THIS BOOK WILL HELP YOUR OPERATOR SEE THAT HE GETS IT

Instruction Book 84591B

Supersedes 84591A

MOTOR-DRIVEN AIR COMPRESSORS

Self-lubricating, Center Gear Type
CP-25, -27, -28, -29, -30
CP-127, -128, -130

When ordering supplies specify "General Electric"

GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.
JUNE, 1921

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Westinghouse
Type 225
G.E. Valves S.L.1

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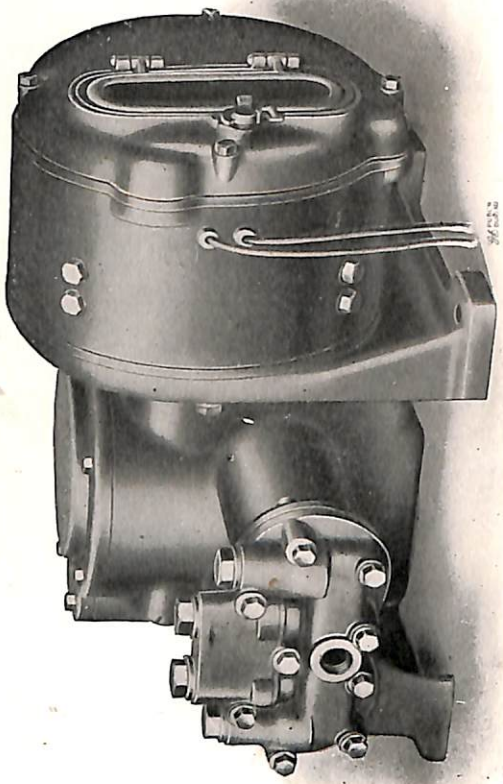

Fig. 1. CP-27-A Air Compressor

MOTOR-DRIVEN AIR COMPRESSORS

Self-lubricating, Center Gear Type CP-25, -27, -28, -29, -30 CP-127, -128, -139

INSPECTION

The motor-driven air compressors covered by this instruction book require very little attention but nevertheless should receive car barn inspection at regular intervals.

Fig. 4 shows the underside of the compressor as viewed from a pit. The oil drain "C" located at the junction of the motor frame and compressor frame does not normally discharge oil, but is provided as a safety device to permit the oil to escape in case the oil does not return properly to the crank chamber.

If oil appears on the compressor frame immediately below drain "C," the vent pipe "D" should be examined and thoroughly cleaned out if it is found in a clogged condition. A short piece of wire with its end bent at a right angle is commonly used for this purpose. In the absence of this, a long bladed screw driver or a clean stick will answer the purpose. In cleaning out the vent pipe care should be taken to draw any dirt which may have accumulated out at the bottom instead of pushing it up through the top into the crank chamber. A record should be kept of a compressor found in this condition, and if at the next regular inspection oil has reappeared on the compressor frame below drain "C," the ½-in. pipe plug "A" should be removed and the oil passage between the motor and crank chamber thoroughly cleaned out. When the oil fails to return properly to the crank chamber, it will usually be found that the trouble is due to the vent pipe being clogged, and it is, therefore, recommended that an examination of this vent pipe be made a part of regular inspection regardless of whether there is an accumulation of oil on the compressor frame below drain "C" or not. The general arrangement of the oil return passage is shown in Fig. 10. Instances where this passage has become clogged with sediment are very rare.

A ¾-in. pipe plug "E" is located at the bottom of a settling well between the armature shaft bearings. This plug should be removed and any sediment which may have collected drawn off at regular intervals of once a year or less. The upper end of this settling well is designated as "E" in Fig. 7.

The cap on the oil filler elbow should be removed at every regular inspection to observe the oil level in the crank chamber, although under average conditions it will only be necessary to add fresh oil on every third or fourth inspection.

Examination of commutator and brushes should be made a part of the regular inspection. Free access to these parts is provided through a door in the frame head.

CARE

LUBRICATION

After first oiling a new compressor, the machine should be operated for a few minutes to fill the various pockets in the crank chamber. The

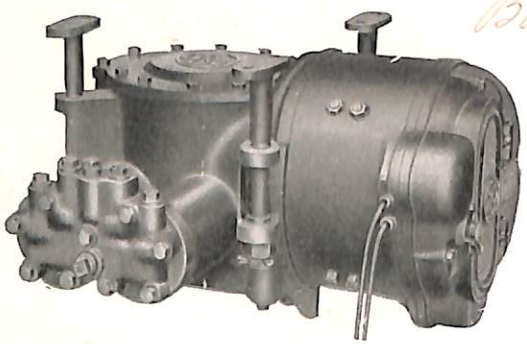

Fig. 2. Type CP-25-C Air Compressor

oil level should then be brought nearly to the top of the oil filling elbow. This elbow is placed low on the side of the crank case near the motor. Its height is such that it serves as an oil gauge. The maximum height of oil in the crank chamber being when the oil stands level with the top of the elbow. The compressor will be lubricated properly when the oil level is much lower than this. As stated in the previous section, the inspector should observe the oil level in the elbow at each regular inspection. Whenever he finds that the oil level has dropped approximately ⅜-in. below the top of the elbow, it is advisable, as a regular matter of routine, to add oil, bringing the oil level back to approximately ⅛-in. below the top of the elbow. Under ordinary conditions this will only require the addition of oil once in several inspections. All bearings are lubricated from the oil well in the bottom of the crank chamber. The system of distribution and return of the oil is shown in Fig. 5, 7, 8 and 10.

