

# SPOT-ON

THEME: SUPINE

Blue Team

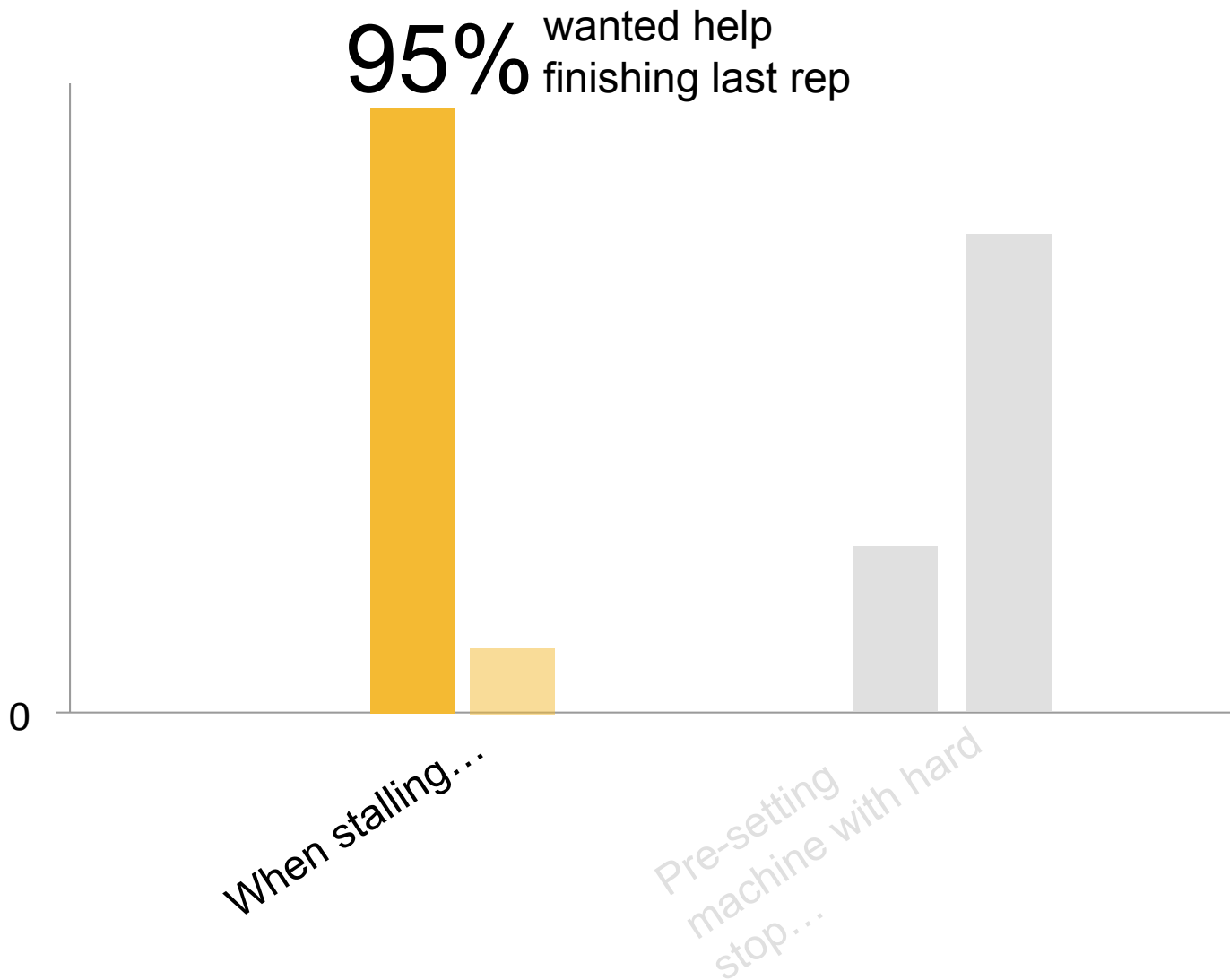
Mockup Review / 10.22.2009

# Spot-On: Our Goals

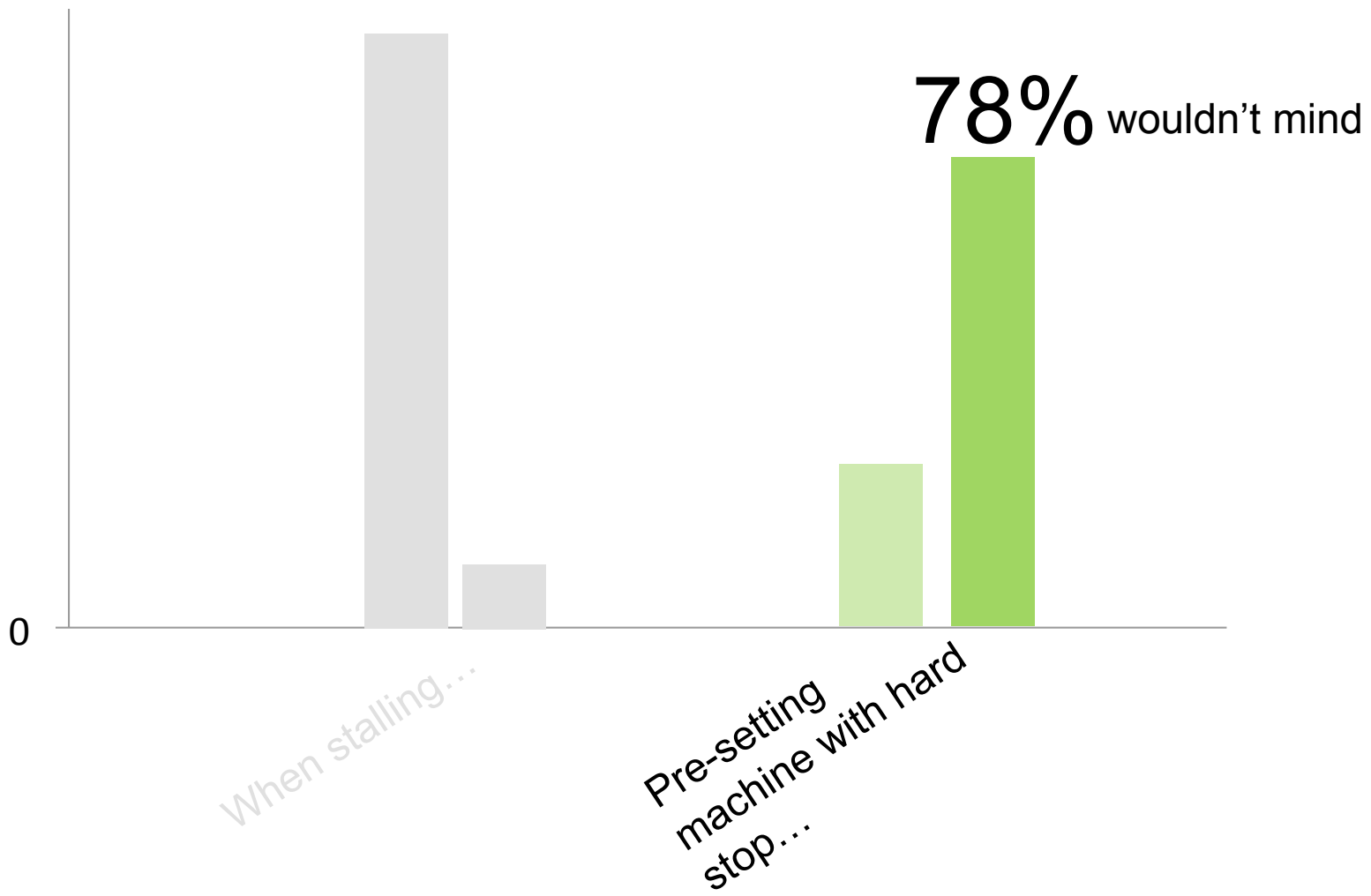


- Free-standing mechanical system that allows for **self-spotting**
- Enable users to bench press in **complete safety**
- Allow users to enjoy **free range of motion**
- Experience a **better overall workout** when exercising alone

