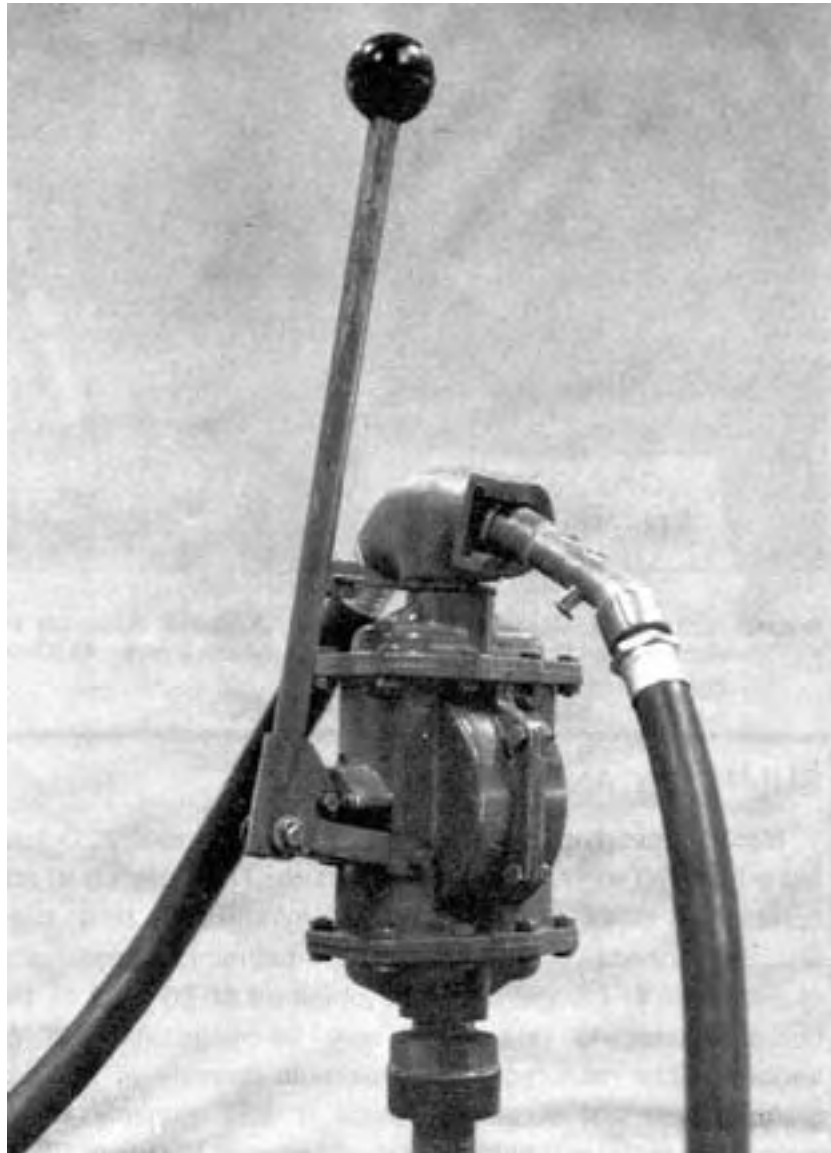


Evaluation Report

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Gasboy Model 320 Dual Vacuum Hand Pump

A Co-operative Program Between

GASBOY MODEL 320 DUAL VACUUM HAND PUMP

MANUFACTURER:

Gasboy of Canada Ltd.
430 Industrial Road
P.O. Box 6185, Stn. "D"
London, Ontario
N5V 2Y3

DISTRIBUTOR:

Westeel-Rosco Ltd.
4111 - 15A St. S.E.
Calgary, Alberta
T2G 3P2

RETAIL PRICE:

\$83.35 (January, 1977, f.o.b. Lethbridge)

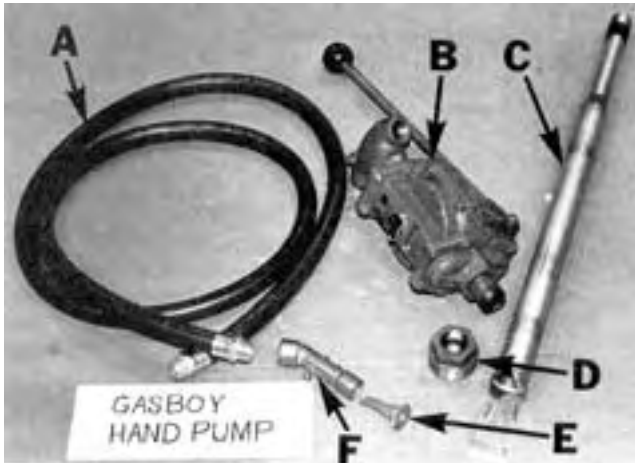


FIGURE 1. Gasboy Model 320 Hand Pump: (A) Outlet Hose, (B) Pump Body, (C) Telescopic Suction Pipe, (D) Bung Adaptor, (E) Nozzle Strainer, (F) Outlet Nozzle.