A high grade oil especially adapted for use in air cooled railway type air compressors should be used.

AIR INTAKE

It is very important that the air taken into the compressor should be clean and free from any grit in order to insure good operation of the valves and to prevent wear and cutting of the working parts. When the compressor is mounted under the car, the intake strainer should be

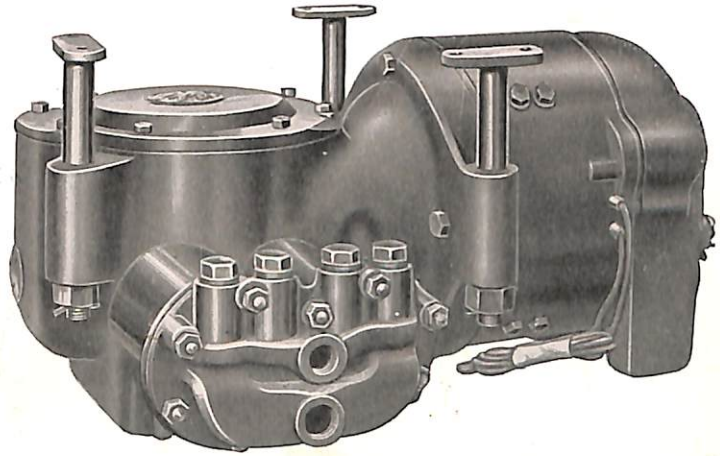

Fig. 3. Type CP-127-B Air Compressor

located inside of the car. If the compressor is used for stationary work, special attention should be given to locating the intake strainer in some place where the air is relatively clean. The strainer should be cleaned occasionally to remove any accumulation of dirt.

CLEANING

The period of operation before cleaning depends upon the service required of the compressor. The motor can be blown out by removing the motor frame head and using an air blast. This can be done without removing the compressor from under the car. When the motor frame head is removed there is free access to the motor and the brush-holders may be adjusted or replaced.

It is recommended that the compressor be taken from under the car before removing the crank chamber cover, this in order to prevent dirt from dropping into the crank chamber from the underside of the car. The large opening in the crank case permits easy access to the bearings and other parts.

COMPLETE DISASSEMBLING

Any occasion for the removal of all parts of this compressor should be very infrequent on account of the very efficient lubrication and liberal proportions of the parts. The arrangement of parts is such that any one part can be removed with very little disturbance of the other parts. The following paragraphs give instructions for taking out all

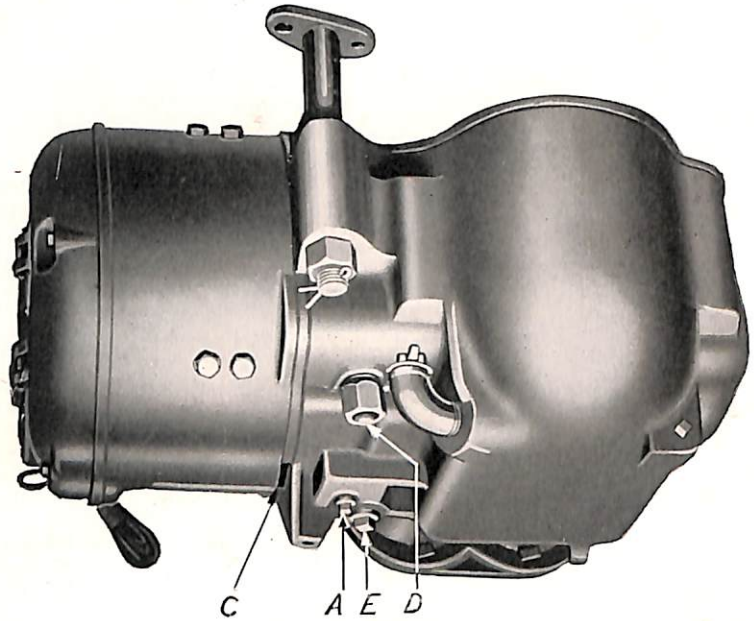

Fig. 4. Type CP-27-B Air Compressor View from Below

parts of the compressor. Each step in this complete disassembly is numbered and the few necessary steps for removing any single part are noted by number under the heading "sequence of operations for removing single members."

1. Place a block under the feet at the motor end of the compressor. This will cause the oil in the pocket between the armature bearings to drain back the crank chamber instead of flowing into the motor when the armature is removed. (See Fig. 7.)
2. Remove the motor frame head.
3. Turn back the brush-holders by removing one tap bolt in each and loosening the other.

