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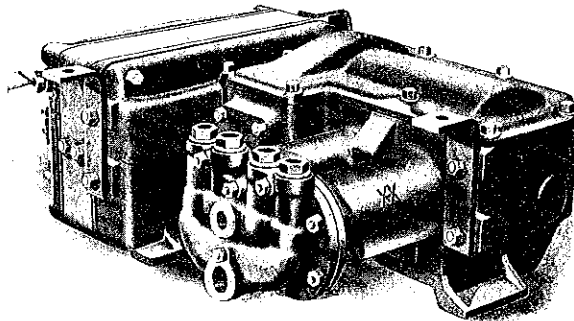
Contents Brakes

Refer Letter dated

Agent Westinghouse Brake Co

Address Pittsburgh Pa

W095276-1,000-2215/25



**WESTINGHOUSE "BUNGALOW" TYPE
DIRECT CURRENT MOTOR DRIVEN
AIR COMPRESSOR**

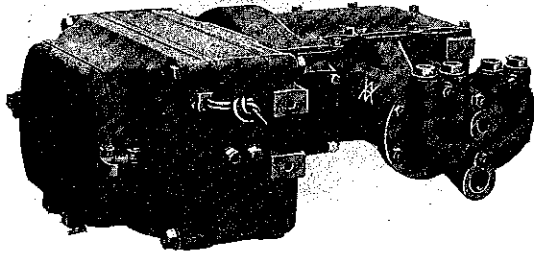


Westinghouse "Bungalow" Type Motor Driven Air Compressor

THE effort to reduce car weight per seated passenger has precipitated some very interesting problems not only in the design and construction of the car itself but in the equipment installed thereon. Very remarkable progress has already been made in the direction of "Low Side," "Easy Entrance-Easy Exit" and "Double Deck" cars in which weight and track clearance have been reduced to a minimum. These designs and construction of car have led to the demand for a motor driven air compressor of minimum weight and minimum overall height.

In order to meet this demand we have developed the "Bungalow" type of motor driven air compressor wherein particular attention has been given to reducing weight and overall vertical dimensions without at the same time sacrificing other factors even more important, and while light-weight and low overall height make this compressor especially suited to low-built, light-weight cars, it is none the less suited to all types of cars. This compressor embodies all those features which the combined experience of operators and our engineers have suggested as desirable, including:

1. Provision for preventing oil passing into the brake system.
2. Few bolts throughout, facilitating taking apart and assembling.
3. Easily removed armature.
4. Easily adjusted brush pressure.
5. Perfect alignment.
6. Accessibility of all working parts.
7. Three Point Suspension, making for ease of mounting and dismounting from car.



View Showing Cylinder Head,
Suspension Pads, Hand Hole
Location, etc.

8. Minimum *height* overall.
9. Minimum *weight*.
10. Separate air strainer for intake.
11. High over all efficiency and continuous capacity motor.

Not the least attractive feature of this type of compressor is low cost, which is the result of minimum manufacturing expense made possible by manufacturing in large quantities and simplification of design and of machining

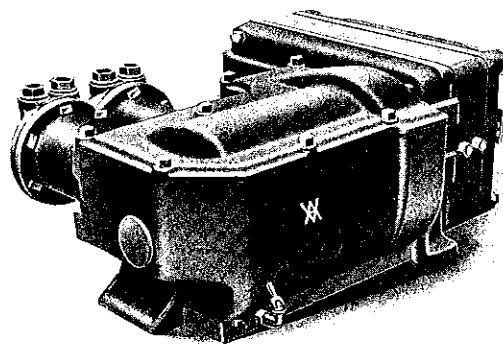
processes, without sacrificing anything in the way of quality or capacity.

After years of experience in designing and manufacturing compressors we believe that this design offers a number of attractive features not heretofore combined in any one machine and that it will appeal to railway men, primarily, because of its low overall height and light-weight, and because of its accessibility while on the car and simplicity for overhauling. The same attention has been given to reliability, compactness, ruggedness, efficiency and low maintenance in the "Bungalow" type of compressor as in other Westinghouse compressors.

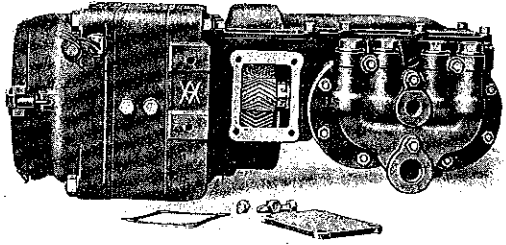
This compressor is built in four sizes, viz.: 5, 10, 16 and 25 cubic feet displacement.

