construction would be compound condensing engines with Corliss valves. In this case though, solidity, simplicity and durability were the principal things desired, while economy of steam was made a minor consideration. Another important point to be considered was that the compressor should have a large capacity in a short time, that is, it should be able to run at a high speed without injury. How well this has been attained is shown by the fact that during part of the test the compressor was run at a piston speed of 568 feet per minute, without vibration or undue heating.

VALVES.

No paper on air compressors would be complete which did not devote some space to a consideration of their most important details —the valves.

With regard to the valves of the steam ends, it will only be necessary to point out the essential differences between the conditions in an air compressor and in an engine for ordinary purposes, such as driving mill machinery or dynamos. In driving dynamos, for instance, the speed must be constant, whatever the load, and the question of economy turns largely on the method of governing. The advantage of governing the cut-off over governing by throttling accounts for much of the superiority of Corliss valves and automatic expansion gear. In an air compressor, however, there is a definite amount of air compressed per stroke, and hence the speed of the compressor should vary according to the demand for air. A compressor is largely self-governing. When the demand is light the pressure in the receiver rises, the work of compression becomes greater, and the engine begins to run more slowly. When the demand is heavy the pressure falls and the machine speeds up again. The only governor that is absolutely necessary is one which will act when the speed rises to the highest safe limit, to prevent the machine from "running away." This might take place when the demand was very heavy or when a break occurred in the discharge pipe.

The most common steam valve for a compressor of medium size is a slide-valve with Meyer cut-off, regulated by hand. A valve of this kind is shown on the H.P. cylinder of Fig. 20. Fig. 34 shows the steam cards from a straight-line compressor with Meyer cut-off. The steam cylinder was 20 x 24, and the air cylinder 22 x 24. The figures for the cards shown are: cut-off, $\frac{1}{4}$; steam pressure, 90; air pressure, 70; revolutions per minute, 50; mean effective pressure (average of two), 43.7.