4. Remove the crank chamber cover.
5. Loosen the valve chamber plugs.
6. Remove the cylinder head.
7. Uncouple the connecting rod of one piston at the crank shaft. (Fig. 8.) Turn the crank shaft by meads of the armature until the connecting rod can be lowered to the bottom of the crank chamber. Turn the hinge bolt until it rests along the top of connecting rod.

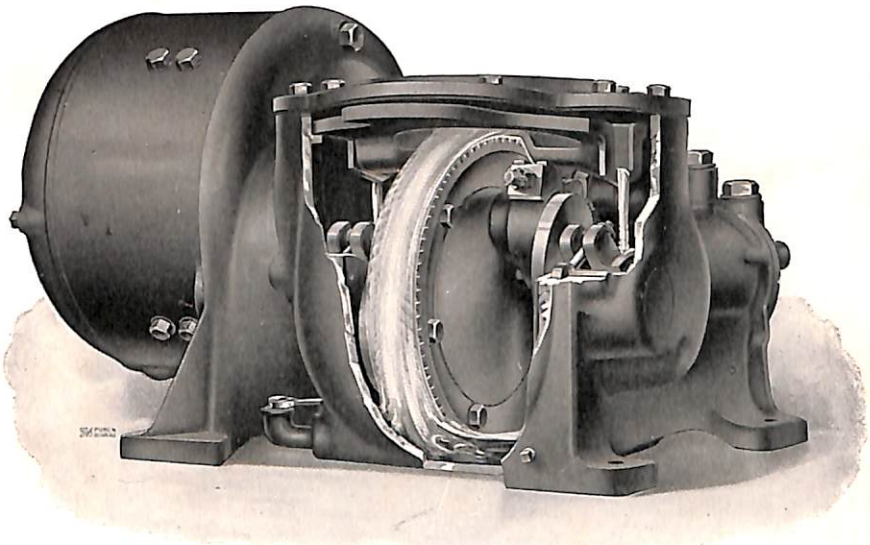

Fig. 5. Type CP-27 Air Compressor Showing Method of Lubrication

8. Push out the piston from the cylinder. Each piston snap ring will remain in its own groove without special precautions. In case the compressors are fitted with sectional piston rings, such as were used some years ago, special care must be taken to prevent the piston rings from springing out of their grooves, as it is important that each section be kept in its own circle and each circle in its own place. Each circle of three sections has its sections numbered on each end. Ends with the same numbers should be assembled together. Each circle of three sections must be kept separate from other circles in order to benefit by the numbers on the ends of the sections. The shims, half round washer and nuts should be replaced on the hinge bolt of the connecting rod in case these have been removed.

9. Place an open end wrench on the pinion nut, allowing the wrench to rest against the compressor frame. A wrench should then be used on the commutator end of the armature shaft to turn the shaft out of the pinion nut. One blow of a hammer on this wrench is usually necessary to start the nut. As the shaft is unscrewed from the nut,

Fig. 6. Air Compressor Intake Strainer

the nut travels back against the stop plug and then acts with the shaft and stop plug as a jack screw to force the shaft out of the taper fit in the pinion.

10. The armature is now entirely free and can be taken out. The pinion nut and lock washer and the thrust collar should be picked up before the armature shaft is wholly withdrawn from the pinion.

11. Loosen the nuts and turn back the hinge bolts and bearing caps of the crank shaft. (Fig. 8.) Lift out the crank shaft, gear and the crank shaft linings.

12. The field coils can be removed by disconnecting the leads and unscrewing the tap bolts that hold the poles in place on the magnet frame.

13. The armature bearing linings can be removed by turning out the screw dowels (Fig. 7) and forcing the linings out with draw bolts.

14. The wrist pin can be driven out by removing the screw dowel. Care must be taken to drive this pin out from the end which has no dowel, as the fit in the piston is larger on the dowel end.

15. If the valves are removed, care should be taken to return each to its proper place. The intake valve has a vent in the bottom and the delivery valve a vent in the side.

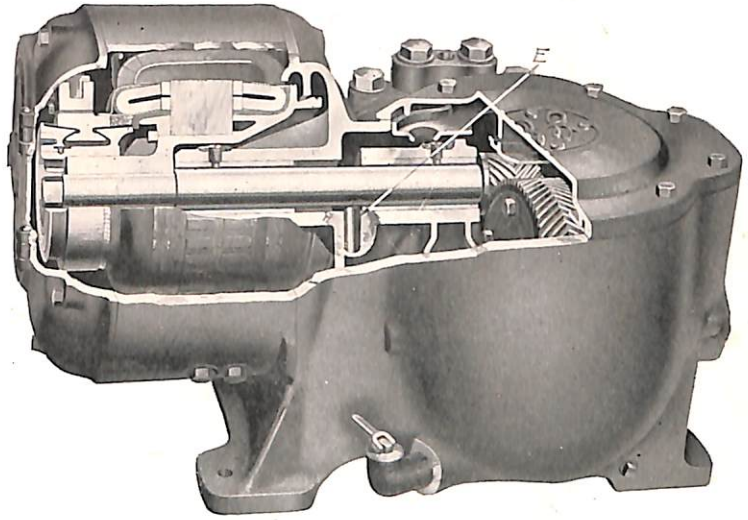

Fig. 7. Type CP-27 Air Compressor, Section View Showing Motor End

SEQUENCE OF OPERATIONS FOR REMOVING SINGLE MEMBERS

Armature removal—Use steps 1, 2, 3, 4, 9, 10.

