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Problem:

- Specialty crops are hard to transport from the field to the destination of sale without damaging
 - Produce bruise and damage very easily
 - Less crop available for sell
 - Less appealing when crop is damaged
- Current way of transporting produce is with a rigid frame trailer with no cushion or shock absorbance
- This wagon has no way of adding any cushion for specialty crops, especially over a wide range of loads

Background:

- Farmer near Battleground, IN specializes in produce (sweet corn, tomatoes, pumpkins)
- These crops have no easy way to be transported from the field to Lafayette area to be sold without damaging
- The farmer usually loads the wagon in the morning and pulls it to its destination where it sits most of the day to be picked through by the community
- The customers chose the highest quality produce that is not damaged and leaves the damaged produce behind
- The wagon needs to be able to vary a load weight of 1000 – 4000lbs

Alternative Solutions:

Option 1: Coil Springs

- Increase bouncing
- Doesn't provide a wide range of load variability while maintaining cushion ride
- Susceptible to swaying

Option 2: Leaf Springs

- Doesn't offer a wide range of load variability and a cushioned ride at the same time
- Heavy and require a larger area to mount
- Durable and simple

Option 3: A-arm design

- Complicated and would require a lot of fabrication
- Not extremely cheap to install or maintain

Option 4: Air Shocks/Bags

- Simple to install
- Very Wide range of load variabilities with change of PSI
- Absorbs small shocks, that damage produce, very well

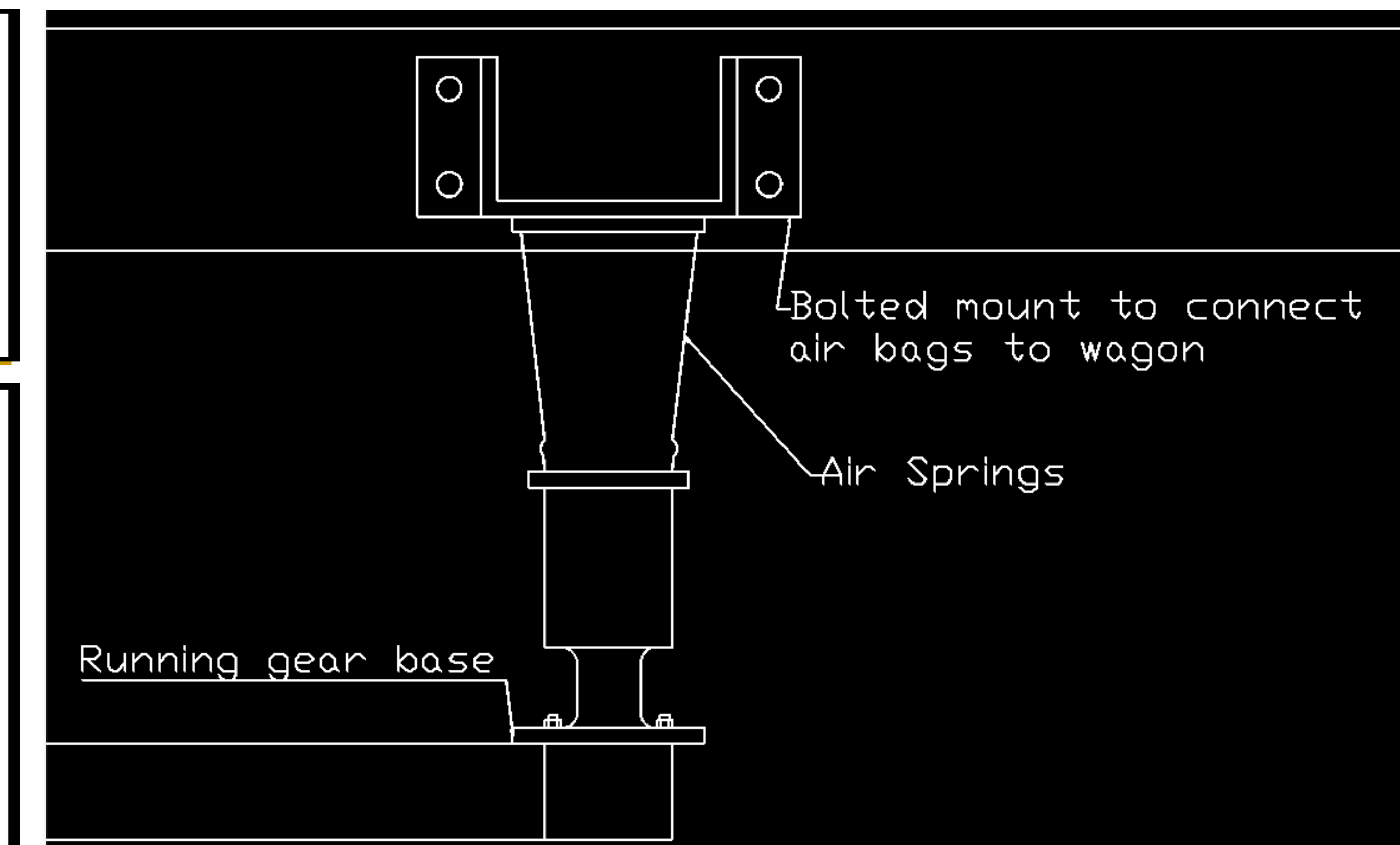


Solution Requirements:

- Reduce impact on produce when traveling
- Relatively inexpensive
- Simple to install and maintain
- Able to accommodate varying loads

Solution Evaluation:

- Option 4 met all the constraints set for this project the best
- Low comparative cost with low or easy maintenance
- Simple design that can be adjusted to different loads
- Weight capacity of 1500 pounds for each air bag with a total weight capacity of 6000 pounds
- Variable inflation up to 100 PSI
- Mounted to running gear and wagon bed in each corner



Economic Analysis:

Costs

2 x Firestone 2212 - Firestone Sport-Rite Air Helper Springs	\$313.99
Total	\$627.98

Crop	Cost per unit	Amount Saved
Sweet Corn	\$6/ dozen	8 dozen
Tomatoes	\$5/ pound	20 pounds
Pumpkins	\$7/ pumpkin	15 pumpkins
Total Saved	\$253/ season	

Societal Impact/Sustainability:

- Simple design allows farmers to perform on farm installation
- Design allows for multiple applications
 - Produce/Vegetables
 - Recreational
 - Various other fragile products
- This air ride suspension kit is designed for a small pick-up
- The addition of brackets to the frame that will act like bumpers will hold the bed from side-to-side and front-to-back movements
- These air bag kits are not hard to find and come in various sizes for different applications
 - Height
 - Weight limits
 - Mounting brackets

Final Design



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