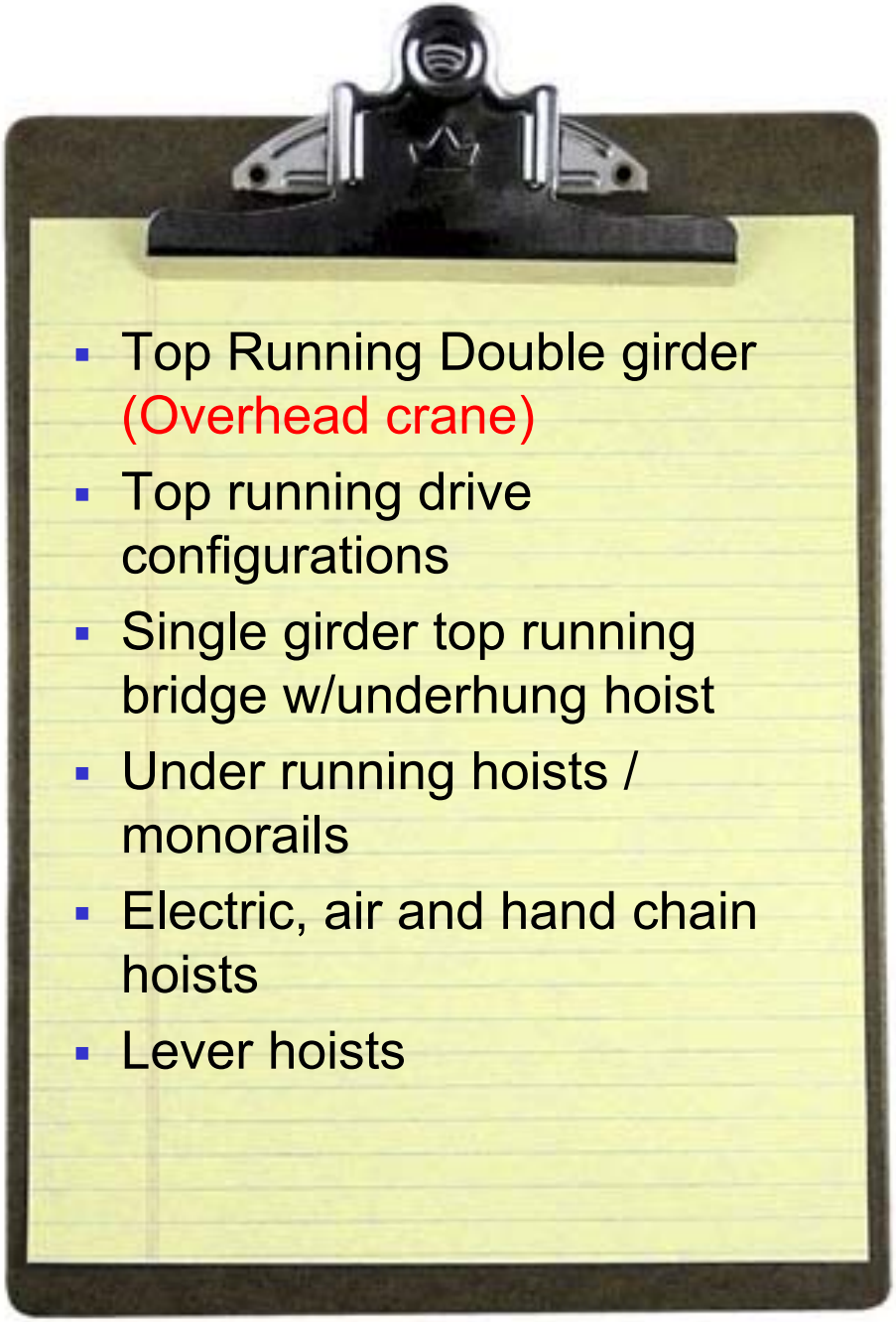
Section 4
Nomenclature & General Requirements

