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GSA Contract Holder
Contract 47QSWA20D002L



S • A • F • E

— **STRUCTURE DESIGNS** —

JOHN 13:7

S.A.F.E. MULE

(MULTI FUNCTION UTILITY LOADER-EXPEDITIONARY)



UNITED STATES DEFENSE CONTRACTOR

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S.A.F.E. MULE

S.A.F.E. MULE: MULTI-FUNCTION UTILITY LOGISTIC EQUIPMENT FOR MILITARY AND COMMERCIAL OPERATIONS



MARINE CORPS MISSION:

The S.A.F.E. Multi-Function Utility/Logistics and Equipment (S.A.F.E. MULE) is an advanced military logistics platform designed for weapons handling, transport, and loading in high-intensity operational environments. It plays a critical role in Forward Arming and Refueling Point (FARP) operations within an adversary's Weapons Engagement Zone (WEZ), ensuring rapid and efficient rearming of assault support aircraft.

NAVY, AIR FORCE, ARMY, AND U.S. COAST GUARD MISSION:

The S.A.F.E. MULE is also designed to support larger aircraft and high-capacity loading operations. With a loading deck reach of up to 78 inches, it seamlessly loads 463L pallets into the MV-22, CV-22, CMV-22, CH-53E, CH-53K, CH-47, C-130, and C-17. It is also capable of loading payloads onto the MTRV (Medium Tactical Vehicle Replacement) and the A/M32K-10 Munitions Trailer, enhancing mobility and logistics across multiple military branches.

KEY FEATURES & CAPABILITIES:

- Hydraulic Lift System – Supports heavy payloads up to 10,300 lbs., improving efficiency and reducing loading/unloading times.
- Modular & Versatile Design – Securely handles a wide range of military and commercial cargo.
- Built-In Safety Features – Minimizes operational risks, ensuring secure transport and deployment.
Remote-Controlled Operation – Single-soldier operation for enhanced maneuverability in combat and tactical environments.
- Rugged, All-Terrain Performance – Functions reliably in unimproved and challenging terrains, ensuring operational success in diverse mission environments.

The S.A.F.E. MULE is the ultimate solution for rapid deployment logistics, supporting mission-critical operations across all branches of the U.S. military and commercial industries.