# Survey Results



# Survey Results



# Our Product Contract

Customer Needs	Attribute(s)	Engineering Specification(s)
Can be easily fitted around current bench press stands	Size	Less than 10' x 3' (clearance required around machines – handicap accessible)
User Needs	Attribute(s)	Engineering Specification(s)
Prevent bar from hitting user at fail	Hard stop	Stop bar within 0.2 s
Help user through the last rep	Provide instantaneous lift assist at stall	Provide 30 lbs-force upwards when user activates foot pedal
Support users lifting up to 400 lbs	Lifting capability	Can provide 400 lbs-force upwards
Free range of motion/ won't interfere with lifting experience	Degrees of freedom	5

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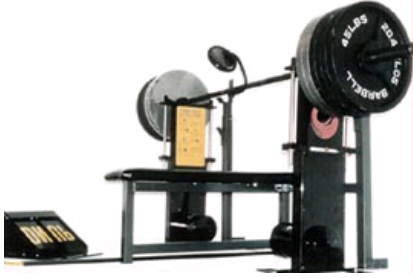
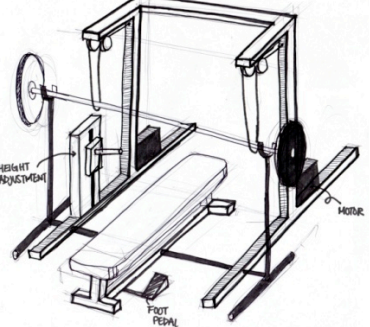
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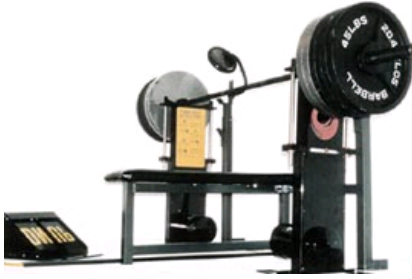
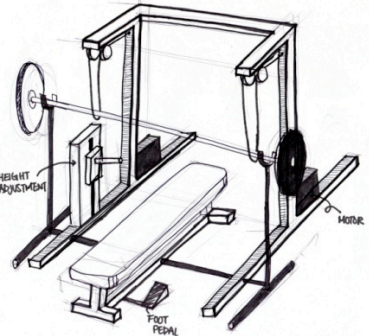
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# Are we competitive?

	Smith Machine	Concepts 2000	Spot On
			
Lift assist at stall		✓	✓
Hard stop at fail	✓		✓
Free range of motion		✓	✓
Market price	\$1,200	\$2,200 - \$2,700	~ \$2,500

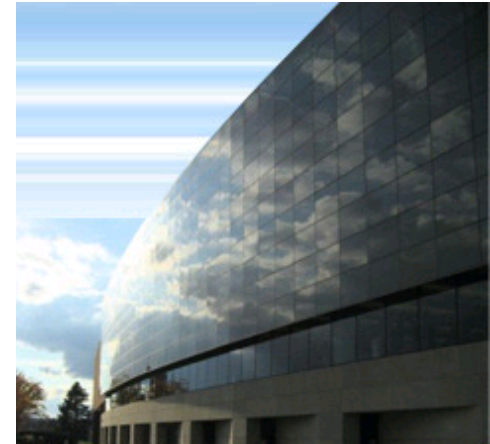
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# Who will buy our product?

- Local market:
  - ▣ MIT Zesiger Center
  - ▣ ~ 230 health clubs and gyms around Cambridge  
(source: [healthclubdirectory.com](http://healthclubdirectory.com))
- National market:
  - ▣ 71,394 gym, health and fitness centers in the US  
(source: [ibisworld.com](http://ibisworld.com))
  - ▣ 50 million estimated health club users in the US by 2010



# Future considerations

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- Winch assembly
  - ▣ Modify to integrate with product
- Motor – less noise!
- Cable creep
- Potentially introducing electrical sensors to fully automate system