Field coil removal—Use steps 1, 2, 3, 4, 9, 10, 12.

Gear and crank shaft removal—Use steps 1, 2, 3, 4, 7, 9, 11, slide the armature along so that the shaft will clear the gear, lift out the gear and crank shaft.

Piston and connecting rod removal—Use steps 4, 6, 7, 8.

OVERHAULING

When overhauling the compressor, it is recommended that the frame be washed out with kerosene or gasolene to remove all grit and oil. There are three pipe plugs which should be removed. One is at

the bottom of the settling well between the armature bearings (see "E," Fig. 4, the top of the settling well is designated "E" on Fig. 7); the second plug is under the passage where the oil, thrown off by the bell end of the armature, returns to the crank chamber (see "A," Fig. 4 and 10); the third is in the side of the crank chamber, near the crank shaft bearing which is farthest from the motor (see "B" on Fig. 10).

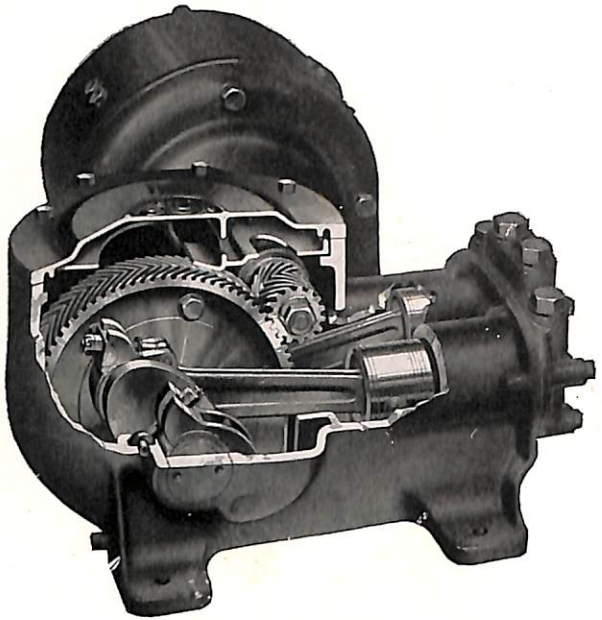

Fig. 8. CP-27 Air Compressor, Section View Showing Compressor End

The stop plug used in forcing the shaft from the pinion should not be removed unless it becomes necessary to take out the armature bearing linings.

The cylinder head should be carefully washed out with kerosene or gasolene.

RE-ASSEMBLY

The various operations for re-assembling should be performed in the reverse order to that given above with the following precautions: See that all pipe plugs are set tight. Try the crank shaft when setting

up the nuts on the hinge bolts to make sure they are not set tight enough to cause the shaft to run hot; neither should these nuts be loose enough to allow the bearings to move in their seats. Make sure that

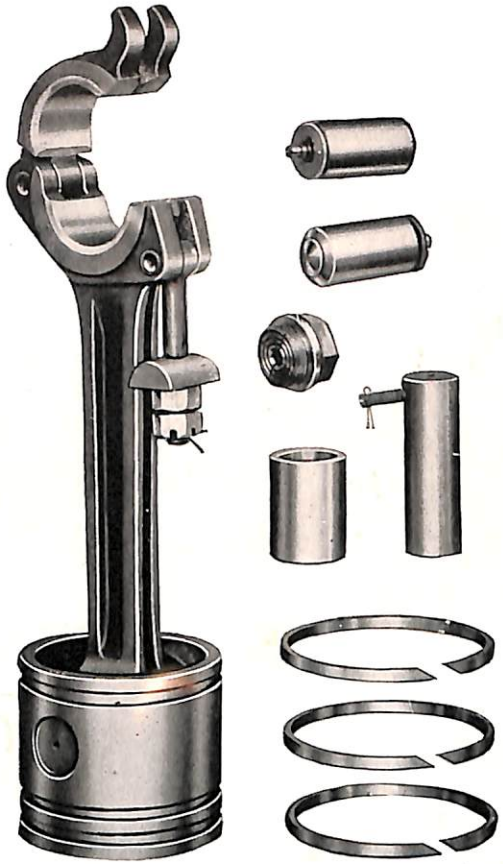

Fig. 9. Piston, Piston Rings, Valves, Connecting Rods, for CP-27 Air Compressor

the thrust collar is not caught between the shoulder at the end of its seat and the pinion. This collar should be perfectly free to move on its seat on the shaft. Compress each piston ring flush with the piston before inserting it in the cylinder so that the side of the ring will not be injured by driving it against the cylinder end. Adjust the rods until

a sufficient freedom is obtained to avoid heating without allowing an amount of play which will result in pounding. This can be determined by moving the rods sidewise on the crank pins and by turning the crank shaft. One or more of the original shims should be removed when wear will permit. Correct adjustment is important to give satisfactory operation.

