

Gas Tractor Engine Capacity and Design

By C. E. SARGENT

THE size of the engine compared to the weight or capacity of its tractors is so variable for not only different designs of tractors but often for different sizes of the same design, that a discussion of the proper size of engine for a given tractor seems desirable both for the purchaser as well as for the manufacturer.

It was not many years ago that when a larger electric generator was required, it would be built, tested and its rating obtained from the test output before its capacity was filled in on name plate, and the tractor engine situation seems almost in the same category.

There has been recently an inclination to furnish larger engines than formerly and the reasons given, which would seem logical if not thoroughly analyzed, are that more belt and draw bar horse power can be developed. In buying a tractor, the purchaser is inclined to prefer the tractor with the larger engine, other things such as weight, draw bar pull, etc., being equal, little realizing that from the standpoint of efficiency too large an engine is worse than one too small.

As the steam engine was the prime mover in the first commercial tractors (in those days they were called traction engines) there has been a tendency of manufacturers to rate the internal combustion or gas engine in the same way and the operator to expect an overload capacity.

In order to thoroughly comprehend the difference between the two types of prime movers, the steam and gas engine, or the external and internal combustion engine, let us consider the cycle or operation of each. A steam engine is rated at its most economical load, which is one-fourth cut off at say 100 pound boiler pressure. Running at this rating, steam at say 100 pounds pressure is admitted to the cylinder until the piston has reached one-fourth of its travel, when the steam is cut off and, on account of the admitted volume of steam expanding as the piston continues the stroke, there will be an average or mean pressure of 50 pounds.

Now if, instead of cutting off the steam at one-fourth stroke, it is admitted full stroke of the piston, the average pressure will be 100 pounds, the horse power will be doubled and the steam consumption will be four times as much as at rated load.

Then again, if the boiler pressure is raised to 150 pounds, the

horse power output is raised fifty per cent so that a steam engine whose economical rating is say 10-horse power will have a possible output of 30-horse power when desired, but with a greater consumption of fuel per horse power output than at rated load.

A gas engine when rated at its most economical load is rated at all the load it will develop at which a full cylinder of gas and air is taken in during the suction or induction stroke. As we cannot increase atmospheric pressure, which corresponds to the boiler pressure used in a steam engine, we cannot get more heat units in the gas engine cylinder—therefore we cannot get an overload from a gas engine and the fuel consumption per unit of output increases rapidly as the load gets lighter, as hereafter explained.

In order to thoroughly diagnose the relation of engine capacity to load, let us consider the operation of the ordinary internal combustion engine—a type used on ninety-nine per cent of the commercial tractors.

When a cylinder full of combustible mixture or gas is compressed, fired, expanded and released, full power of the engine will be developed—and a characteristic of this type of engine is that under such conditions more heat is turned into work than at any other load.

Of course, more than full load cannot be obtained, because if the cylinder is full of gas before compression no more can be drawn in, so the average pressure after ignition within a cylinder cannot be increased.

There are several reasons why a gas engine at full load will furnish more power per pint of fuel consumed than at lesser loads, the most important of which is that the higher the compression the greater the amount of heat turned into work. Diesel engines compressing to 500 pounds deliver a horse power with about one-half the fuel used by a tractor engine.

In order to prevent standard truck or tractor engines from running too fast with a reduced load, the amount of gas drawn in during the suction stroke is limited by a hand or a governor controlled butterfly or throttling valve, reducing the compression pressure and the efficiency, and at the same time putting a back pressure on every piston by

Continued on page 15

Guaranteed Endless Canvas Belts AND LUBRICATING OILS

AT PRICES THAT PUT DOLLARS BACK IN YOUR POCKET | ORDER EARLY AND AVOID DISAPPOINTMENT

100' 8" 4-Ply \$39.50	150' 8" 5-Ply \$69.00
---------------------------------	---------------------------------



100 ft., 8 in. x 4-ply, \$39.50	120 ft., 8 in. x 4-ply, \$46.00
100 ft., 8 in. x 5-ply, \$46.00	120 ft., 8 in. x 5-ply, \$54.30
150 ft., 8 in. x 5-ply, \$69.00	

Special Reduced Prices for Quick Sale
Made of Extra Strong Special Weave Duck

On account of the peculiar construction of this belting it is unaffected by atmospheric changes, uninjured by water or steam and may be subjected to a degree of heat ruinous to other belting. It is therefore the best belting for outdoor use and for wet, damp or hot places.

