INSTRUCTIONS GEH-52C

MOTOR-DRIVEN AIR COMPRESSORS

SELF-LUBRICATING, CENTER GEAR
TYPES CP-25, 27, 28, 29, 30, 127, 128, 130

GENERAL ELECTRIC
SCHENECTADY, N.Y.

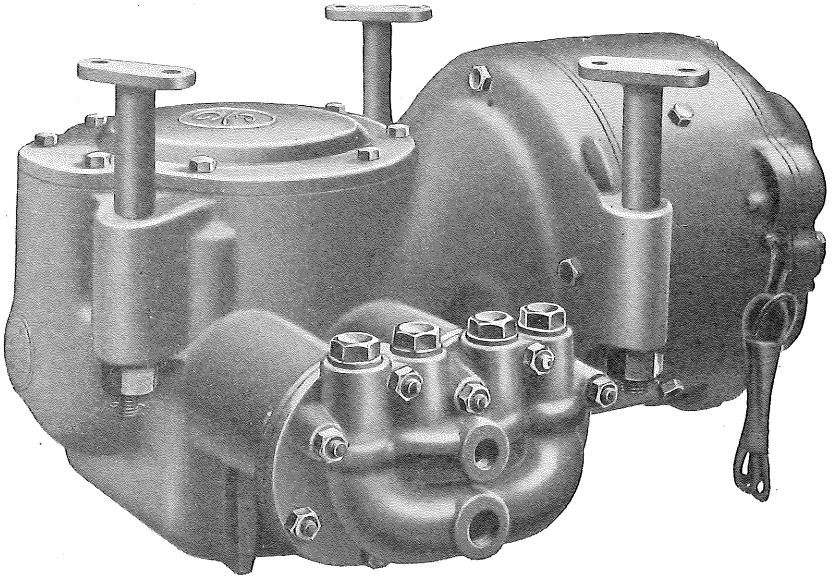


Fig. 1. Air Compressor with Three-point Tee-bolt Suspension

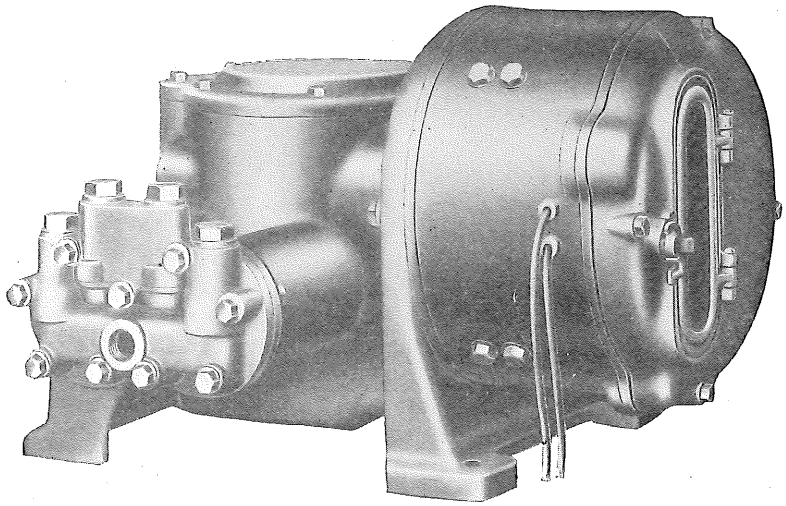


Fig. 2. Air Compressor with Feet

MOTOR-DRIVEN AIR COMPRESSORS

SELF-LUBRICATING, CENTER GEAR
TYPES CP-25, 27, 28, 29, 30, 127, 128, 130

The Type CP air compressor with three-point suspension consisting of three tee bolts is shown in Fig. 1. No suspension cradle is required, thus reducing to a minimum the total weight of compressor and suspension as installed under a car.

The type of center-gear air compressor with feet is shown in Fig. 2. This type is adapted particularly to floor installation in locomotives, power stations, etc.

INSTALLATION

An air intake strainer, Fig. 3, is furnished with each air compressor. It should be installed in a vertical position inside the car, far enough above the floor to avoid the likelihood of accumulations of dirt being drawn in. If it is impossible to find room inside the car for installing the strainer it may be mounted vertically underneath, but great care should be taken in choosing a location that is as high as possible and wholly protected from wheel wash.

Before starting, the compressor should be inspected to see that it is supplied with oil, the level coming nearly to the top of the oil filler. A high grade of oil adapted for use in air-cooled, railway-type air compressors should be used.

The compressor should be located so that the frame-head door and oil filler are readily accessible.

CARE

These air compressors should be inspected at regular intervals. Points to be given attention are as follows:

Lubrication

The oil-filling elbow is placed low on the side of the crank chamber near the motor; its location is such that it also serves as an oil gauge. The normal oil level should be approximately $\frac{1}{8}$ in. below the top of the filling elbow. The oil level should be observed at each regular inspection and whenever it has dropped to approximately $\frac{3}{8}$ in. below the top of the filling elbow a sufficient amount of new oil should be added to restore the normal level. Under ordinary conditions this will require the addition of oil only once in several inspections. Oil of a high-grade especially adapted for use in air cooled, railway-type air compressors should be used.

