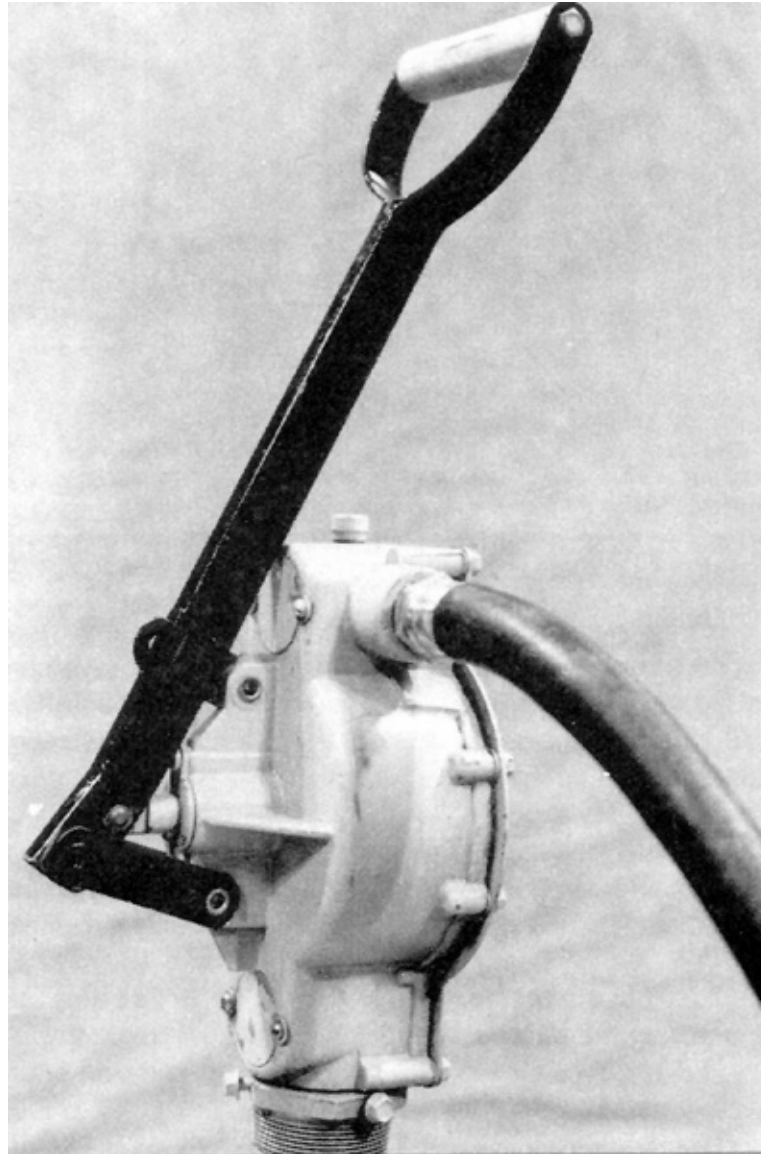


Evaluation Report

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Scienco Hand Pump

A Co-operative Program Between



ALBERTA
FARM
MACHINERY
RESEARCH
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

SCIENTO HAND PUMP

MANUFACTURER:

Scienco Inc.
3093 Bell Brook Ctr. Dr. E.
Memphis, Tenn. 38116
U.S.A.

DISTRIBUTOR:

Mumford Medland Ltd.
21 Murray Park Road
Winnipeg, Manitoba
R3J 3S2

RETAIL PRICE:

\$62.00 (January, 1979, f.o.b. Lethbridge)

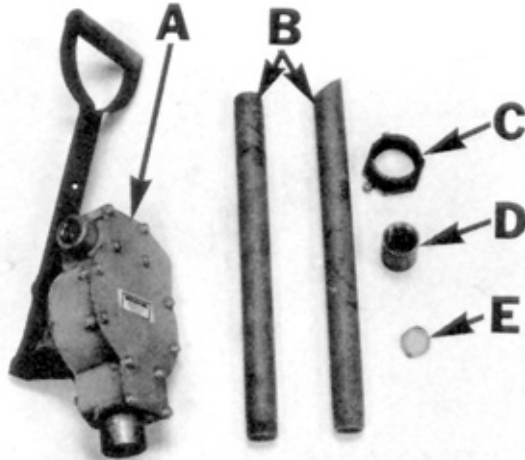


FIGURE 1. Scienco Hand Pump: (A) Pump Body, (B) Suction Pipes, (C) Bung Adaptor, (D) Suction Pipe Coupler, (E) Suction Fuel Strainer.