S.A.F.E. MULE PERFORMANCE REQUIREMENTS

1. Capable of lifting & carrying FW & RW aircraft weapons
2. Small enough to deploy w/in amphibious shipping/flown by MV-22 & CH-53
3. Perform multiple O&I task w/in FARP on unimproved surface/rough terrain
4. Adequate ground clearance to operate in austere environment/off-road environment, approach/departure and break over angles to negotiate a min of 18.5° ramps
5. Compatible w/common Armament Weapons Support Equip (AWSE) fork pockets, containerized/palletized ammunition, rocket M648 APKWS All Up Round (AUR) Stowage and Handling Container Fleet Issue Load (FIUL) and precision-guided munitions
6. Compatible with AWSE fork pockets with a safe working load of 5,500 lbs.
7. Able to tow a minimum of one loaded Carrier Ammunition Rough Terrain (CART) or MHU-151/M Munitions Trailer (MAX GW 3,890 lbs) at walking speed over rough terrain while possessing a lifting capacity in excess of 5,500 lbs by use of forks
8. Capable of lifting or rolling loads off or onto the cargo ramps of MV-22, CV-22, CMV-22, CH-53E, CH-53K, CH-47, C-130 and C-17, the bed of an MTRV, and the deck of the A/M32K-10 Munitions trailer while being towed by the Medium Tactical Vehicle Replacement (MTRV)
9. Certified to fly internally inside the following aircraft
10. (Physical dimensions and gross vehicle weight permit internal transport within) MV-22, CV-22, CMV-22, CH-53E, CH-53K, CH-47, C-130 and C-17.
11. Maintainable and repairable under austere field conditions; does not require any special tools
12. Capable of running on diesel or JP-5/8 for minimum of 8 hrs before refueling.
13. Capable of internal transport inside the MV-22 acft with seats installed
14. Capable of External Air Transport (EAT) sling load IAW MIL-STD-931A
15. EAT and cargo tie down adhere to MIL-STD-209K
16. Ability to operate without without radio emissions
17. Designed to meet MIL-STD-461 Table V, RE102, RS103, CE106, CS114, & CS116 for Navy surface ship equip
18. Meets the structural design and test requirements for mil standard 1365D & 8512D.
19. Designed to meet the Electro-magnetic Environmental Effects (E3) requirements of MIL-STD-464, Para 5.3, Table 1 for flight deck environments. E3 intensity does not exceed the Max Allowable Environment (MAE) detailed in Figures 2-1 and 2-2 of NAVSEA OP 3565 Vol 2 when operated near electrically initiated ordnance
20. Designed to meet shipboard shock requirements of MIL-DTL-901, Grade B
21. Designed to resist vibrations associated with operation of LHA, LHD, LPD, and LSD class ships per MILSTD-810, Method 528.1, Type 1
22. Designed to continually operate in temperatures ranging from -20° F to +120°F
23. Designed to withstand storage in temperatures ranging from -60° F to +160°F
24. Designed to operate continuously in an environment up to 95% relative humidity
25. Designed to operate after exposure to salt fog as specified in MIL-STD-810, Method 509.6
26. Designed to operate continuously in blowing rain consisting of four inches per hour rainfall with 40MPH winds
27. Designed to operate after exposure to blowing dust particles (<149 microns) with wind speeds up to 20MPH and a concentration of 10+/-0.7 g/m3
28. Designed to operate after exposure to blowing sand (150 to 850 micron particle size) with wind speeds up to 65MPH and a concentration of 2.2 +/- 0.5 g/m3
29. Capable of handling a fully loaded 463L pallet (as well as smaller pallets, ISU and other containers typically carried by V-22).
30. The SAFE MULE meets the allowable deck pressure on the aircraft which eliminates the need for shoring under the SAFE MULE when loaded for transport in an aircraft



S.A.F.E. MULE SPECIFICATIONS

1. Kabota V1505D diesel engine producing 25 HP
2. Wired or wireless remote control
3. Fork lift height from -4" to 55" (forks flat)
4. Deck lift height from 31" to 78"
5. Deck capacity up to 10,300 lbs (fully load 463L pallet).
6. Stowed profile 38" tall 59" wide 104" long
7. Closed loop hydraulic system 5800 psi, 40 gpm
8. Open loop hydraulic system 2500 psi, 8 gpm
9. Heavy duty off-the-shelf replaceable rubber tracks
10. Heavy-duty Poclain hydrostatic drive motors
11. Fork Capacity 5,500 lbs.
12. Operating Grade/Angle Tolerance: 22 degree angle
13. All terrain "off the shelf" tracks for easy replacement
14. Ground speed: Various (Turtle to Rabbit using progressive controls)
15. The high-capacity IP68-rated Sherpa winch 10K lbs Lift Capacity (25Klbs Pull) quick-attach mechanism for endless accessory attachments
16. Stucchi coupler allows hydraulics to be disconnect and/or connected to the tractor while under pressure with no need to prime the system.
17. Pintle Hook w/ towing capacity of over 12,500 LBS Pull capacity





The deck and quick-attach mechanism tilt and move independently, providing versatile functionality. Image shows quick attachment with forks. Forks are compatible with Armament Weapons Support Equipment AWSE fork pockets and have a capacity of 5,500lbs.

The high-capacity IP68-rated Sherpa winch assists in heavy loading from the ground or elevated platform onto the Pack Mule's deck.



TILTING MECHANISM:

The lift deck is mounted on a pivot at the front end of the machine. Hydraulic cylinders are attached to the rear end of the deck. When the cylinders retract, they force the rear of the deck upward, causing it to pivot and touch the ground with the roller attachment on the front. The roller attachment guides the load smoothly to and from the ground, reducing friction and impact.