All bearings are lubricated from the oil well in the bottom of the crank chamber. The system of the distribution and the return of the oil is shown in Fig. 5 and 9.

Fig. 6 shows the underside of the air compressor. An accumulation of oil around or near the safety drain is an indication that the vent pipe requires immediate attention. In removing a vent pipe for cleaning, use a socket wrench in preference to a monkey wrench or an open-end wrench. When the vent pipe is put back in place, see that the pipe threads are well shellacked.

The condition of the vent pipe can be determined by holding the hand under it. If there is no sign of air coming from the vent pipe it is probably clogged with dirt but if light puffs of air come from it, it is clear.

If the vent pipe is clogged, oil from the armature bearing cannot return to the crank chamber as it should, but will be discharged through the safety drain and wasted. Therefore keep the vent pipe open.

If the compressor is found with the vent pipe clogged a record should be kept of it and if at the next regular inspection oil has reappeared on the compressor frame below the drain, the $\frac{1}{2}$-in. pipe plug at the bottom of the oil return should be removed and the oil-return passage thoroughly cleaned. The general arrangement of this

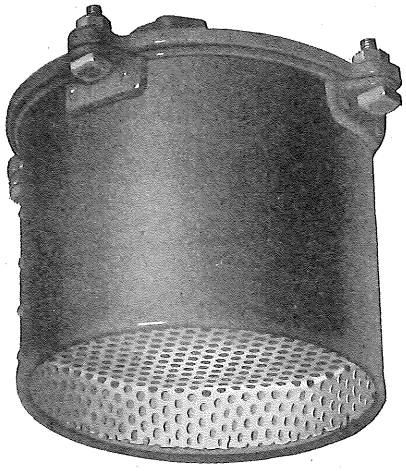


Fig. 3. Intake Strainer

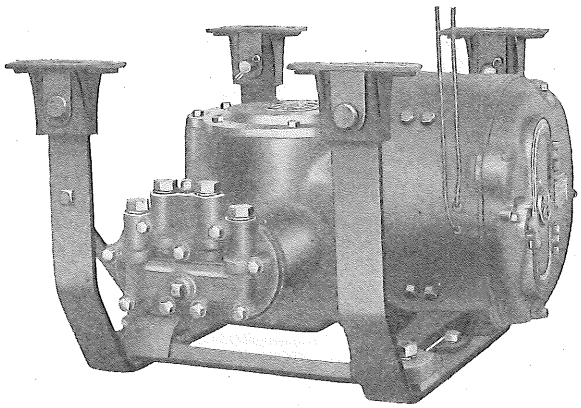


Fig. 4. Air Compressor in Suspension Cradle

passage and the other members concerned with the return of the oil from the armature bearing to the crank chamber and the venting of the crank chamber are shown in Fig. 5.

The ¾-in. pipe plug at the bottom of the settling well should be removed and any sediment which may have collected drawn off once a year, or oftener. The upper end of this settling well is shown in Fig. 9.

Cleaning

The intake strainer should be cleaned as often as conditions of service require. It is very important to avoid taking in dirt with the air.

The motor frame head should be removed and the outer end of the motor, including the brushholders, field coils and the motor frame head, should be thoroughly wiped out. If compressed air is used to blow out the motor a bent nozzle

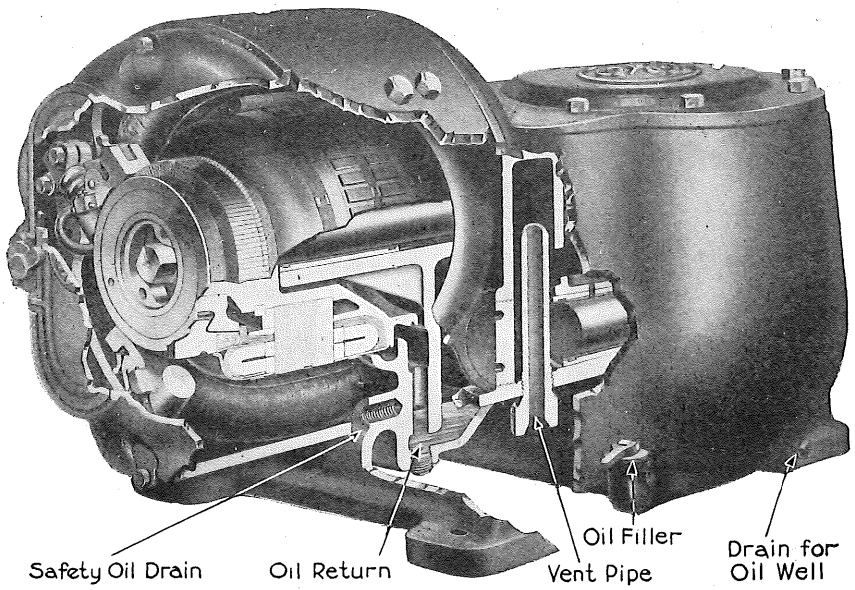


Fig. 5. Air Compressor Showing Oil Return from Motor to Compressor and Crank Chamber Vent Pipe