Nomenclature Topics to be Covered



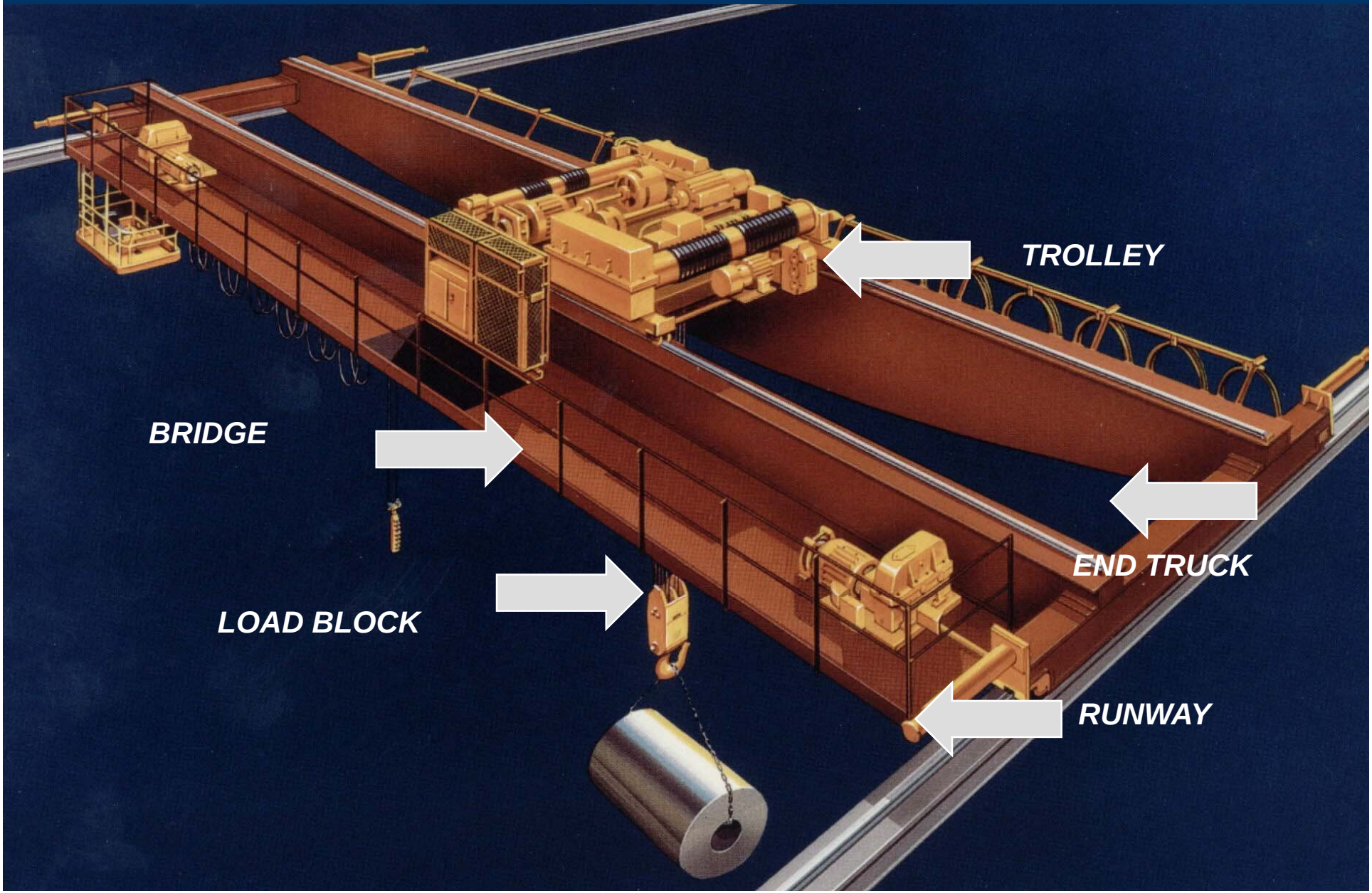
- Top Running Double girder (Overhead crane)
- Top running drive configurations
- Single girder top running bridge w/underhung hoist
- Under running hoists / monorails
- Electric, air and hand chain hoists
- Lever hoists