The DH-5 compressor was designed especially for use with Light-Weight-Safety-Car Brake Equipments where the weight of car is extremely low. It has an overall height of only $9\frac{1}{4}$ inches. The weight is only 250 lbs. without the suspension hangers or $254\frac{1}{2}$ lbs. complete with suspension hangers. It has a displacement of 5 cubic feet per minute when operating against 75 lbs. pressure on 600 volts.

The DH-10 compressor has an overall height of only $10\frac{3}{4}$ inches. Its weight is 400 lbs. without the suspension hangers or 420 lbs. including suspension irons, brackets and bolts. It has a displacement of 10 cu. ft. per minute when operating against 100 lbs. pressure on 600 volts.



View from Crank Case End



Hand Hole Plate Removed,
Showing Accessibility of Pinion

The DH-16 compressor has an overall height of but $12\frac{1}{2}$ inches, which we believe is amply low to permit its use on the lowest cars and will permit of installation where the earlier types could not be used. Its weight is only 565 lbs. without the suspension hangers and brackets. It has a displacement of 16 cubic feet per minute when

operating against 100 lbs. pressure on 600 volts, this being ample for the ordinary requirements of light, surface, city car service.

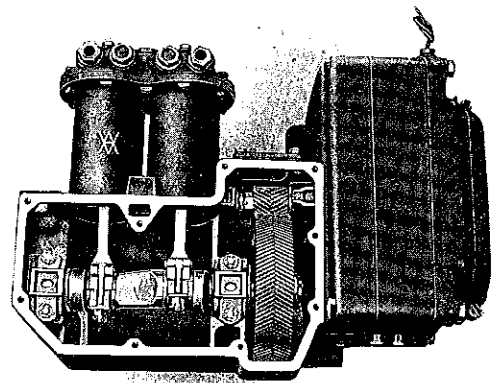
The DH-25 compressor has an overall height of $15\frac{3}{4}$ inches. Its weight is 920 lbs. without the suspension hangers or 955 lbs. complete with suspension hangers and brackets. It has a displacement of 25 cubic feet per minute when operating against 100 lbs. pressure on 600 volts.

GENERAL DESIGN

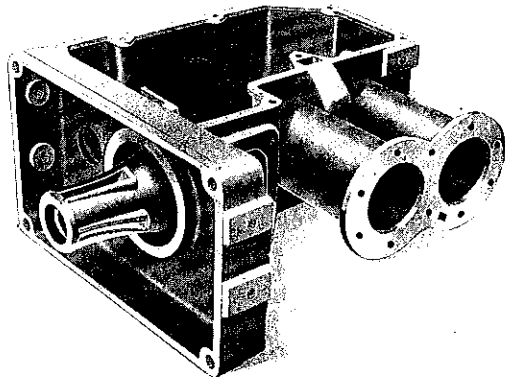
The compressor is of the horizontal duplex air cylinder gear driven type operated by a series wound direct current motor, the whole being a compact, dust-proof unit.

The various cuts clearly show how simplicity and compactness are joined in the design of this compressor with ample proportion of all wearing parts and with effective lubrication, insuring great durability and consequent low cost of maintenance.

One of the most unique features of this compressor consists in the casting of the cylinders, crank case, motor housing, and bearing brackets in one piece, thus eliminating the necessity for a bed plate or adjustment to obtain proper centers of gear and pinion, and providing a construction which is rigid and of few parts. This construction also simplifies and facilitates machining processes, so that perfect alignment is attained, and perfect re-assembly can be guaranteed after the compressor has been disassembled for any reason.



Showing Location of Bearings
and Generous Width of Gears



Main Casting from Motor End

A hand hole in the front or cylinder side of the crank case gives access to the pinion, and a hinged door on the motor end of the compressor provides access to the armature, field coils and brush holders. This construction permits the armature to be easily and quickly removed by simply removing the hand hole cover, taking out the castle nut cotter, holding the castle nut with a wrench and then turning the armature from the commutator end with a wrench, the armature shaft

being flattened for this purpose. No other parts of the compressor are disturbed during this operation.