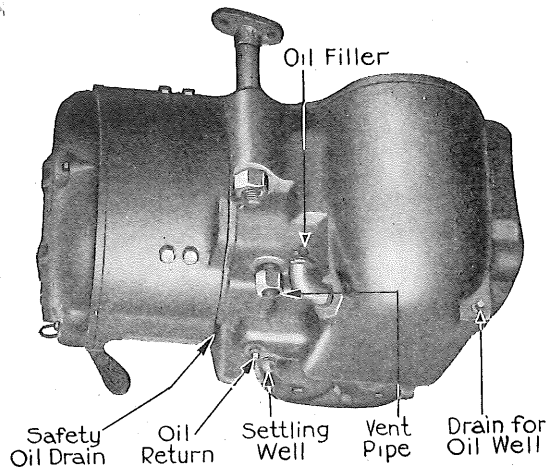


Fig. 6. Under Side of Air Compressor

should be used so that the dirt will be blown away from the open end of the motor, not back toward the interior. The use of compressed air at high pressures should be avoided especially when cleaning old compressor motors as it is possible to damage insulation by this practice.

All parts should be cleaned thoroughly before they are reassembled whenever the air compressor and the motor have been disassembled for a general overhauling.

Commutator and Brushes

An examination of the commutator and brushes should be made a part of the regular inspection. A door is provided in the motor frame head for this purpose.

Brush-holder spring tension is adjusted at the factory and little or no later correction is needed. In case of sparking at the commutator, however, spring tension should be checked.

Fig. 7 shows the manner in which the spring pressures are weighed. The pressures referred to are those at the point where the brush-holder lever bears on the top of the brush when it is level with the top of the carbon-way. The recommended limits for these spring pressures are given in the following table:

Type of Motor	Voltage	Lbs Pressure
CP-25	600	1¾ to 2¼
CP-27	600	2½ to 3
CP-27	750	2 to 2½
CP-28	500, 600 and 750	3¼ to 3¾
CP-29	600/1200	2¾ to 3¼
CP-29	1200 and 1500	2¼ to 2¾
CP-30	600	3 to 3½
CP-30	750/1500 and 1200	2¼ to 2¾
CP-30	1500	2 to 2½
CP-127	400 and 600	2½ to 3
CP-128	600	3¼ to 3¾
CP-130	500 and 600	4¾ to 5¼
CP-130	750/1500	3½ to 4

Fig. 8 shows a view of the brush-holder spring cup. This spring cup is held in position by placing either notch A or notch B, over the little

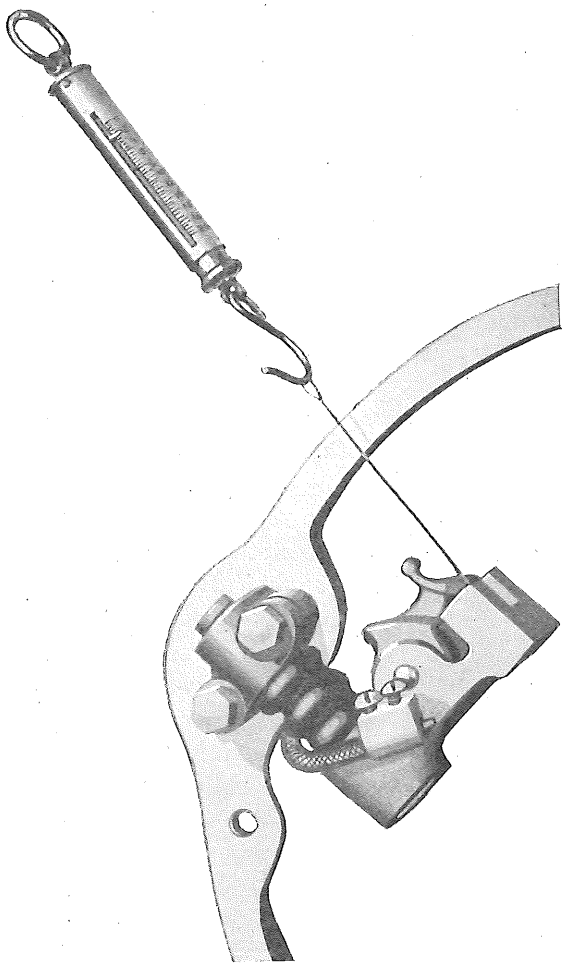


Fig. 7. Method of Measuring Spring Pressure

rib in the bottom of the brush-holder body. The brush-holder spring itself is locked in one of the holes in the rim of the spring cup. If it be desired to make a minimum amount of correction, then the spring cup should be turned so that the notch that was originally at

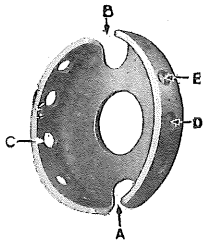


Fig. 8. Brush-holder Spring Cup

the top is now at the bottom and engages with the brush-holder at that point. The spring itself should be engaged with the hole either side of its former position in the brush-holder. For example, if the spring cup is engaged in the brush-holder body at notch A and the spring itself in hole C and it is desired to make a minimum change in its spring tension, it should be disassembled from the brush-holder spring and the spring re-engaged at either D or E, then when reassembling it in the brush-holder, the spring cup should be engaged at the notch B, thus D and E are now on the side where C was before.

Then, according to the direction of the change, the spring tension has been either increased or decreased by a minimum amount. If a change of larger amount is desired do not turn the spring cup over, but shift the end of the spring to the nearest hole. The change in the spring tension is then approximately twice as much as in the former instance. It is important that proper spring tension be maintained.