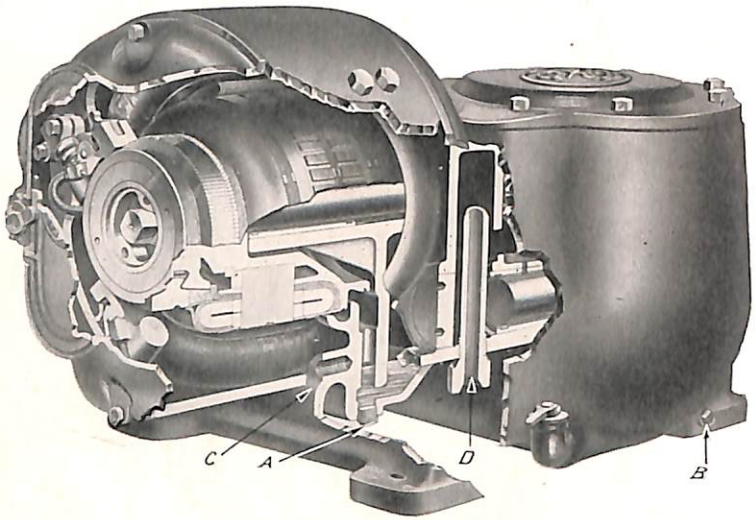

Fig. 10. Type CP-27-A Air Compressor Showing Vent Pipe and Oil Return to Crank Chamber

The surface of the crank chamber cover and the corresponding surface of the crank chamber should be shellacked and assembled with the gasket while the shellac is still wet. Any part of the old gasket which may have adhered to the surface should be removed.

As previously stated it is important to keep each valve in its own place. Valves are often re-ground when there is no occasion for it. In case there is any doubt about the valve action, the valves and cylinder head should be thoroughly cleaned and then tried again. In case it is necessary to regrind, it is well to use a valve seat hand reamer (Fig. 14) to scrape the valve seat to its original form and grind the small amount necessary to produce a seat. Excessive grinding distorts the shape of the valve seat from concave to convex and causes unsatisfactory valve action.