No. 70 "FASCO" Heavy-Duty, Gas Engine Cylinder Oil

A red, colored oil of highest fire test. Guaranteed to lubricate perfectly without carbonizing.

45-GALLON BARRELS	\$19.60
30-GALLON 1/2-BARRELS	\$13.85
5-GALLON CANS, Each	\$2.90
1-GALLON CANS, Each	70c

No. 71 "FASCO" Castor Machine Oil

A stringy-bodied, pale colored oil, suitable for general farm machinery lubrication. Will not run off bearings. This is not a low-grade oil.

45-GALLON BARRELS	\$15.10
30-GALLON 1/2-BARRELS	\$10.55
5-GALLON CANS, Each	\$2.60
1-GALLON CANS, Each	63c

No. 72 "FASCO" Compounded Harvester Oil

Will go twice as far as any other oil on the market. Positively guaranteed to give satisfaction.

45-GALLON BARRELS	\$14.95
30-GALLON 1/2-BARRELS	\$10.90
5-GALLON CANS, Each	\$2.35
1-GALLON CANS, Each	63c

No. 78 "FASCO" CUP GREASE

For the lubrication of cups, crank pins, journal and open bearings. Equal to any, at 20 per cent less in price.

In 25-lb. Pails, Ea.	\$2.70
----------------------	---------------

No. 75 "FASCO" Steam Cylinder Oil

Made from Pennsylvania crude. Has 650 fire test. Nothing like it on the market. Order on approval. 8 gallons will last as long as 7 gallons of any other brand.

45-Gallon Barrels	\$23.75
30-Gallon 1/2-Barrels	\$16.85
5-Gallon Cans, Each	\$3.70
1-Gallon Cans, Each	85c

No. 73 "FASCO" AXLE GREASE

A pure graphite grease. Has great wearing qualities. Put up in 25-lb. pails only. Send for one and save money. In 25-lb. pails, Ea.

	\$1.80
--	---------------

DO YOU DRIVE AN AUTO?

If so, use "FASCO" XXX Auto Oil. There is nothing to equal it on the market. Has highest fire test and will not carbonize. Light yellow in color.

In 45-GALLON BARRELS	\$20.30
In 30-GALLON 1/2-BARRELS	\$15.85
In 5-GALLON CANS, Each	\$3.20
In 1-GALLON CANS, Each	80c



No. 76 "FASCO" Dynamo Engine Oil

A pale red oil, guaranteed the best engine oil made. For dynamos, motors and engines of all kinds. Has good cold test and high fire test.

45-GALLON BARRELS	\$17.80
30-GALLON 1/2-BARRELS	\$12.55
5-GALLON CANS, Each	\$2.85
1-GALLON CANS, Each	69c

THE FARMERS' SUPPLY CO., LTD.

175 BANNATYNE AVE. E. Dept. C.T. WINNIPEG, Man.

TRADE MARKS PATENTS AND DESIGNS

Write for booklet, circulars, terms, etc.

FETHERSTONHAUGH & CO.

FRED. F. FETHERSTONHAUGH, E. C. M. E.
GERALD S. ROXBURGH, E. A. S.C.

36-37 Canada Life Bldg. WINNIPEG

BOOK ON DOG DISEASES And How to Feed
Mailed free to any address by the Author
H. CLAY GLOVER CO., Inc.
118 West 31st Street, New York

Myers Tank Pumps



Have Capacity, Ease of Operation and Wearing Qualities appreciated by threshermen and others. Built with "Rolling Motion" Cut Gear or Plain Handle for operation by hand or gasoline engine. The name MYERS guarantees the pumping service. Circulars on request.

F. E. Myers & Bro., Ashland, Ohio

The "Challenge" WATERPROOF all- linen COLLAR



THE CHOICE OF PARTICULAR MEN
SMART - STYLISH - ECONOMICAL
NO LAUNDRY BILLS TO PAY
AT YOUR DEALER'S, OR DIRECT, 25c
THE ARLINGTON CO., 55-56 Nassau St.
OF CANADA, TORONTO
MADE IN CANADA

Twelve Months of this Magazine for \$1.00