G-E grade B2 carbon brushes are recommended for air compressor motors which have slotted commutators. G-E grade A brushes are recommended for air compressor motors which do not have slotted commutators.

OVERHAULING

It is economical to give air compressors a complete overhaul either periodically or on a car-mileage basis. The following instructions cover the principle points to be observed when complete inspection or major repairs are made.

Complete Disassembly

The arrangement of compressor 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 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 heading "Sequence of Operations for Removing Single Members."

1. Place a block under the motor end of the compressor. This will cause the oil in the pocket between the armature bearings to drain back to the crank chamber instead of flowing into the motor after the armature is removed. See Fig. 9.

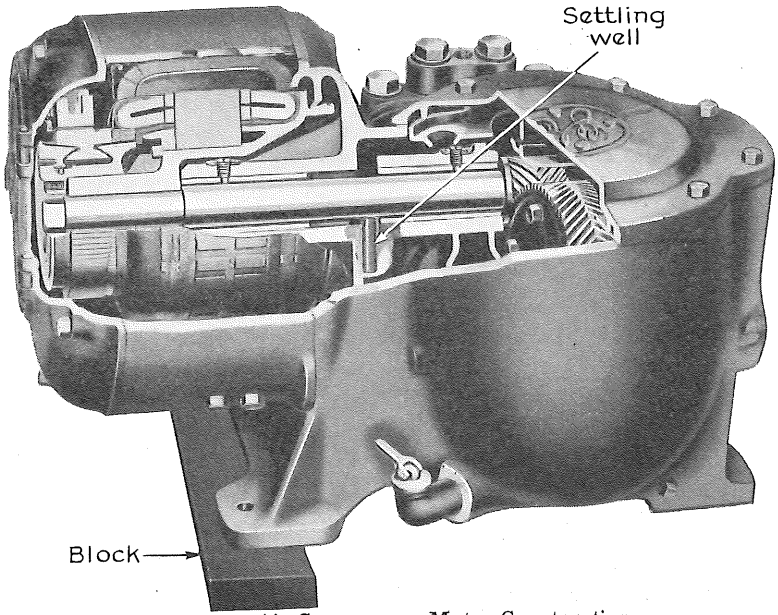


Fig. 9. Air Compressor Motor Construction

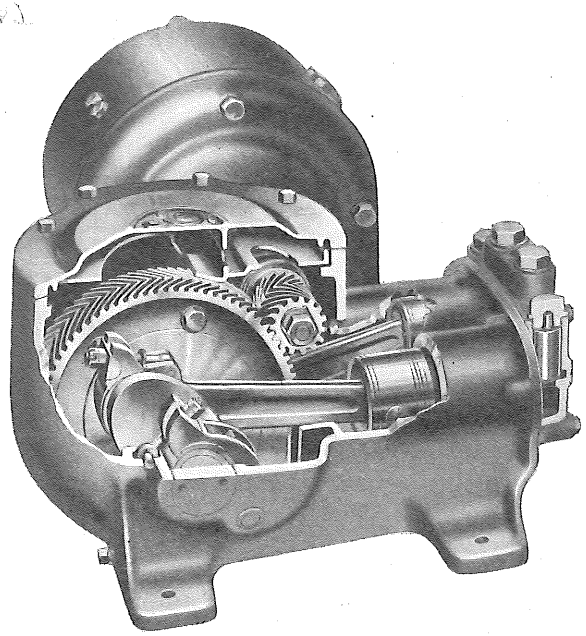


Fig. 10. Interior of Air Compressor

2. Remove the motor frame head.

3. Turn back the brush-holders after removing one tap bolt in each and loosening the other.

4. Remove the crank chamber cover.

5. Loosen the valve chamber caps.

6. Remove the cylinder head.

7. Uncouple the connecting rod of one piston at the crank shaft (Fig. 10). Turn the crank shaft by means 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 the connecting rod.

8. Push out the piston from the cylinder. Each piston snap ring will remain in its own groove without special precautions. 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. Remove the other piston and connecting rod.

10. 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. As the shaft is unscrewed from the nut, 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.

11. 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 from the armature shaft—not dropped to the bottom of the crank chamber.

12. Loosen the nuts and turn back the hinge bolts and bearing caps of the crank shaft (Fig. 10). Lift out the crank shaft and gear with the crank-shaft linings.

13. 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.

14. The armature bearing linings can be removed by turning out their screw dowels (Fig. 9) and pulling the linings out with a draw bolt.

15. The wrist pin can be driven out after removing its 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.

16. In removing valves, care should be taken to return each to its proper place. The inlet valve is open at the bottom and the outlet valve has a small vent in the side.

Sequence of Operations for Removing Single Members

Armature removal—use steps 1, 2, 3, 4, 10, 11.

Field coil removal—use steps 1, 2, 3, 4, 10, 11, 13.

Gear and crank shaft removed—use steps 1, 2 3, 4, 7, 9, 10, 12. Slide the armature along so that the shaft will clear the gear, lift out the gear and crank shaft.