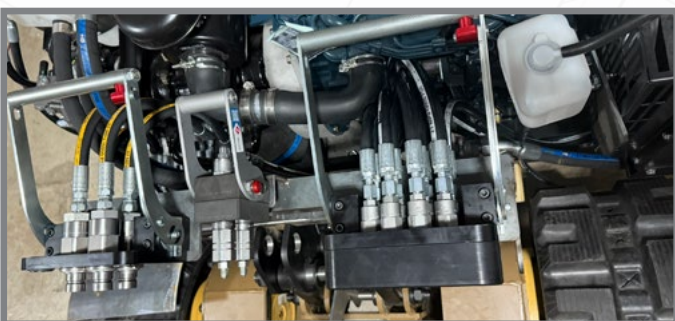
LOADING THE EQUIPMENT:

With the deck on the ground, a load can be pulled directly onto it using the Sherpa winch. The rollers reduce resistance as the load is pulled onto the deck.

RETURNING TO TRANSPORT POSITION:

Once the load is secured, the hydraulic cylinders retract, lifting the front of the deck up to the flat travel position, ready for movement.

The Pack Mule's Power Pack is easily removed by lowering the Power Pack to the down position, pulling four clevis pins and releasing the couplers. These couplers are designed to be released under pressure with no loss of hydraulic fluid or allowing air to enter the system. This creates ease of maintenance or repair or even performing a quick engine change (QEC). Added benefits are the ability to use the Power Pack as a piece of equipment by itself for powering other kinds of hydraulic actuated systems such as generators, water pumps, and many others similar systems.



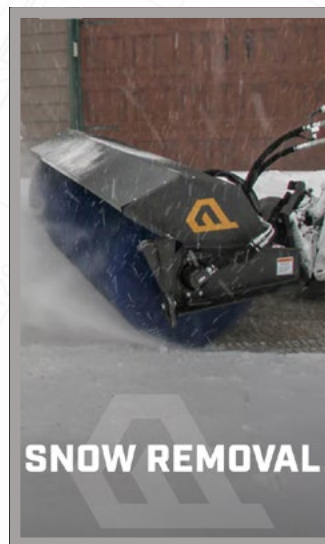
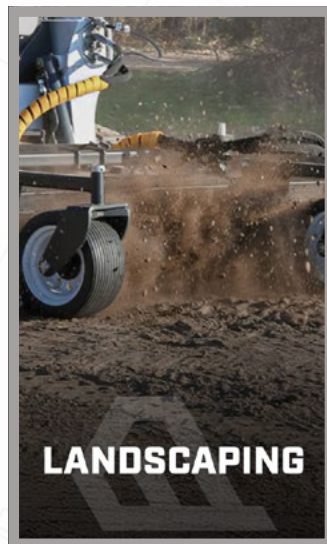
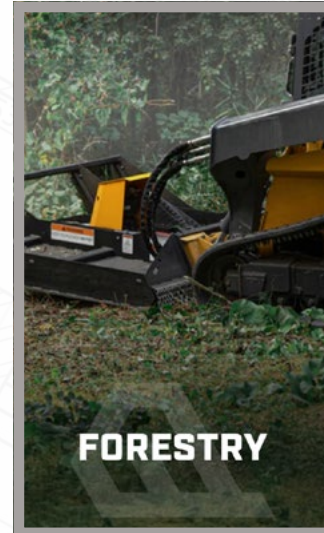
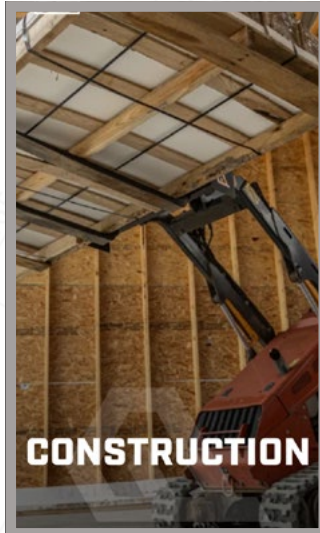
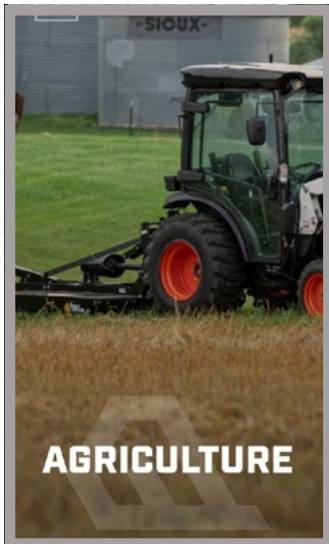
The Stucchi coupler highlighted in the image disconnects from the tractor while under pressure with no need to prime the system after reconnecting. The generator would then couple to the power pack to power the hydraulic motor.