SUMMARY AND CONCLUSIONS

Normal pumping rates for the Scienco 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 32 L/min (7 gal/min). A maximum flowrate of 60 L/min (13.2 gal/min) was obtained at 74 strokes per minute but could only be maintained for about 30 seconds. Increasing suction and discharge heads had no effect on the 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 152 N (34 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 37%, when operating at 40 strokes per minute.

The Scienco pump was very portable. The pump was very easy to position in a fuel supply tank since it was equipped with a rotating bung adaptor.

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

The pump was equipped with a suction screen which could be easily serviced.

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

One mechanical problem occurred during the test. Both the outlet and inlet valve covers leaked due to valve cover seals deteriorating and the valve cover screws not applying enough pressure on the valve cover seals.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to prevent fuel leaking around the outlet and inlet valve covers.

2. Supplying an outlet hose and nozzle as standard equipment and making available, as an option, an outlet nozzle with an automatic shut-off.

3. Supplying operating instructions and a parts list.

Chief Engineer: E. O. Nyborg

Senior Engineer: E. H. Wiens

Project Technologist: L. B. Storzynsky

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Leaking valve covers were probably caused due to the gasket material drying out. New pumps will be equipped with O-rings instead of gaskets.
2. The pump is normally supplied with a 2.4 m (8 ft) length of 19 mm (3/4 in) inside diameter hose with 19 mm (3/4 inch NPT) fittings on each end complete with an open end nozzle. An automatic shut-off could be supplied depending on customer demand. The additional price would be \$60.00.
3. Operating instructions and a parts list are supplied with each pump and were inadvertently omitted from the test pump package.

GENERAL DESCRIPTION

The Scienco hand pump is a self priming, hand operated, double action piston pump. It is designed for pumping gasoline, diesel fuel, solvent, or lube oil from above ground tanks or drums equipped with 50 mm (nominal 2 inch NPT) openings. It is equipped with two lengths of pipe which are coupled together to form an 840 mm (33 in) long suction pipe. The pump handle is 362 mm (14.25 in) long. The top of the pump handle is equipped with a wooden grip and can be locked against the pump body to prevent theft. The pump tested was not supplied with an outlet hose. For the test, a standard 2 467 mm (8 ft) long, 20 mm (0.75 in) inside diameter, hose was supplied by P.A.M.I. The pump body has a receptacle for storing a standard hand pump nozzle when not in use.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Scienco hand pump 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 DISCUSSION

PUMP PERFORMANCE

Pumping Rate: Pumping rates from 30 to 50 strokes per minute were determined as the normal range a farmer could continuously operate this pump when filling a large tractor tank. A maximum pumping rate of 74 strokes per minute was reached but was impossible to maintain for any reasonable length of time.

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 0.8 L (0.2 gal) per stroke. Flowrate at the average pumping rate of 40 strokes per minute was 32 L/min (7 gal/min).

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 no variation in flowrate.

The maximum flowrate obtained was 60 L/min (13.2 gal/min) at a pumping rate of 74 strokes per minute. This pumping rate could only be maintained for about 30 seconds.

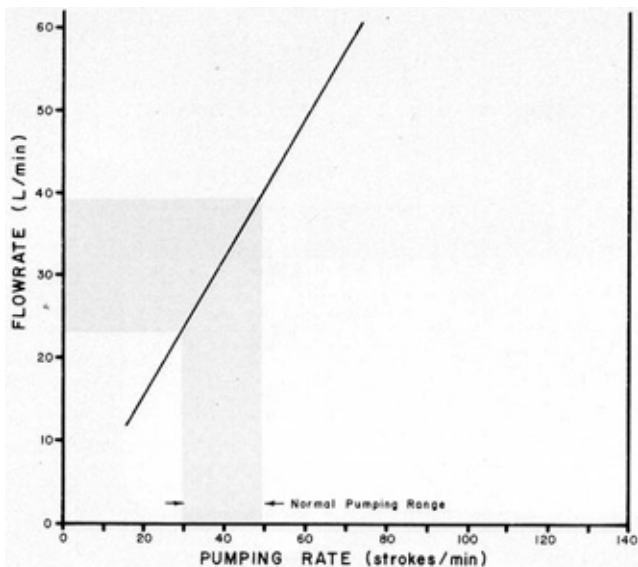


FIGURE 2. Flowrate with Diesel Fuel at Zero Suction and Discharge Heads.