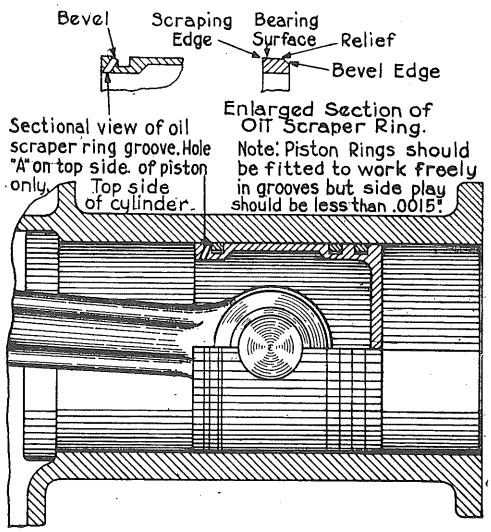
Piston and connecting rod removal—use steps 4, 6, 7, 8, 9.

Compressor Frame

It is recommended that the compressor frame be washed out with kerosene or gasoline to remove all sediment and oil. There are three

pipe plugs which should be removed. The drain for the oil well and the oil-return plug are shown in Fig. 5 and 6. The settling well plug is shown in Fig. 6. The top of the settling well is shown in Fig. 9.

Do not remove the stop plug that is used to force the shaft from the pinion unless there is occasion to take out the armature bearing lining.



Section through Cylinder Showing Method of Assembling Oil Scraper on Ring Air-compressor Piston.

Fig. 11. Arrangement of Piston Rings in Piston and Chamber

Piston Rings

The satisfactory performance of piston rings is largely dependent upon their being closely fitted sideways in the piston ring grooves. When being assembled with pistons at the factory they are lapped to width so that they will neither stick in the groove nor be so loose that a thickness gauge of 0.001 in. can be withdrawn from between the side of the piston ring and the side of the groove. For this lapped operation, the ring is placed in a recessed holder and lapped on a flat surface plate charged with powdered carborundum. As soon as one side is perfectly flat, the ring is turned over in the holder and the other side lapped until the ring is reduced to the proper width. It is recommended that replacement rings be fitted in a similar manner.

Unless otherwise specified replacement rings are furnished with sides ground but unlapped and may vary in width from the normal width of the ring to 0.0015 in. wider.

In case lapping equipment is not available, rings lapped to exactly the normal width will be furnished on specific request.

Overwidth piston rings exceeding the standard nominal widths by 0.002 in., 0.004 in. and 0.006 in. can be supplied. These are used when refitting pistons in which the rings are no longer a proper fit sideways in the grooves. The grooves should be trued up to dimensions which will permit the lapping of the rings to a proper fit.

The scraper ring is shown in Fig. 11. This ring has a scraping edge on one side, then a narrow bearing surface against the cylinder bore, then a slight relief from bearing and finally has a bevel on the opposite edge. The scraper ring should be assembled in that groove of the piston which is nearest the crank chamber and its scraping edge should be toward the crank chamber.

The piston should be assembled in the cylinder bore with drain hole A on top. This hole discharges oil from the oil groove in the piston body which may have been collected by the scraper ring.

Supply piston rings are furnished in complete sets, that is, in the proportion of two of the plain rings to one scraper ring for the total number of rings ordered unless otherwise specified.

Piston and rings $\frac{1}{16}$ in. or $\frac{1}{8}$ in. larger in diameter than the standard can be furnished in case it is desired to rebore worn cylinders.

Cylinder bushings can be furnished when it is desired to rebore and bush worn cylinders, so that standard diameter pistons may be continued in use. Cylinder bushings should be a light drawn-in fit in the cylinders. They must not be loose but should be as near as possible to a size-and-size fit. After they have been drawn in place, they should be finish-bored.

Valves and Cylinder Heads

Valves are sometimes reground when there is no occasion for it. In case there is any doubt about the valve action, the valves and cylinder head should be cleaned thoroughly and the compressor should be tried again. In case it is necessary to regrind, use a valve-seat hand reamer, Fig. 12, to scrape the valve seat to its original form and then grind the small amount necessary to produce a seat. Excessive grinding distorts the form of the valve seat from concave to convex and causes unsatisfactory valve action.

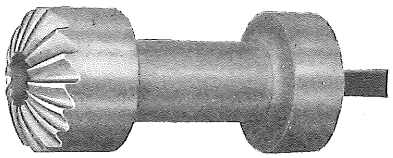


Fig. 12. Valve Seat Reamer

When the valves have become worn, the proper spherical shape of the seats can be restored by regrinding. For this service consult the nearest District Office of the Company.

The cylinder head should be thoroughly washed out with kerosene or gasoline before reassembly.

Reassembly

The various operations for reassembling should be performed in the reverse order to those for the disassembling of the air compressors.

See that all pipe plugs are set tight. Make sure that the crank shaft turns freely in its bearings. Make sure that the thrust collar is not caught between the shoulder on the shaft at the end of its seat and the pinion. This collar should be free to move on its seat.

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 connecting rod shims so that sufficient freedom is obtained to avoid heating without allowing an amount of play that will result in pounding. This can be determined by moving the rod sideways 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.

The crank chamber cover gasket should be shellacked on both sides and the cover assembled on the crank chamber while the shellac is still wet.