S.A.F.E. MULE WITH: QUICK ATTACH

THE S.A.F.E. MULE is designed for maximum versatility, seamlessly integrating with a wide range of attachments to enhance its functionality across various mission and operational needs. It is fully compatible with all QuickAttach skid steer and tractor implements, allowing users to customize their equipment for specific tasks.

VISIT: QuickAttach.com to explore a selection of quick attachments that can be used with the S.A.F.E. MULE.

NOTE: When selecting attachments, be sure to choose standard skid steer and tractor implements, as the S.A.F.E. MULE is not designed for mini skid steer or mini tractor attachments.



S.A.F.E. MULE WITH: QUICK ATTACH

VISIT: QuickAttach.com to explore a selection of quick attachments that can be used with the S.A.F.E. MULE.

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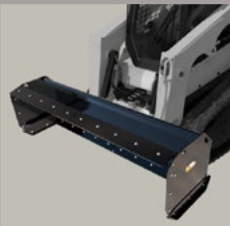
THE SUMMIT SERIES -
SKID STEER
STANDARD FLOW
SNOW BLOWER



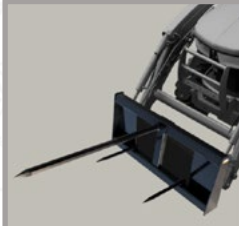
QUICK PUSH - SNOW
PLOW



XTREME BRUSH
MOWER HD - BRUSH
CUTTER/MOWER



THE XTREME PUSH -
SNOW PUSHER



BALE SPEAR - SKID
STEER AND TRACTOR



SUPER SEEDER - SKID
STEER SEEDER



QUICK MOVE HD -
LOW PROFILE
MATERIAL BUCKET



THE QUICK SCRAPE-N-
GRAB - SOLID
BOTTOM GRAPPLE
BUCKET



THE BIG CHIPPER -
SKID STEER CHIPPER



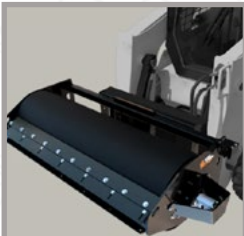
MUD HOPPER -
CONCRETE BUCKET



QUICK TURF - SOD
ROLLER



RAIN MAKER - DUST
CONTROL WATER KIT



QUICK PACK -
VIBRATORY PACKER



THE EZ PUSH - SNOW
PUSHER



POWER SPREADER -
SALT, SAND AND
FERTILIZER SPREADER



SKID HITCH - SKID
STEER HITCH



QUICK XCAVATOR
BACKHOE



TRENCH-IT -
INDUSTRIAL
TRENCHER



SNOW BREAK - V-
PLOW



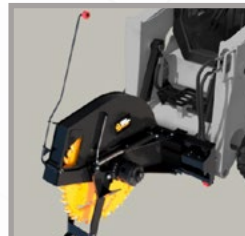
THE PILE DRIVER -
POST DRIVER



THE BIG BUCKET™ -
SNOW/LIGHT
MATERIAL BUCKET



HD QUICK SWEEP - HD
POWER ANGLE
BROOM



XTREME CUT HD -
ROCK/PAVEMENT SAW



CLEAN SWEEP HD™ -
INDUSTRIAL PICK-UP
BROOM



VERSA BLADE -
INDUSTRIAL 6-WAY
DOZER
BLADE/GRADER/LEVE
LER



SKID STEER TREE
SPADE | TREE JACK-
TREE SPADE



BRUSH BUSTER -
ROTARY BRUSH
CUTTER/MOWER



QUICK MILL -
INDUSTRIAL COLD
PLANER



THE BIG BREAK -
BREAKER/JACK
HAMMER



EZ DIG - RIGID
BACKHOE

S.A.F.E. MULE WITH: QUICK ATTACH

VISIT: [QuickAttach.com](https://www.QuickAttach.com) to explore a selection of quick attachments that can be used with the S.A.F.E. MULE.

NOTE: When selecting attachments, be sure to choose standard skid steer and tractor implements, as the S.A.F.E. MULE is not designed for mini skid steer or mini tractor attachments.



