Residential Compost Spreader

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Problem

Currently, there is very little available for the average homeowner to use to apply organic compost as a fertilizer on their lawns. Our plan was to design, develop, build, and test a spreader that can be pulled behind the average lawnmower to spread compost. The unit is cost effective enough to appeal to a broad market. The budget for this project was $500. The idea was if we can make one spreader for $500, a company producing a large quantity of them can make one for $150 and market them $250- $300. Completion date is April 19, 2012.

Economics

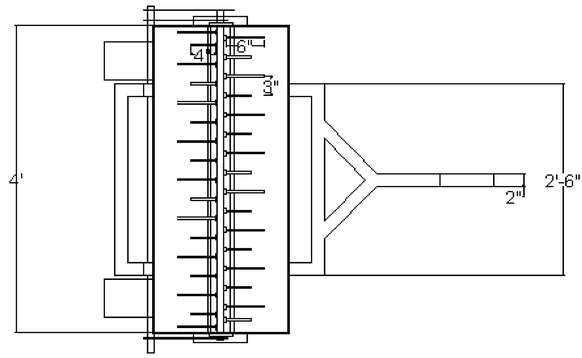
Our materials were ordered and purchased through various local suppliers. This allowed us to have a large choice of vendors for replacement parts if necessary. All of our steel came from Purdue Central Machine. Our sprockets, bearings, and chains were purchased at Kaman Industrial Technologies. The miscellaneous hardware and fasteners were from Ace Hardware and Tractor Supply Co. If a spreader like ours were to be mass produced, the input costs would be much lower after bulk purchasing discounts. The steel prices would also be a lot less because the hopper would be injection molded from plastic. Then the frame could be much lighter.

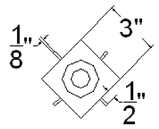
Bill of Materials

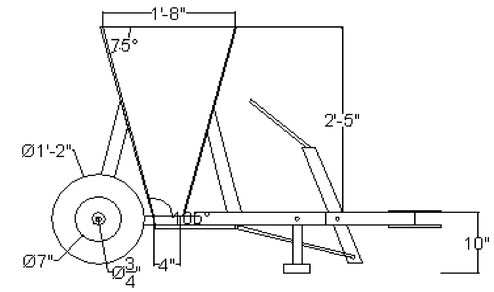
Steel	$ 178
Bearings and sprockets	$212
Chains	$35
Fasteners	$25
Paint	$50
Total	$500

Background

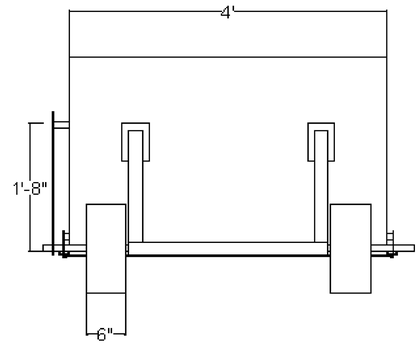
There are few options on the market for a homeowner to spread compost on their lawn. However, there are dry and wet fertilizer spreaders, but nothing that can handle compost. Compost is a heavy, bulky, bio-based material that is applied to lawns as a form of fertilizer and soil treatment. The compost is high in organic matter and rich in nutrients. With compost, nutrients are released slowly, lowering the amount nutrients lost in runoff. Compost is much more effective than pelleted fertilizer.







Isometric Drawing



Final Solution

The final solution that was chosen is a drop spread system. It is growd driven with an agitator spinning spreader at the bottom of the hopper. Its max capacity is 12 cubic feet of compost. There is a gear ratio of 1:1 between the tire and bottom spreader and a 1:2 ratio between the agitator and the tire. In 100 feet, the beater will spin 27 times and the agitator will spin 13.5 times. The spreader was made from carbon steel. The chain is ANSI #40 and the sprockets are 12 and 24 tooth. The gate is adjustable to regulate the flow of material.

Spreader Test

Alternative Solutions

- Building the prototype out of plastic to reduce weight
- Using pulleys and belts to transfer power would make disengaging the spreader easier
- Implementing tighter tolerances to reduce the amount of unregulated flow
- Milling keyways on the stub shafts would reduce the potential for sprocket slipping

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