SUMMARY AND CONCLUSIONS

Normal pumping rates for the Gasboy Model 320 hand pump were from 30 to 50 strokes per minute. The flowrate at an average pumping rate of 40 strokes per minute, at zero suction and discharge heads, was 37 L/min (8.1 gal/min). A maximum flowrate of 64 L/min (14.1 gal/min) was obtained at 70 strokes per minute but this pumping rate could only be maintained for about 15 seconds. The manufacturer's maximum flowrate of 76 L/min (16.7 gal/min) was not obtainable since it was humanly impossible to pump that fast. Increasing the suction head to 0.9 m (3 ft) and the discharge head to 1.8 m (6 ft), at 40 strokes per minute, resulted in only a 3% reduction in flowrate.

Pumping effort increased significantly with increased pumping rates, suction and discharge heads. The required pumping force at the end of the pump handle increased from 91 N (20 lb) at 30 strokes per minute to 163 N (37 lb) at 50 strokes per minute. Increasing the suction and discharge heads from zero to 0.9 m (3 ft) and 1.8 m (6 ft), respectively, increased pumping effort by 16% when operating at 40 strokes per minute.

The Gasboy 320 was very portable. The pump was difficult to position in a fuel supply tank since the bung adaptor did not rotate relative to the pump body. The entire pump body and hose had to be turned and over tightened or loosened to properly position the pump handle for convenient pumping.

The pump was equipped with both a suction filter and an outlet nozzle strainer. The outlet nozzle strainer plugged easily due to its irregular shape, which reduced the area in which foreign material could be trapped.

The Gasboy 320 was safe to operate. When filling a tank, care must be exercised to prevent overflow.

No operating instructions or parts list were supplied with the pump.

One mechanical problem occurred during the test. The spot welds attaching the pump handle to the handle mechanism broke and had to be rewelded.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying a rotating bung adaptor.
2. Welding the pump handle to the handle mechanism more securely.
3. Modifying the shape of the removeable nozzle strainer to increase straining area.
4. Supplying operating instructions and a parts list.
5. Modifying the pump handle grip to permit easier hand motion while pumping.

Chief Engineer: E. O. Nyborg

Senior Engineer: E. H. Wiens

Project Technologist: L. B. Storozynsky

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Gasboy had a rotating bung adaptor. However, because most hand pumps are used in tanks on pick-up trucks, we changed to the rigid adaptor. This was at the request of our distributors who claimed that the rotating adaptor became loose from road vibrations.
2. This will be done.
3. We have referred this to our supplier and asked that the fold in the mesh be made broader to give a greater surface.
4. We will supply a parts list with each pump.
5. The knob handle grip was designed to provide for easy pumping from any position at the tank (i.e. from the end of the tank or either side). It has long been an advantageous feature of the Model 320 and we do not consider making any modifications.

GENERAL DESCRIPTION

The Gasboy Model 320 is an instant priming, hand operated, double action piston pump. It is designed for pumping gasoline, diesel fuel, solvents, or lube oil from above ground tanks and drums equipped with 50 mm (nominal 2 inch NPT) openings. It is equipped with a 1040 mm (41 in) telescopic suction pipe, a 2.6 m (8.5 ft) outlet hose and a 387 mm (15.25 in) pump handle. The top of the pump handle is equipped with a plastic ball grip and can be locked against the pump body to prevent theft. The pump nozzle when not in use is stored within a receptacle on the pump body.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Gasboy Model 320 was evaluated for ease of operation and safety. Pump performance characteristics and pumping effort at various pumping rates, suction and discharge heads were determined with diesel fuel.