LAND LEVELER - LAND
PLANER



VERSA GRAB - MULTI-
PURPOSE KNOCK
AROUND GRAPPLE



QUICK SLEDGE - DROP
HAMMER POST
DRIVER



MIGHTY DIG-N-GRAB -
STUMP BUCKET
GRAPPLE



QUICK MOVE XHD -
LOW PROFILE
MATERIAL BUCKET



BRUSH BUSTER MAX -
DUAL ROTARY BRUSH
MOWER



THE QUICK SPLIT -
LOG SPLITTER



QUICK DIG - SWING
BACKHOE



THE MIGHTY DIG -
STUMP BUCKET



RAZOR TOOTH -
PAVEMENT SAW



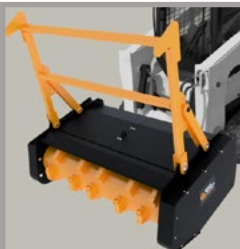
QUICK SCOOP -
UTILITY SPADE



THE MEGA MOWER X -
STANDARD FLOW
BRUSH CUTTER



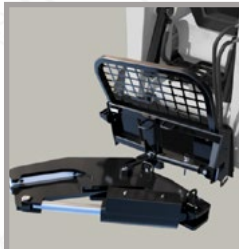
THE QUICK CLAW -
GRAPPLE RAKE/ROCK
GRAPPLE



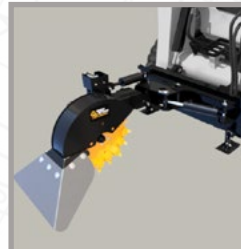
THE QUICK MULCH -
FORESTRY MULCHER



