on a reciprocating air compressor exceeds the supply. By so utilizing the exhaust steam of the reciprocating set the rotary set will supply air at 30 pounds absolute to the main compressor, and thus almost double the output of the main set with no more steam than was used previously.

The capital or initial costs of a high-pressure set and a mixed-pressure set are compared in the following table. The operating expenses for a twelvemonth at an average deep colliery where exhaust steam is plentiful are also computed. As the plant under construction is of two units, each of 1,000 horse-power, the reciprocating engine is not considered:—

Capital Costs.

Plant 2, 750 Kw. Sets.	H.P.	M.P.
Power-house and crane	$ 8,250	$ 8,250
(2) 750 kw. turbo-generators, complete	50,400	60,000
Complete installation of two condensing sets	15,000	23,000
One cooling plant	4,000	6,500
Battery of boilers with essentials	30,000	....
One regenerator	....	8,000
	$107,650	$105,750

Annual Cost Sheet.

Plant instld. 2,750 kw. sets. H.P. Condenser 26 kw. M.P. Condenser 50 kw.	High Pressure	Mixed Pressure	High Pressure $	Mixed Pres. $
Day Shift per Annum 288 Working days of 8 hours = 2304 hours at 600 kw. per hr. = 1,382,400 + condenser = 1,442,300 1,497,600	1,442,300	1,497,600		
Afternoon Shift (Same as Day)	1,442,300	1,497,600		
Night Shift 288 working days at 8 hrs. 2304 hours at 250 kw. =576,000 + condenser	635,900	691,200		
Grand Total of Units	3,520,500	3,686,400		
Ditto, of Useful Units	3,340,800	3,340,800		
	Heat Pres.	Mixed Pres.	Heat Pres.	Mixed Pres.
Coal consumption per annum in metric tons at the rate of 3.4 lbs. of coal per kw. hr. when mixed pressure turbine runs on 6-hr. live steam on the night shift	Tons 5,670	Tons 730		
Cost:				
Price of coal at $4.00 per ton			$22,680	2,920
Int. at 5% on capital outlay			5,380	5,280
Depreciation at 10%			10,576	10,575
Boilerhouse attendance			2,500	600
Enginehouse attendance			3,000	3,000
Oil waste and stores			300	300
Total Cost per Annum			$44,625	22,675
Cost per Useful Unit			1.33 cts.	0.68 cts.

Advantage for Mixed Pressure Turbine, .65 Cents per Useful Unit.

In conclusion, an interesting instance in support of the foregoing argument may be here cited. In the power station of the Edinburgh Corporation, Scotland, were eight Willin & Beliss engines, each of 1,200 horse-power, designed to operate with a 25-inch vacuum; but because of a lack of water these engines were not operated non-condensing. Mr. P. S. Mitchell, of Glasgow, Scotland, collected the exhaust steam from four of the engines and installed two Rateau low-pressure turbines with a Brown Boveri, D.C. combination at 490 to 500 volts. Each of these turbines is capable of developing 1,250 kw. when supplied with 45,600 pounds of exhaust steam per hour. Two of the reciprocating engines have a total output of 1,550 kw. Consequently the output has been increased no less than 80 per cent. by the utilization of what was formerly waste steam. The condensers installed were the contra-flow condensers made by Richardson & Westgarth, and it is interesting to note that this Scottish engineer had the boldness to use the sewage water of the city of Edinburgh for circulating purposes.

OPERATION OF TRAILERS IN CONNECTION WITH PEAK LOAD CITY SERVICE.

A description of the operation of trail cars in Cleveland is given by Mr. G. L. Radcliffe, general manager of the Cleveland Railway, in a recent number of the Electric Railway Journal. The article deals principally with the changes made in equipment since the trail car was last in general use.

With adequate motors and improved tracks, its operation is no longer hazardous; its application to traffic problems is definite and easy. No more a makeshift, but specially designed to meet certain conditions, it is in every way a worthy running mate for the modern motor car. The first modern trailer operated on the system of the Cleveland Railway Company was placed in service September 16th, 1912. One hundred are now on our lines, and a second hundred will shortly be added. The operating features of this equipment necessitates a brief description of the car itself.

The extreme length is 49 ft., and there is no platform or vestibule at either end. A continuous longitudinal seat completely encircling the interior gives a maximum seating capacity of seventy-two and leaves a very large area for standing passengers.

The cars are mounted on Brill No. 67-F trucks, with 22-in. wheels, bringing the floor of the trailer close to the ground and making entrance to the car easy. It is but one step from the ground into the car—15 in.—and a second step of the same height to the car floor proper.

There are two doors in the centre of the car, one for entrance, the other for exit. The fare-box is placed opposite the post which separates the doors. The conductor's position at the box is facing the rear, so that an aisle is open between the fare-box stand and the devil-strip side of the car. The stand supporting the fare-box has a small shelf for change, on which is mounted a set of push buttons to govern the doors. Each door is opened and closed by compressed air electrically controlled by the conductor through the push buttons. The opening and closing of the doors flashes signals to the motorman by an electric contact, which should make trailer operation much safer than when he is entirely dependent on the signal bell.

The trailer is pulled by a 38-ft. motor car, equipped with four 40-h.p. motors of the Westinghouse 307-F type. The train is equipped with Westinghouse semi-automatic brakes and is coupled with the Tomlinson automatic air coupler. The couplers, while not yet entirely perfect, are a great improvement over the couplers in general use on the old-type train. Cars equipped with the modern automatic air coupler can be coupled much more quickly and with much less danger to the employee than formerly, while the application of air brakes to both cars reduces very largely the danger of accidents through the heavier equipment. These two features, we believe, with the electric signal device, give the requisite safety both to employees and the public.

When these trailers were first put in operation it was decided that we should use them only during the rush hour, morning and evening, and that trains would be left coupled so that it would not be necessary to switch, couple and un-