TRAINING OBJECTIVE

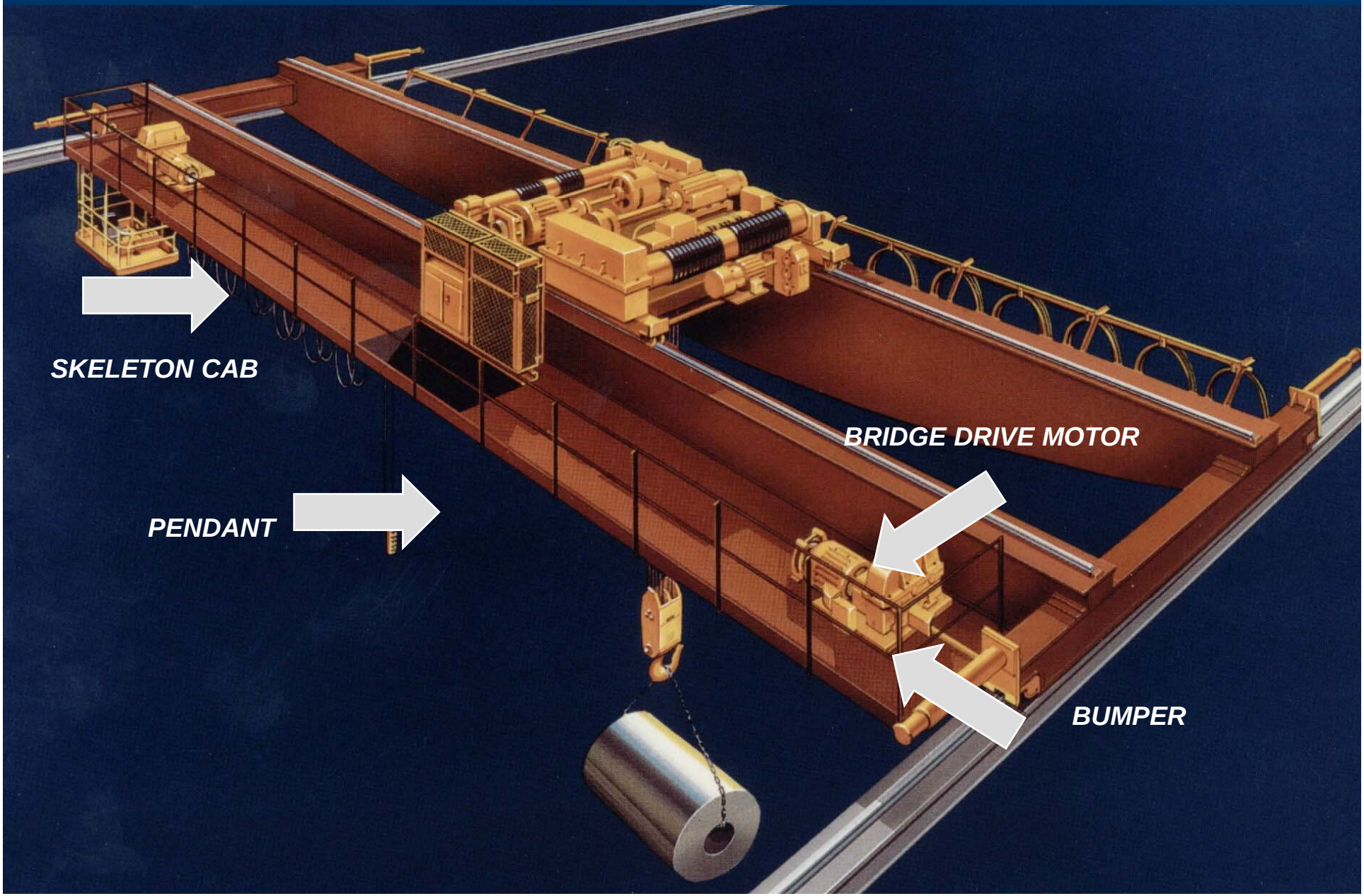
Upon completion of this section, participants should know:

- the proper names for all major components of top running and under running cranes, electric, hand chain and lever hoists and understand the **general** inspection requirements for each component.