# Mock-Up



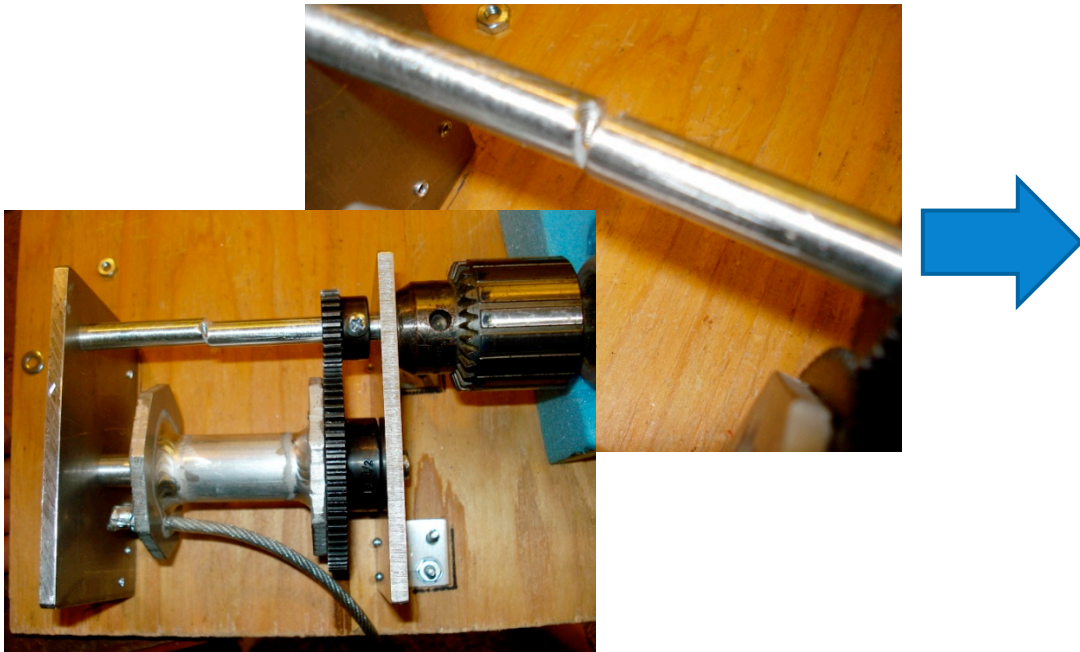
# Can we keep the user from being crushed?

- Height adjustment assembly
  - ▣ User pre-sets lowest point that bar can move to just above chest
  - ▣ Metal stopper on cable hits assembly and prevents further motion



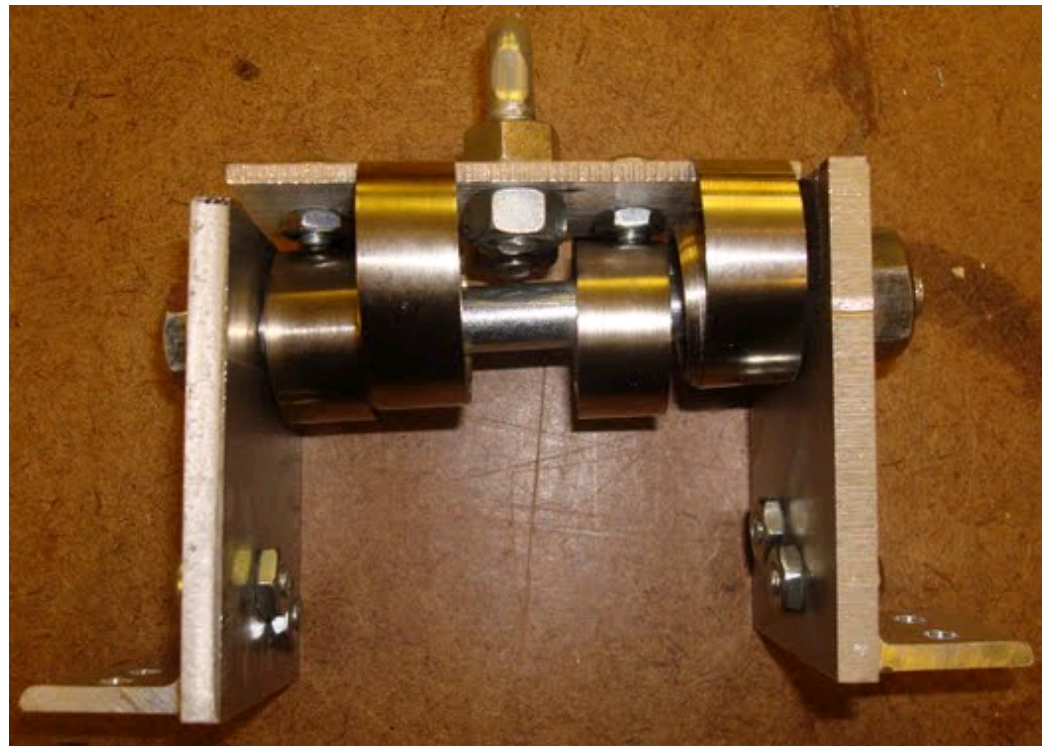
# Can we instantaneously help the user at stall?