AIR COMPRESSORS WITH VENTILATED MOTORS

Fig. 13 shows an air compressor with ventilated motor. This illustration also shows the manner in which the air circulates through the intake and discharge openings provided in the motor frame head. The fan at the end of the commutator produces this circulation.

CONNECTION DIAGRAMS

A connection diagram is shown on page 11. This diagram shows the location of the armature coils in the slots and their connections to the commutator; it also shows the connection of the field coils with each other and with the armature, and the proper position of the field coils in the motor. Connection diagrams for motors of other types or other voltages will be furnished on application.

AIR COMPRESSORS FOR INDUSTRIAL SERVICE

Compressors for industrial service are similar to the railway type except for the driving motor which may be for either direct or alternating current. All of the instructions given in the preceding pages for the care and handling of railway-type air compressors will apply to the industrial type so far as the compressor is concerned.

To remove a pinion from an induction motor-driven compressor, loosen the nut from the rotor shaft and the shaft from the pinion-tapered fit in the same manner as described under disassembly of d-c machines. The rotor, with its shaft, may then be withdrawn until the pinion is free. In the case of CPT-30 and CPT-31 compressors only, it is necessary to remove the stator frame in order to withdraw the shaft far enough to release the pinion.

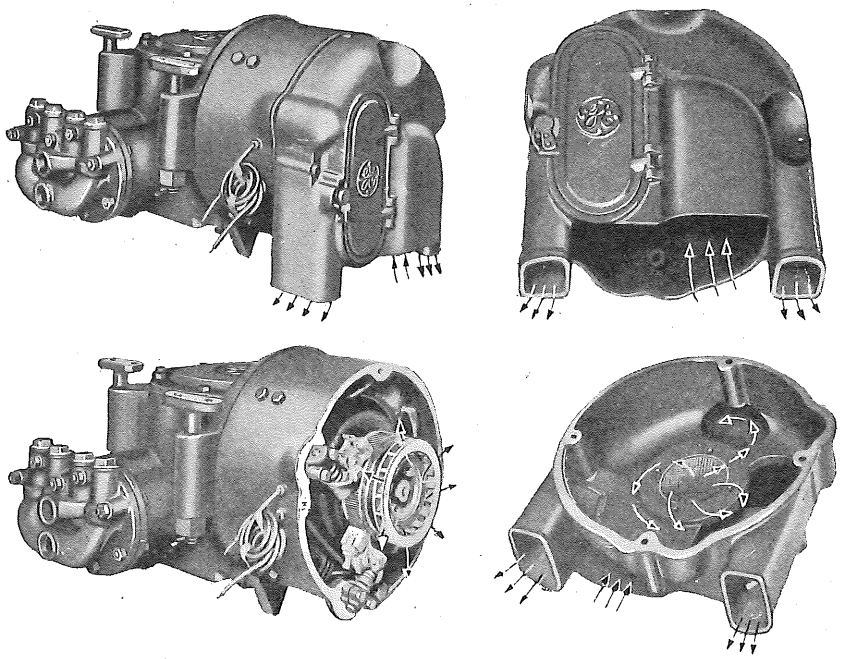


Fig. 13. Arrangement of Motor Ventilation

Low-voltage, direct-current motors are similar in general construction to the higher voltage railway types.

The induction motors are of a very simple and sturdy construction and trouble rarely occurs in their operation. Instructions covering induction motors will be furnished on application.

Portable air compressor sets are equipped with either induction or direct-current motors as desired.

THE USE OF FORM NUMERALS ON NAMEPLATES

Form numerals have been a part of the General Electric air compressor nomenclature for several years. Those compressors which have the form numeral as a part of their designation are completely identified so far as interchangeable supply material is concerned. When ordering parts state the full designation of the air compressor on the order.

For example:

"CP-27-B3" fully identifies the machine for which the replacement parts are desired.

In this example "3" is the form numeral.

Other identifying information should be given in the case of air compressors which were built earlier and do not bear any form numeral on their nameplates.

For example, if the nameplate is stamped "CP-27-B" without any form numeral, then the serial number of the motor should be stated when ordering renewal parts. Care in stating the identifying information will allow prompt service when furnishing any desired parts.

RENEWAL PARTS

A bulletin which lists the renewal parts of any given type of air compressor will be furnished by the nearest District Office of the Company upon request.

