

Breaking 100 Acres a Day



This Trade Mark on a Traction Engine is a Guarantee of Satisfaction, or No Pay



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These three Big Four "30s," each pulling ten 14-inch breaker bottoms and turning over 35 feet of furrows at once, broke 8,000 acres of tough prairie sod this summer at the rate of 100 acres a day. The wonderful automatic steering device, an exclusive feature of The Big Four "30," made it possible for one man to run both engine and plows. Write today for "The Book of Gas Traction Engines"—it's mighty interesting.

GAS TRACTION COMPANY FIRST and LARGEST Builders of FOUR-CYLINDER FARM TRACTORS in the World
General Offices and Factory: MINNEAPOLIS, Minn. Showrooms: 156 Princess Street, WINNIPEG, Man.

piston should be set back into the cylinder is 77 divided by 63.6, or 1.21 inches, about 1 7/32 in.

In most cases this may be conveniently done by inserting a plate of the required thickness between the crank end of the connecting rod and the brass. This, of course, will require longer studs. Sometimes it is preferable to have a cast iron plate turned to the diameter of the cylinder and then fastened to the head of the piston. This should be done by means of studs screwed into the piston and not by cap screws. The plate should be counterbored for the nuts on the studs, and pins should be driven in, or else the studs riveted over to prevent the nuts working loose. Before adding a plate it should be ascertained if there is a sufficient amount of space directly back of the piston to allow for the addition. Putting a plate between brass and rod pushes the piston itself back, and will oftentimes cause the last ring to move back enough to spring out into the counterbore of the cylinder. In this case the plate on the end of the piston would have to be used. It is well to turn the engine over by hand after making any alterations of this kind. The engine should be turned at least two revolutions or through a complete cycle as the movement of the valves inward may be sufficient to strike the head of the piston.

Let us assume an engine of 7 in. bore and 10 in. stroke; to

determine the compression. There were no pockets in the clearance space, the valves being in the head, so that the cylinder bore extended back to the head. The distances from the piston at the end of the stroke to the head was 3 in. The area of a 7 in. circle is 38.5 square inches, so that the volume swept by the piston was 385 cubic inches. The volume

of the clearance space was 38.5 times 3, or 115.5 cubic inches, the volume ratio was, therefore, 385 ÷ 115.5 divided by 115.5, or 4.33. From the curve, the pressure ratio corresponding is found to be 7. The absolute compression will then be 7 times 13.5, or 94.5 pounds. Subtracting 14.7 to get the gauge pressure we have practically 80 pounds.

The maximum pressure developed in the cylinder by the combustion of the gasses at the end of the compression stroke cannot be as readily calculated as the pressure of compression. One reason for this is that this maximum pressure is controlled by conditions not dependent upon the design of the engine. The quality of the mixture and the time of ignition are the controlling factors, and in very few cases in actual practice do we find these two working together under the most advantageous conditions. A little change in the quality of the mixture or variation in the time of ignition quite materially affects the pressure developed.

After the spark occurs in the cylinder there is a slight lapse of time before the maximum pressure is reached. With a piston speed of 600 feet per minute. Tookey states that the spark should occur about 3/100 of a second before the piston reaches the rear dead center.

The above table taken from Poole gives the average pressure rise produced in the cylinder by combustion for gas, gasoline and kerosene. By referring to the curve the pressure ratios may be found corresponding to the volume ratios, and will probably be more convenient for general use. The average maximum pressure found in practice varies from 250 to 300 pounds absolute the pres-

PROBABLE MEAN EFFECT. PRESS.
(Poole, "The Gas Engine").

FUEL USED.	H.P. OF ENGINE.	COMPRESSION PRESSURE LB. PER SQ. IN., ABSOLUTE.							
		65	75	85	100	115	130	145	160
GASOLINE VAPOR.	5	70	75	80	85				
	10	75	80	85	90				
	25	80	85	90	95				
	50	85	90	95	100				
KEROSENE SPRAY.	5	50	55	60	65	70			
	10	55	60	65	70	75			
	25	60	65	70	75	80			
	50	65	70	75	80	85			
NATURAL AND ILLUMINATING GASES.	5	60	65	70	75				
	10	60	65	70	75				
	25	65	70	75	80	85			
	50	70	75	80	90	90			
	100	75	80	85	90	95	100		
	250	80	85	90	95	100	105		
SUCTION PRODUCER GAS.	500			95	100	105	110		
	10				55	60	65		
	25				60	65	70	75	
	50				65	70	75	80	80
	100				70	75	80	85	85
	250				75	80	85	90	90
	500				80	85	90	90	90

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