

PITTSBURGH, PA.

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Bulletin N

THE speed of air compressors has heretofore been limited by the air valves. Piston speeds in excess of 500 feet per minute resulted in excessive wear and breakage of valves or in heavy compression losses. The use of our plate valves (Iversen Patent) makes possible the economic use of much higher piston or rotative speed, in fact, the piston or rotative speed is limited only by the speed of the driving engine or by general wear and tear of the compressor, if the latter be driven by electric power.

The higher safe speed of our compressor compared with other types means a much smaller cost of installation, not only of compressor but of foundation and building, since the compressor for a given capacity equipped with our plate valves requires about twothirds of the floor space required by other compressors. High rotative speed also means a smaller and less expensive motor.

The principal advantages gained by the use of our plate valves are:

- 1. Simplicity of air end (no valve gear required).
- 2. Higher volumetric and mechanical efficiency.
- 3. No wear of valves or seats; practically no repairs.
- 4. No lubrication of valves required; no attendance needed.
- 5. Noiseless operation of valves up to the highest speed.
- 6. No adjustment of valves necessary.



Details of the Mesta Automatic Plate Valve (Iversen Patent)

AIR COMPRESSORS AND VACUUM PUMPS



Mesta Motor Driven Two Stage Air Compressor

A S already mentioned, the success of our compressors is largely due to the use of our automatic plate valve (Iversen patent). This valve was developed by systematic study and experimenting; it offers larger free area than any other plate valve on the market, excels in precision of guiding and is especially free from chattering and fluttering. The lift is small, so that it attains its full opening quickly and offers small resistance to the flow of air. The same type of valve is used for inlet and discharge.

The valve consists of a thin, light, annular steel plate, which is guided without friction by a flat, volute spring; the latter furnishing the small force which is necessary to start the closing motion of the valve. Prongs on the valve plate are bent around the spring so that the fastening of the spring to the plate is simple and permanent. In regular operation, the valve plate is not deformed, since all deformation occurs in the spring. The valve lifts parallel to the seat and is not restrained by friction of any guiding surfaces or guiding pins.

Since the introduction of these valves, we have developed correct methods of selection and inspection of materials, and have installed special machines and appliances for producing valve plates and springs of perfect shape; so that today our valves excel not only in design, but also in material and workmanship.



Regulating Apparatus.

N our steam driven compressors a variable demand for air is met by allowing the pressure to control the speed, thus keeping the resisting torque practically constant. A centrifugal governor acts as a speed limit.

Our power or gas driven compressors, whose speed must remain constant, are equipped with unloading devices, acting in four steps and maintaining a constant intercooler pressure. Details of both regulating systems will be furnished upon application.

Types and Sizes of Compressors.

Owing to the large number of types and sizes of compressors which we build, a tabulation of sizes is not given. We have designs and patterns to suit almost any demand for air and shall be pleased to submit quotations on compressors, in sizes from 2000 cubic feet per minute of free air upward, including compressors driven by steam or gas engines or by electric motors.

How Much Air Does a Compressor Deliver?

The ratio of the weight of air actually delivered per stroke to the weight of air which corresponds to the piston displacement (at inlet pressure and temperature) is called the true volumetric efficiency. It depends upon the ratio of delivery pressure to intake pressure; upon clearance volume; upon size, speed and type of compressor; and upon tightness of pistons and valves.

AIR COMPRESSORS AND VACUUM PUMPS

The latter can be determined by simple tests, so that leakage can be eliminated for comparative calculations. The other elements are taken care of in the accompanying chart. The indicated volumetric efficiency is found from the compression and expansion curves and the true volumetric efficiency is obtained by multiplying by the factor obtained from the factor curve. Increased volumetric efficiency due to inertia of air in intake pipe is not considered. The choice of the factor curve requires judgment, because the size, type and speed of compressor enter into it. The example given on the chart will make its use clear. We have similar charts for natural gas compressors which we will gladly send to interested parties.



VACUUM PUMPS

ACUUM pumps are used for compressing a mixture of air and vapor from a varying initial pressure up to atmospheric pressure. They work under very exacting conditions, because the high ratio of compression (often exceeding 1 to 15) heats the air considerably and reduces the volumetric efficiency.

The influence of this excessive heating is two fold:

First, valves with sliding surfaces requiring lubrication, stick on account of the burning and gumming of the oil. Our plate valve, having no sliding surfaces, is free from this trouble.

Second, the volumetric efficiency is reduced to a greater extent than the indicator cards show. This reduction is comparatively small in our pumps; they produce 29.8 to 29.9 inches vacuum (referred to 30 inch barometer) on a closed inlet, thereby showing that they are applicable up to the highest commercially useful vacuum (lowest absolute pressure).



Mesta Vacuum Pump, Showing Simplicity of Design

AIR COMPRESSORS AND VACUUM PUMPS Closed Inlet VREMMEN 29 9" Mercury referred to 30" barosmeter Vacuum 278" measury refeared to 30" basometer

Cards taken from Vacuum Pumps Equipped with Mesta Plate Valves (Wavy Lines are due to Vibration in Indicator and Show Absence of Indicator Friction)

T may be mentioned here that pumps with sliding valves and flash ports (a type which we have discontinued to build) give a high apparent volumetric efficiency from the indicator card, but a very small volumetric efficiency by direct measurement. Our air pumps have been tested carefully with regard to volumetric and compression efficiency. Test data will be sent upon application.

In addition to the advantages cited on page 2, our air compressors and air pumps excel in efficiency. If you have air compressors, write us for information on how to determine their efficiency by a simple test.

Our plate valves are now in successful operation for pressure as high as 1000 pounds per square inch gauge.



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Mesta Two Stage Compressor, Driven by Cross Compound Steam Engine



We equip existing compressors and air pumps of various makes with our plate valves or with heads containing them. Above is shown a shipment of valves, replacing those of another type in an existing compressor. The reliability of the compressor is increased by the change and more air is obtained because of the higher speed. The change from the old to new valves can usually be made in a few hours.