RESULTS AND DISCUSSIONS

PUMP PERFORMANCE

Pumping Rate: Pumping rates from 30 to 50 strokes per minute were determined as the normal range at which a farmer could continuously operate this pump when filling a large tractor tank. A maximum pumping rate of 70 strokes per minute was reached but was impossible to maintain for any reasonable length of time. The pumping rate of 90 strokes per minute, upon which the manufacturer based the maximum capacity of the pump, was unrealistic and virtually impossible to obtain.

Flowrate: Pump performance characteristics with diesel fuel at zero suction and discharge heads are given in FIGURE 2. Suction head is the distance the fuel level is below the pump intake valves and discharge head is the height the outlet nozzle is held above the pump.

Increased pumping rates increased the flowrate by about 0.9 L (0.20 gal) per stroke. Flowrate at the average pumping rate of 40 strokes per minute was 37 L/min (8.1 gal/min).

Increasing suction and discharge heads had only a small effect on the flowrate. Increasing the suction and discharge heads from zero to 0.9 (3 ft) and 1.8 m (6 ft), respectively, decreased the flowrate from 37 L/min (8.1 gal/min) to 36 L/min (7.9 gal/min), when pumping at 40 strokes per minute. This combination of suction and discharge

heads is more severe than would be encountered in transferring fuel to most farm machinery and represents only a 3% decrease in flowrate.

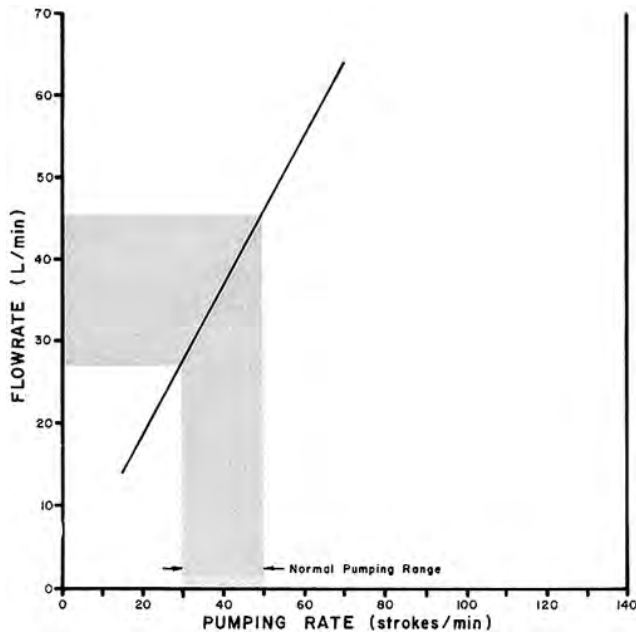


FIGURE 2. Flowrates with Diesel Fuel at Zero Suction and Discharge Heads.

The maximum flowrate obtained was 64 L/min (14.1 gal/min) at a pumping rate of 70 strokes per minute. This pumping rate could only be maintained for about 15 seconds. The manufacturer's maximum flowrate of 76 L/min (16.7 gal/min) at 90 strokes per minute could not be obtained, since the average person could not pump that fast.

EASE OF OPERATION

Pumping Effort: Pumping effort is the hand force that has to be exerted, perpendicular to the pump handle, to operate the pump. FIGURE 3 shows the hand forces needed at various pumping rates, suction heads and discharge heads. Pumping effort increased with increases in both pumping rates and head. At a pumping rate of 50 strokes per minute, with zero suction and discharge heads, pumping effort was 183 N (37 lb) compared to an effort of 91 N (20 lb) at 30 strokes per minute. At an average pumping rate of 40 strokes per minute, pumping effort increased from 127 N (29 lb) at zero suction and discharge heads to 147 N (33 lb) at suction and discharge heads of 0.9 m (3 ft) and 1.8 m (6 ft), respectively.

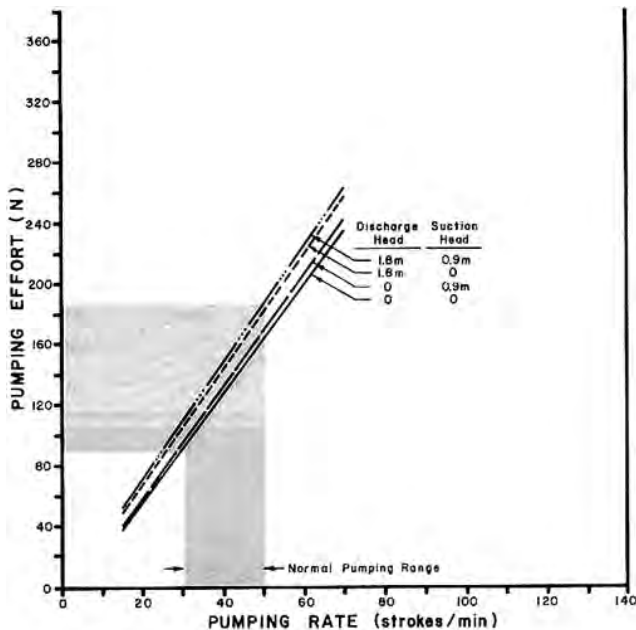


FIGURE 3. Pumping Effort with Diesel Fuel at Various Pumping Rates, Suction and Discharge Heads.