- ❑ Foot pedal activated winch assembly
  - ▣ Engages jam cleat
  - ▣ Starts motor to wind cable around capstan to shorten cable length and help user lift bar



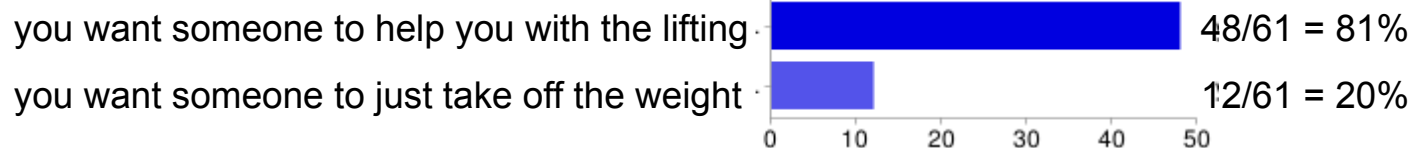
# Can we instantaneously help the user at stall?

- 4 constant force springs supply a total of **40N of upward force** → fast response

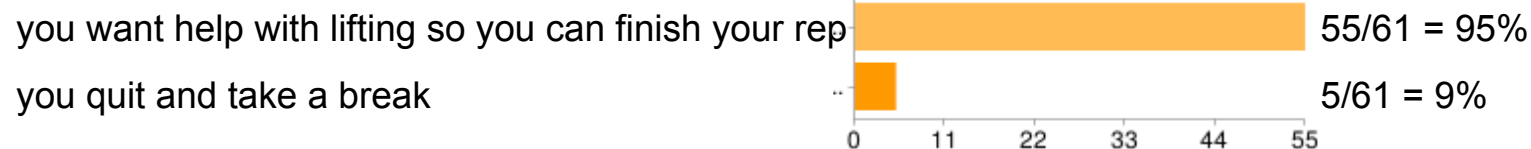


# Survey results

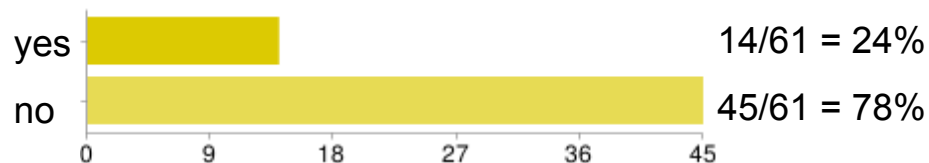
When you are being crushed by the weight while lifting...



When you are stalled (stuck) during a rep...



Do you mind setting up the bench press before lifting so that the bar will not fall and crush you?



\*\*\* People may select more than one checkbox, so percentages may add up to more than 100%. \*\*\*