XTREME TREE PULLER
- POWER CLAW
HEAVY-DUTY TREE
PULLER



THE POWER AXE -
TREE SHEAR HD



THE QUICK STUMP
AWAY - STUMP
GRINDER



THE ROCK HAUL -
ROCK
BUCKET/GRAPPLE



EAGLE TALON - LOG,
BRUSH AND ROCK
GRAPPLE RAKE



THE BORE PIG HD -
SKID STEER AUGER



THE RAGE - DISC
MULCHER



XTENDA REACH™ -
INDUSTRIAL
TELEBOOM



QUICK TILLER -
ROTARY TILLER



QUICK TILT-TACH -
TILT ATTACHMENT



CLEAN SWEEP - PICK
UP BROOM

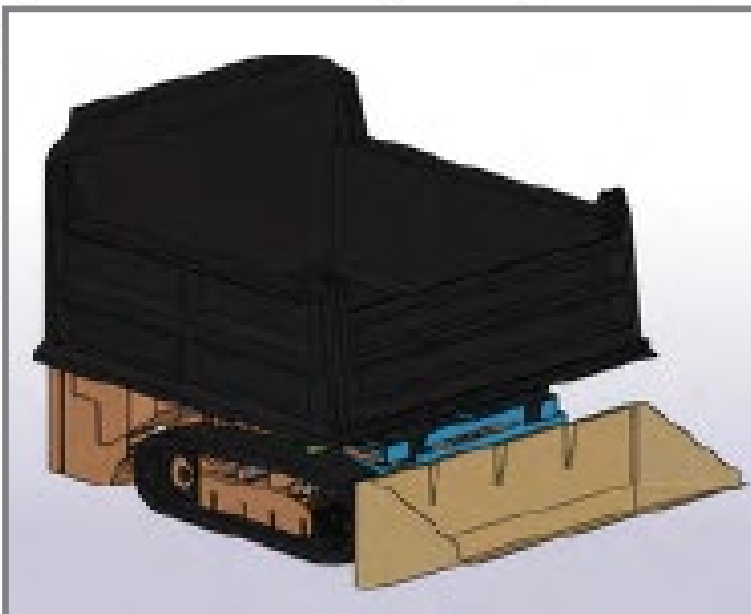
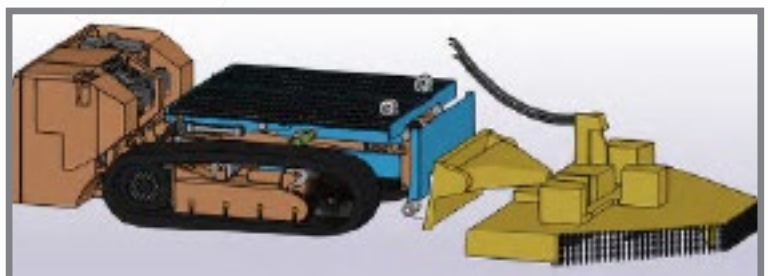
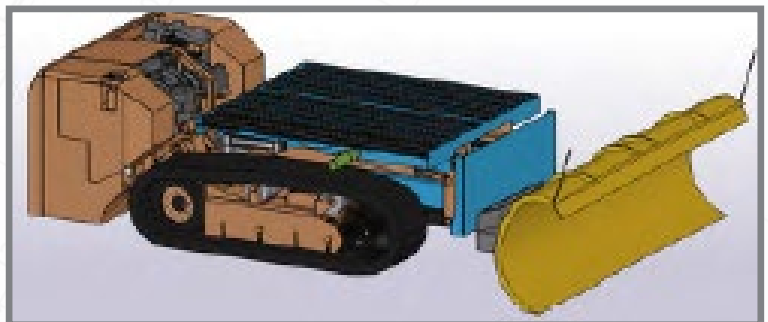
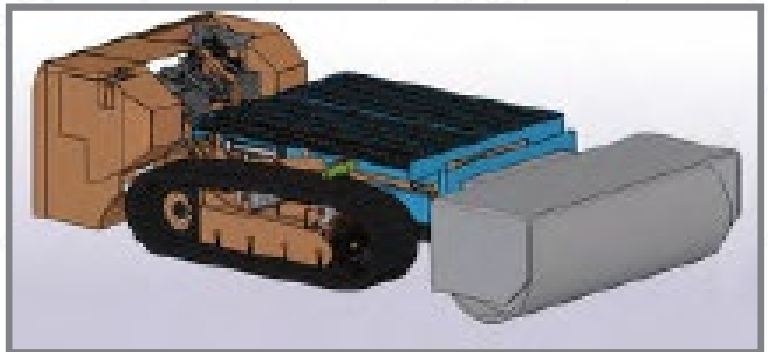
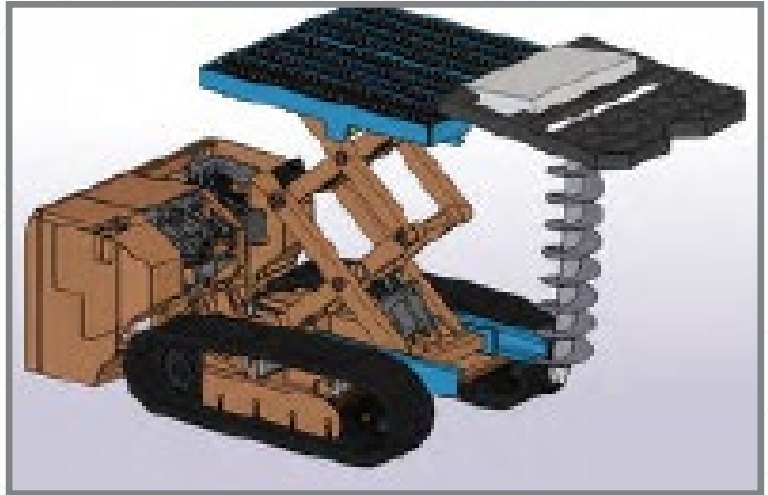
S.A.F.E. MULE FUTURE CAPABILITIES