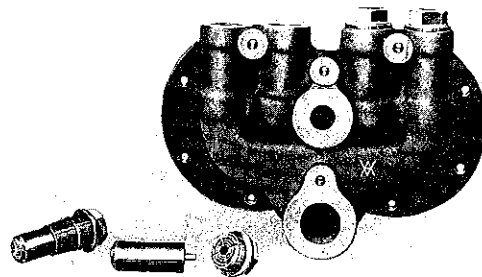
Three supporting lugs are provided for the suspension hangers—two on the cylinder side of the compressor and one on the back. Feet are also provided in case it should be desired to install the compressor on the car floor.

Provision has been made to protect against oil passing into the discharge air and thence into the air brake system, thus eliminating detrimental effects from this cause.

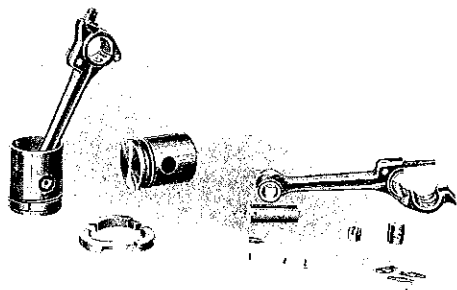
CYLINDER COVER AND AIR VALVES

The head for both cylinders is in one piece, containing the valves, and may be easily removed when access to the cylinders is desired. The cylinder cover is provided with pipe taps for the suction and discharge pipe connections, the suction opening usually being piped to an air strainer located in the motorman's cab or on the roof of the car. These openings are so designed as to permit of tapping one size larger should the threads become worn.

The air valves (four in number—one suction and one discharge valve for each cylinder) are located in the cylinder cover, and are placed so close to the cylinder as to permit minimum valve clearance and consequent



Cylinder Head



Pistons and Connecting Rods

removable by simply removing the caps. The valve stops are of a design found necessary for best valve operation.

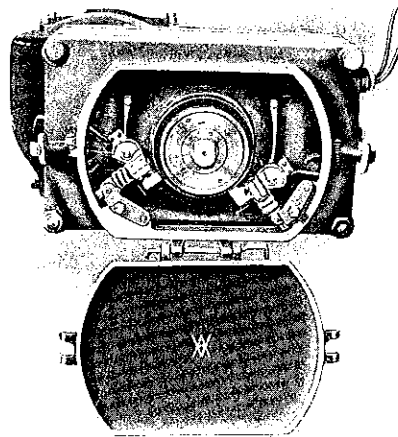
PISTONS, CONNECTING RODS, CRANK SHAFT, ETC.

Particular attention has been given in the design of this compressor and in the quality of materials used to reducing wear to a minimum and thereby insure low maintenance expense. The pistons and connecting rods have been made long with a view to insuring minimum and even wear on the cylinders, wrist pins, wrist pin bearings and pistons themselves. The pistons are of the trunk type and are carefully ground to fit the bore of the cylinders. Each piston is provided with a three segment packing ring which is the most efficient and durable type of ring for the purpose, a special quality of cast iron being used so as to give minimum and uniform wear.

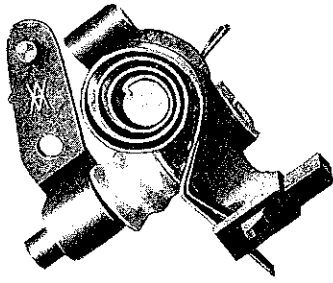
The wrist pins are of hardened steel, carefully ground. They are pressed into the pistons and held in place by set screws.

The connecting rods and crank shaft are drop forgings of a high grade steel, the latter being especially heat treated, and are designed to combine strength, rigidity and light-weight. The wrist pin ends of the connecting rods are provided with liberal brass bushings which can be readily and cheaply replaced when worn. The crank shaft ends of the connecting rods are provided with split bearings of babbitt metal, ample allowance being made between the connecting rods and bearing caps to take up wear quickly and readily by removing liners and tighten-

maximum cylinder efficiency. The valves are accurately machined hydraulic forgings, carefully ground to seat, this type having proved its superiority through years of service in Westinghouse air compressors. These valves require little or no attention. Placed vertically, they close by gravity so that there are no springs to break, corrode or lose their temper. They are easily



Showing Accessibility for Inspection and Cleaning of Brushes, Commutator and Complete Motor



Brush Holder

ing the connecting rod eye bolts hinged to the caps.

All bearings are of our special bearing metal mixture and of ample proportions, thereby insuring long life, and are readily renewable when worn.