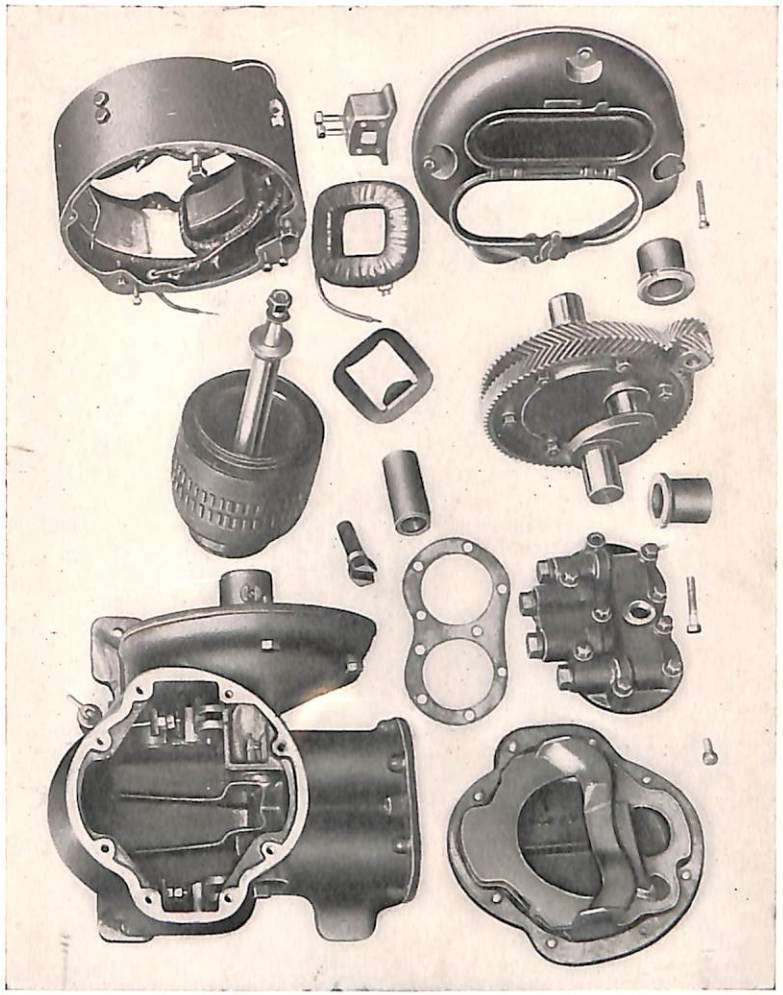

Fig. 11. Type CP-27-A Air Compressor Disassembled

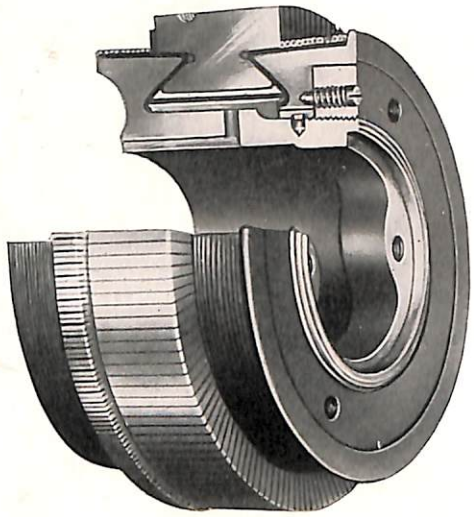

Fig. 12. Commutator for Type CP-27 Air Compressor

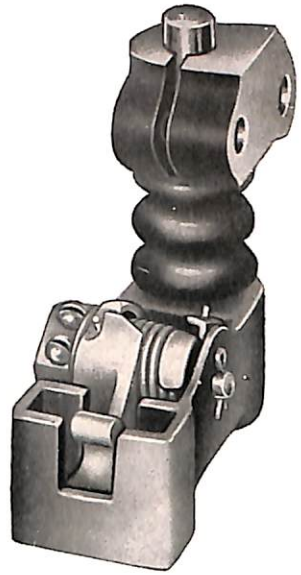

Fig. 13. Brush-holder for Type CP-27 Air Compressor

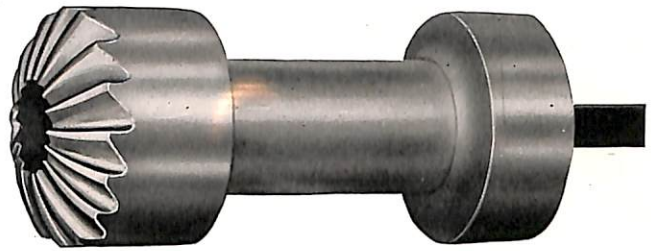

Fig. 14. Valve Seat Reamer for Air Compressor

CONNECTION DIAGRAMS

Connection diagrams applying to the 600- and 1200-volt direct current compressor motors of the various types are given herewith. Connection diagrams for motors of other types will be furnished on application.

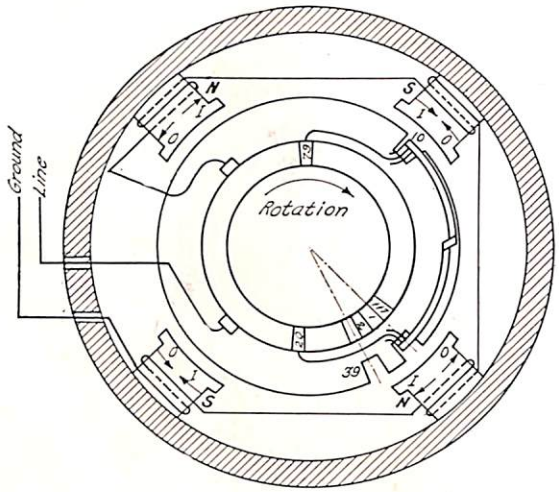

Fig. 15. Connections of Armature and Field Winding for CP-25, 600-volt Air Compressor

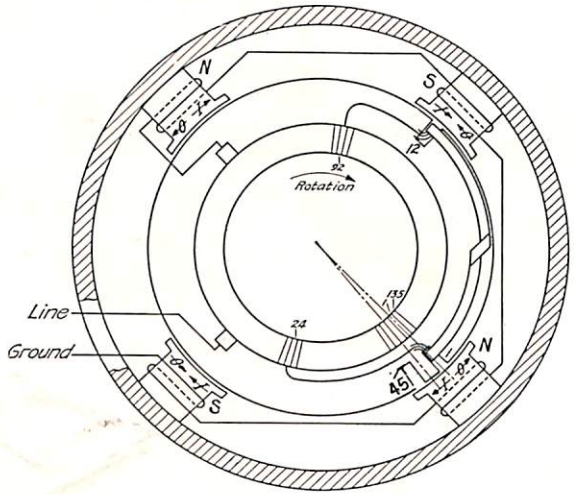

Fig. 16. Connections of Armature and Field Winding for CP-27, 600-volt Air Compressor

