East State St.
PHILADELPHIA, PA., 1101 Race St.
PHOENIX, ARIZONA, 315 West Jackson St.
PITTSBURGH, PA., Iron City Electric Co.
PORTLAND, OREGON, 134 N. W. Eighth Ave.
PROVIDENCE, R. I., 66 Ship St.
RALEIGH, N. C., 322 S. Harrington St.
READING, PA., 619 Spruce St.
RICHMOND, VA., 301 South Fifth St.
ROANOKE, VA., 726 First St., S. E.
ROCHESTER, N. Y., 240 St. Paul St.
ST. LOUIS, MO., 1011 Spruce St.
ST. PAUL, MINN., 145 East Fifth St.
①SACRAMENTO, CALIF., 1805 20th St.
SALT LAKE CITY, UTAH, 235 West South Temple St.
SAN ANTONIO, TEXAS, 1201 E. Houston St.
SAN DIEGO, CALIF., The Electric Supply Co.
SAN FRANCISCO, CALIF., 260 Fifth St.
SCRANTON, PA., Penn. Elect'l Engineering Co.
SEATTLE, WASH., 558 First Ave., South
SIOUX CITY, IOWA, 1005 Dace St.
SPOKANE, WASH., 152 So. Monroe St.
SPRINGFIELD, MASS., 46 Hampden St.
SYRACUSE, N. Y., 961 W. Genesee St.
TAMPA, FLA., 417 Ellamae St.
TOLEDO, OHIO, 812 Lafayette St.
TRENTON, N. J., 245 N. Broad St.
TULSA, OKLA., 303 East Brady St.
UTICA, N. Y., 113 N. Genesee St.
WASHINGTON, D. C., 1216 "K" St., N. W.
WATERLOO, IOWA, 328 Jefferson St.
WICHITA, KANSAS, 233 So. St. Francis St.
WILMINGTON, DEL., 216 E. Second St.
WORCESTER, MASS., 24 Southbridge St.
YORK, PA., 143 S. George St.
YOUNGSTOWN, OHIO, Moock Elec. Sup. Co.

§ Merchandising Products Only ‡ Apparatus Products Only.
① Changed or added since previous issue.

April, 1937