EASE OF OPERATION

Pumping Effort: Pumping effort is the hand force that has to be exerted, perpendicular to the end of the pump handle, to operate the pump. FIGURE 3 shows the hand force needed at various pumping rates, suction and discharge heads. Pumping effort increased with increasing pumping rates and with increased head. At a pumping rate of 50 strokes per minute, with zero suction and discharge heads, pumping effort was 152 N (34 lb) compared to 91 N (20 lb) at 30 strokes per minute. At an average pumping rate of 40 strokes per minute, pumping effort increased from 121 N (27 lb) at zero suction and discharge heads to 166 N (37 lb) with suction and discharge heads of 0.9 m (3 ft) and 1.8 m (6 ft), respectively.

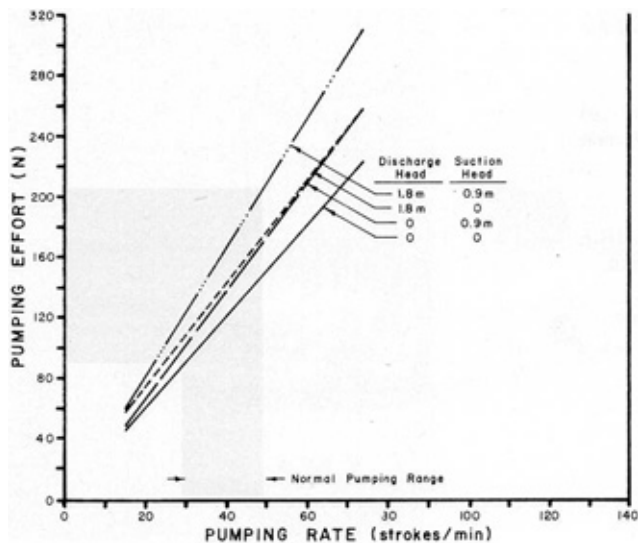


FIGURE 3. Pumping Effort with Diesel Fuel at Various Pumping Rates, Suction and Discharge Heads.

Fuel Tank Connection: The Scienco was portable and was equipped with a 50 mm (nominal 2 inch NPT) bung adaptor to fit standard fuel tank openings. The bung adaptor turned relative to the pump body, making it very easy to install and position in a fuel tank.

Filling A Fuel Tank: No outlet hose or nozzle were supplied with the pump. It is recommended a hose and nozzle be supplied as standard equipment and an automatic shut-off nozzle be made available as an option.

Pumping at 40 strokes per minute, it took from 7 to 7.5 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 Scienco hand pump was equipped with a suction fuel strainer. The strainer was located inside the coupler which coupled up the two lengths of suction pipe.. It could be easily serviced by removing the bottom half of the suction pipe from the coupler.

The pump required no lubrication.

SAFETY

When pumping, care must be exercised to avoid overflow.

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 Scienco pump. It is recommended this information be supplied with each pump.

MECHANICAL PROBLEMS

The Scienco pump 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 mechanical problem encountered during the functional evaluation was that both the inlet (FIGURE 4) and outlet valve covers leaked. The original valve cover seals deteriorated early in the test and were replaced with heavier gaskets. The screws provided for the valve covers did not provide enough pressure on the gaskets. A silicone sealant around the valve cover edges was used to stop the leaking. Modifications are recommended to prevent valve cover leaking.

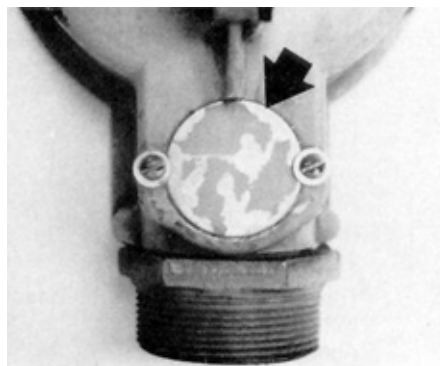


FIGURE 4. Inlet Valve Cover.

APPENDIX I

SPECIFICATIONS

MAKE: Scienco Hand Pump

OVERALL DIMENSIONS:

- height	495 mm (19.5 in)
- width	160 mm (6.3 in)
- length	178 mm (7 in)
- pump handle length	362 mm (14.25 in)

WEIGHT:

- pump body	3.2 kg (7 lb)
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SUCTION PIPE:

- size	25 mm (nominal 1 inch NPT)
- standard length	840 mm (33 in)
- storage tank bung adaptor	50 mm (nominal 2 inch NPT)

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 (ga/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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