Our design process is completely free of cost to you, and we'll work closely with your team to understand and define your exact requirements. This process ensures that we provide the best solution to meet your unique circumstances.

WE'LL DESIGN YOUR VISION ON OUR DOLLAR... SO WHY NOT GIVE US A TRY?

Possible Endless Capabilities Such As:

1. Post/Grounding Rod Driver
2. Magnetic FOD Sweeper / Mower
3. Fuel Pump for refueling/defueling
4. Hydraulic power Generator XXXXXXXX
5. Boom Arm for Canopy/Seat Removal
6. Inground Cable Installer
7. Security – Weapons
8. Universal Attachment for BOBCAT/SKID STEER
9. Weapons/Tank/Pod Loading Adapters
10. Remote Bomb/Missile Loader Scissor Lift
11. Aircraft Towbar Attachment or Nose Wheel Cradle
12. Hydraulic Mule Pump
13. Air Compressor (High Pressure & Low Pressure Air Cart)
14. Fire Fighting equipment
15. GPS Guidance/Automation
16. Camera System for BLOS Control



S.A.F.E. MULE (ORIGINAL PROOF OF CONCEPT)



Remote Control Operated with No RF Hard-Wired Cable Option



Operational in 24" Mud/Water/Snow



MULE with PACK ANIMAL(PA) 5' x 9'6" x 42" Tall



MULE with PACK ANIMAL(PA) 6,500-6,800lbs



Built to Fit in an MV-22



PACK ANIMAL Forks Capable of 4,500+lbs to 36" Height



Scissor Deck Lifting Ability of 10,000+ lbs to 65"



MULE with PA and Fork Riser Mast(FRM) Tested for 3,500+lbs to 6'



Hitch Receiver for Towing in Unimproved Terrain

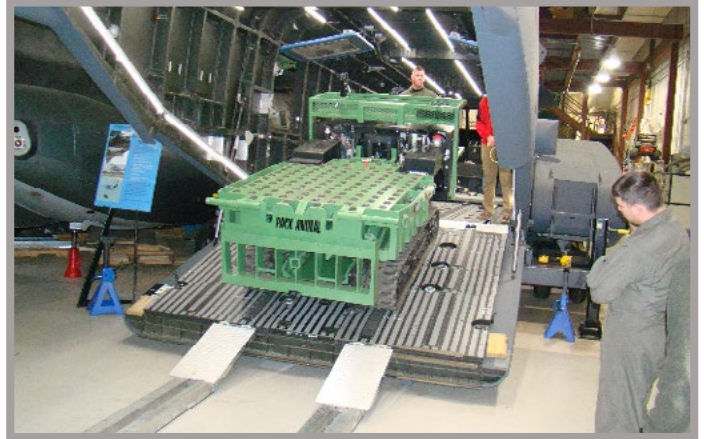
S.A.F.E. MULE (ORIGINAL PROOF OF CONCEPT)