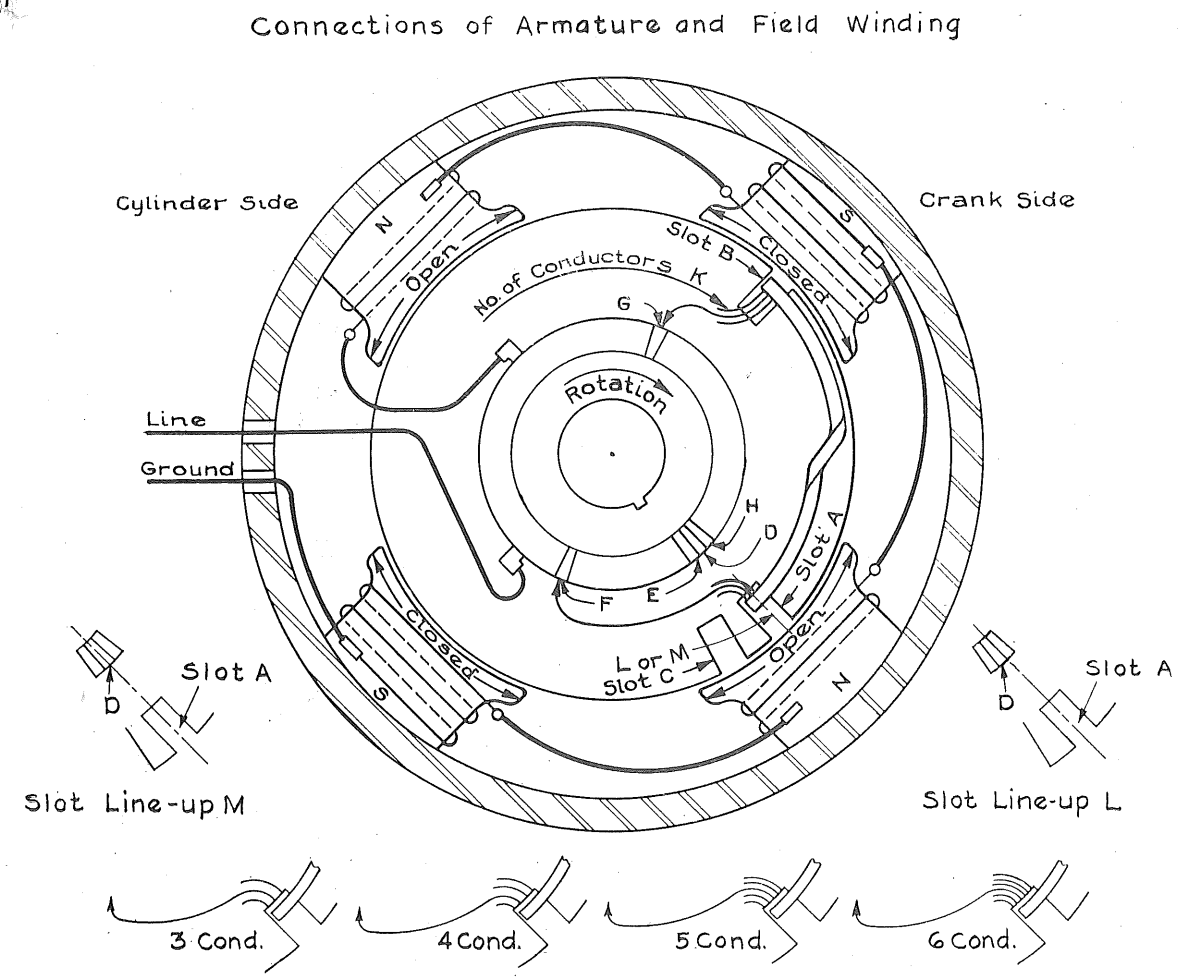


Fig. 14. Armature and Field Winding Diagram for Various Types and Sizes of Motors for Compressor Drive

Type and Size	SLOT NO.			SEGMENT NO.					NUMBER OF CONDUCTORS	SLOT LINE-UP
	A	B	C	D	E	F	G	H	K	L or M
CP-25, 250 and 600 volts	1	10	39	1	2	20	79	117	3	L
CP-27, 600 and 750 volts	1	12	45	1	2	24	92	135	3	M
CP-28, 500 volts	1	10	37	1	2	17	73	111	3	M
CP-28, 600 and 750 volts	1	12	45	1	2	22	90	135	3	M
CP-29, 600/1200 volts	1	11	41	1	2	27	109	163	4	L
CP-29 and CP-30, 1200 volts	1	11	41	1	2	33	136	205	5	M
CP-29, 1500 volts	1	12	47	1	2	40	158	235	5	M
CP-30, 600 volts	1	12	45	1	2	23	91	135	3	M
CP-30, 750/1500 volts	1	11	41	1	2	33	136	205	5	M
CP-30, 1500 volts	1	11	43	1	2	46	175	257	6	L
CP-127, 600 volts	1	12	45	1	2	24	92	135	3	M
CP-127, 400 volts	1	11	41	1	2	21	83	123	3	L
CP-130, 600 volts	1	12	45	1	2	22	90	135	3	M
CP-130, 500 volts	1	11	41	1	2	20	82	123	3	L
CP-130, 750/1500 volts	1	11	41	1	2	27	109	163	4	M

WHEN SERVICE IS REQUIRED

THE facilities of our engineering departments and factories are available to purchasers of G-E apparatus, through G-E Service Shops and Sales Offices. Any additional information or advice can be obtained on application to the nearest Sales Office. When it is necessary to renovate, repair, or change apparatus to meet a new operating condition or application, the facilities of the nearest Service Shop should be employed. Each Service Shop is equipped to maintain the same standard of workmanship and excellence of materials as that employed in the factory. When the required work must be performed on the purchaser's premises, the Service Shop is prepared to send capable and dependable men into the field to make the changes or repairs promptly and efficiently. G-E Service Shops and Sales Offices are located at the points listed below.