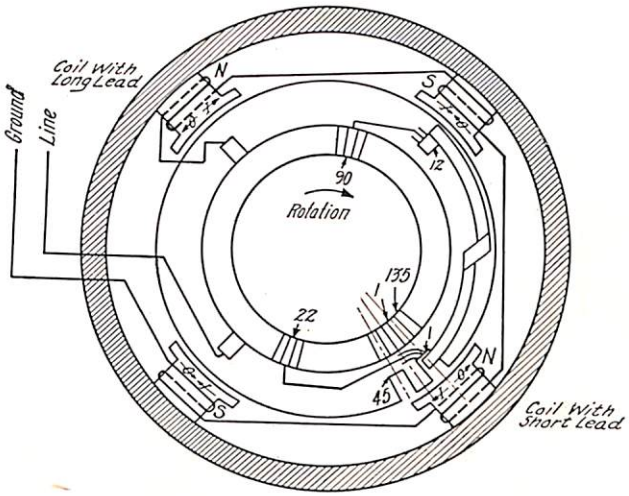

Fig. 17. Connections of Armature and Field Winding for CP-28, 600-volt Air Compressor

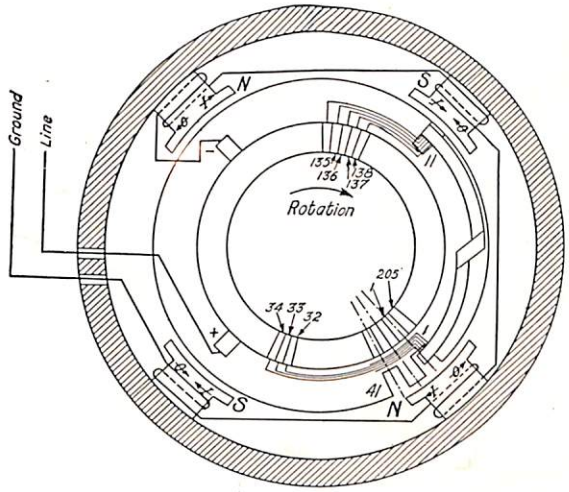

Fig. 18. Connections of Armature and Field Winding for CP-29 and CP-30, 1200-volt Air Compressor

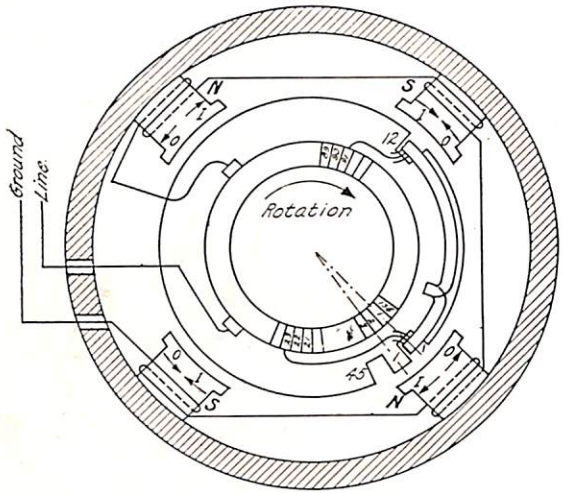

Fig. 19. Connections of Armature and Field Winding for CP-30, 600-volt Air Compressor

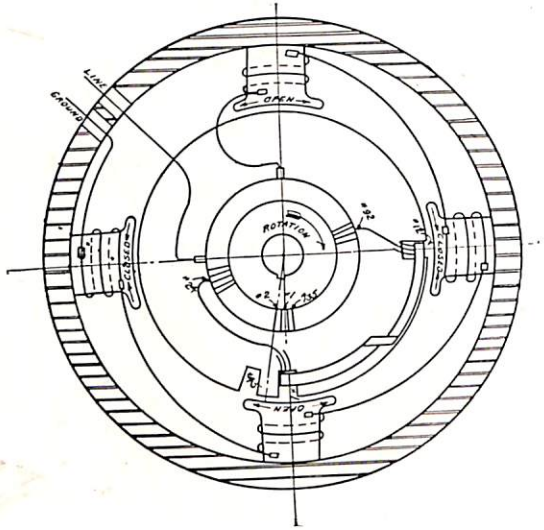

Fig. 20. Connections of Armature and Field Winding for CP-127, 600-volt Air Compressor

INDUCTION MOTOR-DRIVEN AIR COMPRESSORS, CPT-27, -28, and 30

All of the instructions given in the preceding pages for the care and handling of the railway type compressors will apply equally to industrial types so far as the compressor ends of the units are concerned.