S.A.F.E. MULE (ORIGINAL PROOF OF CONCEPT)



Loading/Unloading of Cargo Aircraft



Capable of 18.5°+ Ramp and Terrain



Load/Unload 463L Pallets To/From Cargo Aircraft



Ability to Load/Unload 463L Fully Loaded From/To Ground



10,000+lbs Towing Capability



PACK ANIMAL Forks Capable of 4,500+lbs to 36" Height



PACK ANIMAL with Fork Riser Mast Max Height of 11'

S.A.F.E. MULE (ORIGINAL PROOF OF CONCEPT)



United
States
of
America

Patent No.: US 12,240,743 B2

SAFE Structure Designs, LLC

To Promote the Progress

of Science and Useful Arts

The Director

*of the United States Patent and Trademark Office has received
an application for a patent for a new and useful invention. The title
and description of the invention are enclosed. The requirements
of law have been complied with, and it has been determined that
a patent on the invention shall be granted under the law.*

Therefore, this United States

Patent

grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.

Coke Morgan Smead

ACTING DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE



US012240743B2

(12) **United States Patent**
Buscema

(10) **Patent No.:** **US 12,240,743 B2**
(45) **Date of Patent:** **Mar. 4, 2025**

(54) **CARGO LOADER**

(71) Applicant: **SAFE Structure Designs, LLC**, Las Vegas, NV (US)

(72) Inventor: **John Buscema**, New Port Richey, FL (US)

(73) Assignee: **SAFE Structure Designs, LLC**, Las Vegas, NV (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/776,213**

(22) Filed: **Jul. 17, 2024**

(65) **Prior Publication Data**

US 2024/0391744 A1 Nov. 28, 2024

Related U.S. Application Data

(63) Continuation of application No. PCT/US2024/021182, filed on Mar. 22, 2024.

(60) Provisional application No. 63/454,041, filed on Mar. 22, 2023.

(51) **Int. Cl.**
B66F 9/12 (2006.01)

B66F 9/06 (2006.01)

(52) **U.S. Cl.**
CPC **B66F 9/12** (2013.01); **B66F 9/063** (2013.01)

(58) **Field of Classification Search**
CPC B64F 1/322
USPC 414/495
See application file for complete search history.

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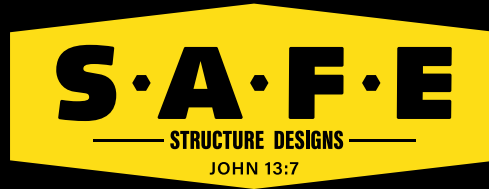
Primary Examiner — Mark C Hageman

(74) *Attorney, Agent, or Firm* — Lippes Mathias LLP;
Mitchell Ghaneie; Josephine Chen

(57) **ABSTRACT**

The present disclosure provides a cargo loader comprising a tractor assembly and a vertical adjustment assembly carried by the tractor assembly. The vertical adjustment assembly comprises a base, a deck platform linked to the base by a lifting mechanism. The lifting mechanism is configured to retract and extend in a vertical direction such that a height of the deck platform varies between a retracted height and an extended height. The vertical assembly further comprises an attachment. The attachment is interchangeably and removably coupled to the deck platform and configured to vary between the predetermined retracted height and the predetermined extended height.

20 Claims, 16 Drawing Sheets



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JON ZIEGLER

Senior Engineer



BROOK BROWN

Logistics Manager



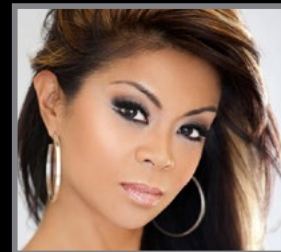
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JAMES SCHWADER

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CW04 USCG
Persian Gulf
(1966-2024)
In Loving Memory



GENE RODRIGUEZ

Junior Engineer



MIKE MACALUSO

Graphic Designer