# Customer + user needs

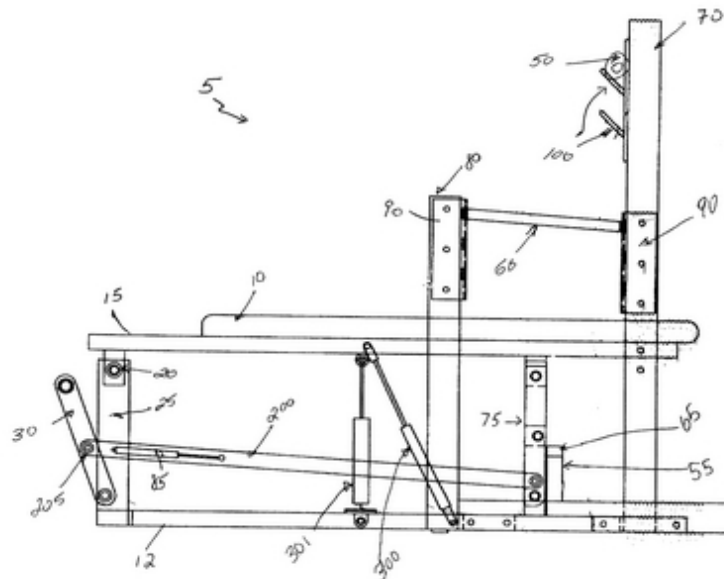


- **Ability to detect stalling and failing**
- **Lift assist at stall to help complete last rep**
- **Hard stop at fail to prevent injury**
- Hold up to 400 lbs
- Free range of motion – 4 degrees of freedom
- Won't interfere with workout experience
- Ability to lock at top, similar to racking



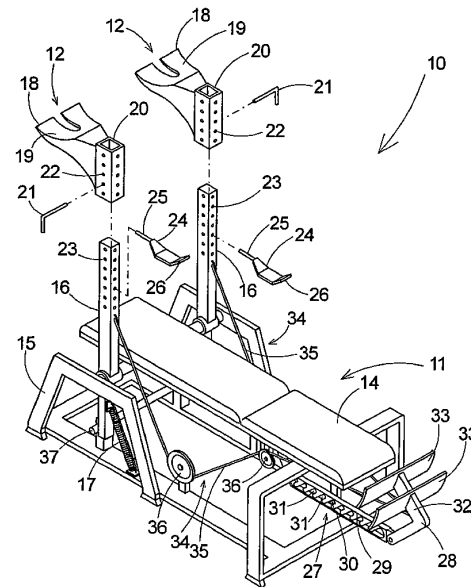
# Existing Patents #1

- Automatic spotting weight bench
  - United States Patent 6689027
  - <http://www.freepatentsonline.com/6689027.html>
  - features
    - controlled lowering motion with a mechanical knuckle
    - mechanical safety device when the operator needs to escape being pinned by the barbell



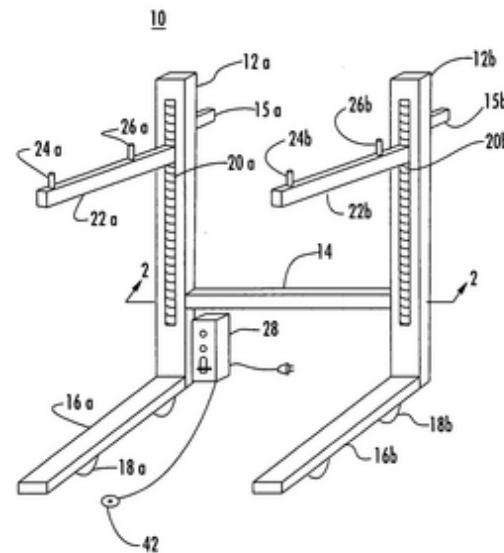
# Existing Patents #2

- Weight bench apparatus
  - United States Patent 7226400
  - <http://www.freepatentsonline.com/7226400.html>
  - features
    - foot assembly that is pushed on to rotate the support assemblies to the horizontal position



# Existing Patents #3

- Weight lifting spotting device
  - United States Patent Application 20070072750
  - <http://www.freepatentsonline.com/y2007/0072750.html>
  - features
    - when assistance is necessary, the exerciser presses a foot actuated switch which in turn operates a motor to rotate the screws to raise the support arms



# Product cost

Item	Specifications	Quantity	Unit Cost	Total Cost
Plywood	70x50 in	2	12.47	24.94
Cable		30 ft	0.45	13.5
Lightbulbs	60 W	4	0.22	0.87
Switches		2	4.49	8.98
Pulleys		9	4.78	43.02
Cam cleats		1	20.91	20.91
			Total \$112.22	