An unloader has been developed which can be furnished for use with induction motor-driven industrial air compressor sets. It is very important that an unloader be included in each installation unless the power supply conditions from which the compressor set is to operate

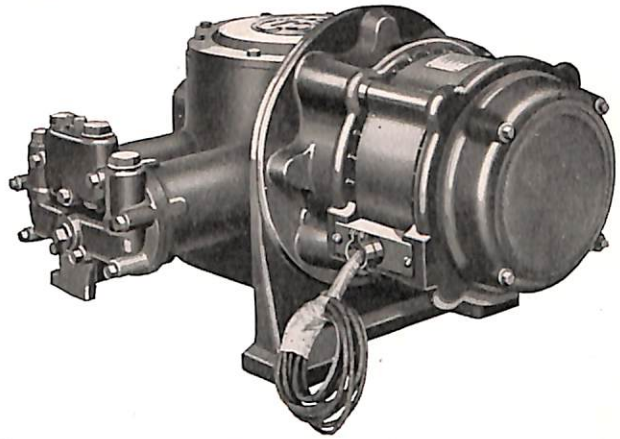

Fig. 21. CPT-28-B Air Compressor

are exceptionally favorable. The reason for the use of the unloader is that the compressor motor when starting up the compressor against its normal load pressure, requires for a fraction of a second at start, several times more than its normal power supply. The unloader assists the motor by reducing the delivery pipe to atmospheric pressure whenever the governor cuts out the compressor regardless of whatever pressure may be maintained in the reservoir or any part of the system on the other side of the unloader.

We recommend the use of unloaders unless the user is absolutely sure that the conditions of installation are such as will maintain full voltage across the motor terminals at the momentary peak demand when the compressor is starting up against load.

The induction motors are of a very simple and sturdy construction and trouble rarely occurs in their operation. Instruction card No. IC81300-C which covers Type K polyphase induction motors will be furnished on application.

The construction of these compressors is shown in Fig. 21 and 22.

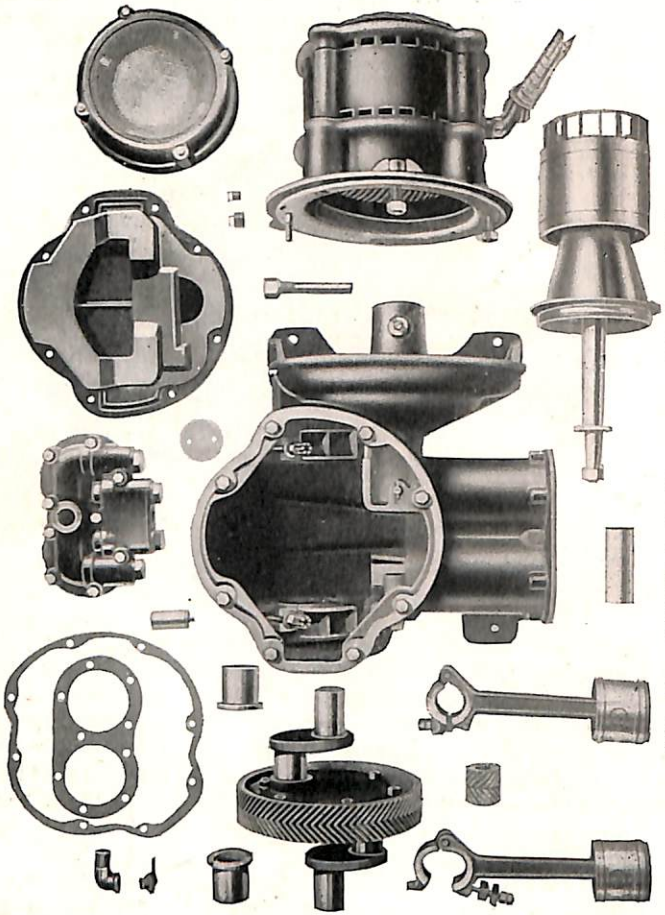

Fig. 22. CPT-28-B Air Compressor Disassembled

GENERAL ELECTRIC COMPANY

GENERAL OFFICE: SCHENECTADY, N. Y.

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Cleveland, Ohio	Illuminating Building
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Denver, Colo.	U. S. National Bank Building
Des Moines, Iowa	Hippee Building
Detroit, Mich.	Dime Savings Bank Building
Duluth, Minn.	Fidelity Building
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Erie, Pa.	Commerce Building
Fort Wayne, Ind.	1600 Broadway
Grand Rapids, Mich.	Commercial Savings Bank Building
Hartford, Conn.	Hartford National Bank Building
Indianapolis, Ind.	Traction Terminal Building
Jacksonville, Fla.	Graham Building
Joplin, Mo.	Miners Bank Building
Kansas City, Mo.	Dwight Building
Knoxville, Tenn.	Burwell Building
Little Rock, Ark.	Southern Trust Building
Los Angeles, Calif.	Corporation Building, 724 S. Spring Street
Louisville, Ky.	Starks Building
Memphis, Tenn.	Exchange Building
Milwaukee, Wis.	Public Service Building
Minneapolis, Minn.	410 Third Ave., North
Nashville, Tenn.	Stahlman Building
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New Haven, Conn.	Second National Bank Building
New Orleans, La.	Maison Blanche Building
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Niagara Falls, N. Y.	Gluck Building
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Providence, R. I.	Turks Head Building
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Rochester, N. Y.	Granite Building
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Salt Lake City, Utah	Newhouse Building
San Francisco, Calif.	Rialto Building
Seattle, Wash.	Colman Building
Spokane, Wash.	Paulsen Building
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Syracuse, N. Y.	Onondaga County Savings Bank Building
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