The crank shaft is so designed as to eliminate the necessity for a center or thrust bearing.

GEAR AND PINION

The power is transmitted from motor shaft to crank shaft by a herringbone pinion and gear.

These gears have a large number of fine teeth which makes for quiet running for a longer time. The gear is forced on to the taper shaft over a square key and secured by a castle nut and cotter. This arrangement, combined with a steep taper on the crank shaft, permitting the gear to be readily removed.

MOTOR

The motor is of the four pole, direct current series wound type totally enclosed, with two field coils.

FIELD YOKE

The field yoke is made up of laminated soft steel punchings, insuring uniformity of section, minimum weight and excellent commutation. The yoke fits between milled surfaces of the motor housing, being supported firmly in place by means of long bolts and studs which hold the two parts of the motor housing together.

FIELD COILS

The field coils are supported by the laminated pole pieces which are held in place by two cap screws each and are, therefore, very easily removable. The consequent poles are a part of the field yoke. The field coils are wound with enamelled wire, which has superior heat resisting and radiating qualities, thus tending to keep the motor temperature down to a minimum. To prevent injury due to vibration, the coils are held firmly in place by a flat steel spring which presses them against the pole tip guards.

ARMATURE

The armature is of generous proportions so as to reduce losses and enable continuous operation without overheating. The coils are insulated and protected from moisture in accordance with standard railway practice.

They are rigidly supported at both ends and protected against injury and any possibility of entrance of oil. The commutator is of liberal length and is slotted in accordance with best railway practice. The leads are carefully protected against any possibility of movement that might injure them.

BRUSH HOLDERS

The brush holders are permanently located in a position slightly back of the neutral position which is the most efficient location on account of the fact that the armature always rotates in one direction; they are, however, arranged for easy radial adjustment. One of the unique features provided for in the design of this compressor is the ability to adjust the tension of the brush holder springs without removing them and without the use of tools. By merely moving a small wire lever from notch to notch on a notched dial provided on the carbon holder, the tension of the spring may be changed in small steps at will. The holders are fastened to the motor case with one cap screw and one dowel pin, making removal exceptionally easy. High grade brushes are held in contact with the commutator by a combination of a coiled spring and a flat spring fastened at the uncoiled end of the former, thus providing a spring of double amplitude. The flat uncoiled spring exerts only a light pressure upon the brush and, therefore, takes care of the small vibrations. This acts to hold the brush against the commutator at all times and thereby eliminate chattering and improve commutation.

The brushes are located on the lower quadrant of the commutator. This position is most accessible from the pit and in itself tends to keep the brushes, holders and commutator clean.

LUBRICATION

The lubrication of the compressor is entirely automatic and requires no attention other than to replenish the oil supply when required. The crank shaft, crank shaft bearings, connecting rods and pistons are lubricated by the splash system, the oil being poured into the dust proof crank case through a small fitting which acts as a gauge of the oil level. There being but one place to oil, it becomes a convenient and simple matter to oil the compressor. The churning of the crank shaft in the oil also splashes some over into the gear case chamber where it is carried up by the gear on to the armature shaft and the two armature shaft bearings, thus insuring lubrication of these parts. The oil which seeps through the overhung armature shaft bearing is carried by a return passage back to the crank case. In this manner oil is prevented from flooding the motor. There being no bearing at the commutator end of the armature, no oil whatever can reach the commutator.

ACCESSIBILITY

One of the distinguishing features of the "Bungalow" compressor is its extreme accessibility for inspection and repairs.

The gears, crank shaft, crank shaft bearings and connecting rods may be exposed for examination merely by removing the crank case top cover.

The motor door covers practically the whole end of the motor so that when the door is open, the commutator, brushes and interior are entirely exposed to view and easy of access.

The removal of the armature is especially facilitated, being accomplished without lowering the compressor from the car. The absence of a bearing on the commutator end of the armature makes armature removal especially easy.

SUSPENSION

The suspension used with the "Bungalow" compressor is of the "three-point" type which not only contributes to light weight but facilitates the mounting and dismounting of the compressor and provides accessibility. This type of suspension consists of three light-weight steel hangers fastened by two bolts each to lugs cast upon the compressor, the weight of the compressor being actually supported by the ends of the hangers which are bent sharply underneath these lugs. The upper ends of two of these hangers are bolted by one bolt each to brackets bolted to the car body. No bolt is needed for the third hanger since the other two hangers act to hold it in place. This method of suspension requires the removal of only two bolts to disengage the compressor from the car body.