SERVICE SHOPS

Atlanta, Ga.	496 Glenn Street, Southwest
Buffalo, N. Y.	318 Urban Street
Chicago, Ill.	509 East Illinois Street
Cincinnati, Ohio	215 West Third Street
Cleveland, Ohio	4966 Woodland Avenue
Dallas, Texas	1801 North Lamar Street
Detroit, Mich.	5950 Third Avenue
Houston, Texas	5 North Milam Street
Kansas City, Mo.	819 East Nineteenth Street
Los Angeles, Calif.	5203 Santa Fe Avenue
Milwaukee, Wis.	940 West St. Paul Avenue
Minneapolis, Minn.	410 Third Avenue, North
New York, N. Y.	416 West Thirteenth Street
Philadelphia, Pa.	429 North Seventh Street
Pittsburgh, Pa.	16 Terminal Way, South Side
St. Louis, Mo.	1110 Delmar Boulevard
Salt Lake City, Utah	360 West Second South Street
San Francisco, Calif.	361 Bryant Street
Seattle, Wash.	1508 Fourth Avenue, South

Special service divisions are also maintained at the following Works of the Company: Erie, Pa.; Ft. Wayne, Ind.; Pittsfield, Mass.; Schenectady, N. Y.; and West Lynn, Mass. (River Works and West Lynn Works).

SALES OFFICES (Address nearest office)

Akron, Ohio	335 South Main Street
Atlanta, Ga.	187 Spring Street, Northwest
Baltimore, Md.	39 West Lexington Street
Bangor, Me.	600 Main Street
Binghamton, N. Y.	19 Chenango Street
Birmingham, Ala.	600 North Eighteenth Street
Boston, Mass.	140 Federal Street
Buffalo, N. Y.	1 West Genesee Street
Butte, Mont.	20 West Granite Street
Cedar Rapids, Iowa	203 Second Street, Southeast
Charleston, W. Va.	304 Capitol Street
Charlotte, N. C.	200 South Tryon Street
Chicago, Ill.	230 South Clark Street
Cincinnati, Ohio	215 West Third Street
Cleveland, Ohio	4966 Woodland Avenue
Columbus, Ohio	40 South Third Street
Dallas, Texas	1801 North Lamar Street
Davenport, Iowa	511 Pershing Avenue
Dayton, Ohio	25 North Main Street
Denver, Colo.	650 Seventeenth Street
Des Moines, Iowa	418 West Sixth Avenue
Detroit, Mich.	700 Antoinette Street
Duluth, Minn.	14 West Superior Street
El Paso, Texas	109 North Oregon Street
Erie, Pa.	10 East Twelfth Street
Fort Wayne, Ind.	1635 Broadway
Fort Worth, Texas	408 West Seventh Street
Grand Rapids, Mich.	148 Monroe Avenue, Northwest
Hartford, Conn.	338 Ann Street
Houston, Texas	1016 Walker Avenue
Indianapolis, Ind.	110 North Illinois Street
Jackson, Mich.	212 Michigan Avenue, West
Jacksonville, Fla.	237 West Forsyth Street
Kansas City, Mo.	106 West Fourteenth Street
Knoxville, Tenn.	602 South Gay Street
Los Angeles, Calif.	5201 Santa Fe Avenue
Louisville, Ky.	455 South Fourth Street
Memphis, Tenn.	8 North Third Street
Milwaukee, Wis.	940 West St. Paul Avenue
Minneapolis, Minn.	107 South Fifth Street
Nashville, Tenn.	234 Third Avenue, North
Newark, N. J.	744 Broad Street
New Haven, Conn.	129 Church Street
New Orleans, La.	837 Gravier Street
New York, N. Y.	570 Lexington Avenue
Niagara Falls, N. Y.	201 Falls Street
Oklahoma City, Okla.	119 North Robinson Street
Omaha, Nebr.	409 South Seventeenth Street
Philadelphia, Pa.	1405 Locust Street
Phoenix, Ariz.	441 West Madison Street
Pine Bluff, Ark.	501 Main Street
Pittsburgh, Pa.	436 Seventh Avenue
Portland, Me.	25 Bedford Street
Portland, Ore.	621 Southwest Alder Street
Providence, R. I.	56 Pine Street
Richmond, Va.	700 East Franklin Street
Roanoke, Va.	202 South Jefferson Street
Rochester, N. Y.	89 East Avenue
St. Louis, Mo.	112 North Fourth Street
Salt Lake City, Utah	200 South Main Street
San Antonio, Texas	201 Villita Street
San Francisco, Calif.	235 Montgomery Street
Schenectady, N. Y.	1 River Road
Seattle, Wash.	821 Second Avenue
Spokane, Wash.	421 Riverside Avenue
Springfield, Ill.	607 East Adams Street
Springfield, Mass.	95 State Street
Syracuse, N. Y.	113 South Salina Street
Tacoma, Wash.	1019 Pacific Avenue
Toledo, Ohio	420 Madison Avenue
Tulsa, Okla.	409 South Boston Street
Utica, N. Y.	258 Genesee Street
Washington, D. C.	806 Fifteenth Street, Northwest
Waterbury, Conn.	72 West Liberty Street
Wichita, Kan.	116 South Main Street
Worcester, Mass.	165 Commercial Street
Youngstown, Ohio	25 East Boardman Street

Canada: Canadian General Electric Company, Ltd., Toronto

Hawaii: W. A. Ramsay, Ltd., Honolulu

Motor Dealers and Lamp Agencies in all large cities and towns

GENERAL ELECTRIC

February, 1937 (1700)
Filing No. B9270