Pump Handle: The top of the pump handle was equipped with a plastic ball grip. The hand normally moved on the grip during each pumping stroke. Friction between the plastic ball and the hand caused the hand to become sore during constant pumping. It is recommended that the manufacturer modify the pump handle grip to allow for easier hand motion.

Fuel Tank Connection: The Gasboy Model 320 was portable and was equipped with a 50 mm (nominal 2 inch NPT) bung adaptor to fit standard fuel tank openings. The bung adaptor could not be turned relative to the pump body, making it difficult to install in a fuel tank since the entire pump body and hose had to be turned. Once attached to a fuel tank the pump had to be over tightened or loosened to place the pump handle in a convenient pumping position. A rotating bung adaptor is recommended to eliminate this problem.

Filling A Fuel Tank: The outlet hose was equipped with a standard fuel nozzle. An automatic shut-off nozzle is available as optional equipment. Pumping at 40 strokes per minute, it took from 6 to 8.5 minutes to fill a 225 L (50 gal) tractor fuel tank with filler opening typically located 1 m (3.3 ft) higher than the top of a typical farm truck fuel supply tank.

Servicing: The Gasboy Model 320 was equipped with a suction fuel screen. The screen could be serviced by removing the bottom cover plate on the pump body.

The outlet nozzle was equipped with a removeable strainer. The strainer could be serviced by unscrewing it from the outlet nozzle. The nozzle strainer plugged quickly due to its irregular shape, which reduced the area in which foreign material could be trapped (FIGURE 4). This resulted in a high concentration of foreign material in one area of the strainer. It is recommended that the manufacturer improve the shape of the strainer to increase the straining area. The pump required no lubrication.



FIGURE 4. Plugged Outlet Nozzle Strainer.

SAFETY

The fuel outlet nozzle was equipped with a hook, which prevented it from falling out of a filler opening when pumping. Care must be exercised to avoid overflow. To prevent overflow, an automatic shut-off nozzle is available as an option. A lock arm was provided which permitted locking the pump handle in storage position.

OPERATOR'S MANUAL

No parts list or operating instructions were supplied with the Gasboy Model 320. It is recommended this information be supplied with each pump.

MECHANICAL PROBLEMS

The Gasboy Model 320 was operated for about 3 hours. The intent of the test was an evaluation of functional performance and an extended durability evaluation was not conducted.

The only problem that occurred was failure of the spot welds attaching the pump handle to the handle mechanism, necessitating rewelding. It is recommended that the pump handle be more securely welded to the handle mechanism to avoid spot weld failures.

**APPENDIX I
SPECIFICATIONS**

MAKE: Gasboy Dual Vacuum Hand Pump
MODEL: 320
SERIAL NUMBER: 25809

OVERALL DIMENSIONS:
-- height 560 mm (22 in)
-- width 134 mm (5.3 in)
-- length 200 mm (7.87 in)
-- pump handle length 387 mm (15.25 in)

TOTAL WEIGHT: 7 kg (15 lb)

SUCTION PIPE:
-- size 25 mm (nominal 1 inch NPT)
-- telescoping length 584 to 1041 mm (23 to 41 in)
-- storage tank bung adaptor 50 mm (nominal 2 inch NPT)

DISCHARGE HOSE:
-- size 20 mm (0.75 in)
-- length 2.6 m (8.5 ft)

**APPENDIX II
METRIC UNITS**

In keeping with the Canadian metric conversion program, this report has been prepared in SI units. For comparative purposes, the following conversions may be used:

1 litre per minute (L/min) = 0.22 Imperial gallons per minute (gal/min)
1 metre (m) = 1000 millimetres (mm) = 39.37 inches (in)
1 Newton (N) = 0.22 pounds force (lb)
1 kilogram (kg) = 2.20 pounds mass (lb)



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