DIMENSIONS, DISPLACEMENT, ETC., OF THE "BUNGALOW" TYPE MOTOR DRIVEN AIR COMPRESSOR

The performance data in the following table is based upon an operating air pressure of 75 lbs. for the DH-5 compressor and 100 lbs. for the DH-10, DH-16 and DH-25 compressors.

Designation	Displacement Cu. Ft. per Min.	Size of Cylinder in Inches	Crank Shaft R.P.M.	Motor R.P.M.	E.H.P. Input	Amperes of Pump at 600 Volts	Size of Piping, Inches		Dimensions in Inches			Weight, Lbs.	
							Suction	Discharge	Length	Width	Height	Net	Shipping
DH-5	5	2 $\frac{1}{2}$ x3	250	1350	1.25	2	$\frac{3}{4}$	$\frac{1}{2}$	24 $\frac{7}{8}$	18 $\frac{3}{8}$	9 $\frac{1}{4}$	250	350
DH-10	10	3 $\frac{5}{8}$ x3 $\frac{3}{4}$	226	1200	1.6	4	1	$\frac{3}{4}$	30 $\frac{3}{4}$	22	10 $\frac{3}{4}$	400	515
DH-16	16	4 $\frac{1}{4}$ x4 $\frac{1}{2}$	217	1120	3.25	5	1 $\frac{1}{4}$	$\frac{3}{4}$	33 $\frac{3}{4}$	25 $\frac{3}{8}$	12 $\frac{1}{2}$	565	665
DH-25	25	5 x5 $\frac{1}{2}$	200	1075	5.65	10	1 $\frac{1}{2}$	1	39 $\frac{3}{4}$	28 $\frac{1}{4}$	15 $\frac{3}{4}$	920	1050

TESTS

Before leaving the factory each compressor is subjected to a thorough test to determine its efficiency and accurate adjustment of parts. The compressor must show a high cylinder efficiency before it is allowed to pass and the motor is thoroughly tested to insure its performance meeting certain rigid requirements.

Any further information regarding this compressor will be furnished promptly on request direct to our nearest District Office.

Westinghouse Traction Brake Company,

Pittsburgh, Pa., U. S. A.

WORKS AT WILMERDING, PA.

OFFICES:

ATLANTA	---	---	---	---	---	---	---	Candler Building
BOSTON	---	---	---	---	---	---	---	Exchange Building
CHICAGO	---	---	---	---	---	---	---	Railway Exchange Building
COLUMBUS	---	---	---	---	---	---	---	Columbus Savings and Trust Building
DENVER	---	---	---	---	---	---	---	Tramway Building
HOUSTON, TEX.	---	---	---	---	---	---	---	4802 Main Street
LOS ANGELES	---	---	---	---	---	---	---	Pacific Electric Building
MEXICO CITY, MEXICO	---	---	---	---	---	---	---	4a Puente de Alvarado, No. 100
NEW YORK	---	---	---	---	---	---	---	City Investing Building
PITTSBURGH	---	---	---	---	---	---	---	Westinghouse Building
PORTLAND, ORE.	---	---	---	---	---	---	---	Spalding Building
ST. LOUIS	---	---	---	---	---	---	---	Boatmen's Bank Building
ST. PAUL	---	---	---	---	---	---	---	Endicott Building
SALT LAKE CITY	---	---	---	---	---	---	---	McIntyre Building
SAN FRANCISCO	---	---	---	---	---	---	---	Pacific Building
TOPEKA	---	---	---	---	---	---	---	New England Building



ASSOCIATED COMPANIES:

THE AMERICAN BRAKE COMPANY, St. Louis, Mo.	WESTINGHOUSE AUTOMATIC AIR AND STEAM COUPLER COMPANY, St. Louis, Mo.
WESTINGHOUSE AIR BRAKE COMPANY, Pittsburgh, Pa.	WESTINGHOUSE PACIFIC COAST BRAKE COMPANY, Emeryville, Calif.
CANADIAN WESTINGHOUSE COMPANY, LTD., Hamilton, Ontario, Canada.	COMPAGNIE DES FREINS WESTINGHOUSE Sevran, France.
THE WESTINGHOUSE BRAKE COMPANY, LTD., London, England.	COMPAGNIA ITALIANA WESTINGHOUSE DEI FRENI, Turin, Italy.
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