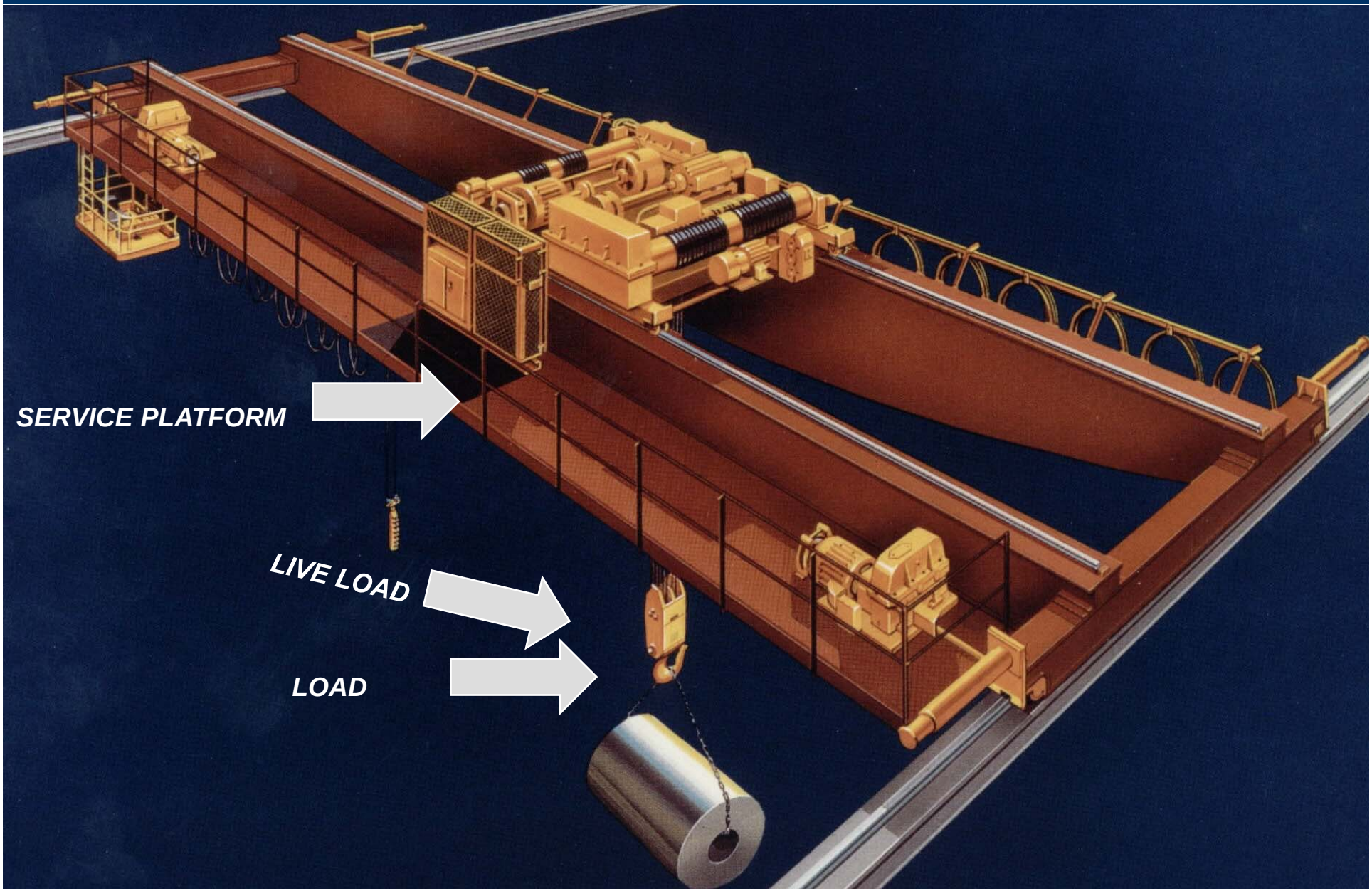
BRIDGE CRANE COMPONENTS



BRIDGE CRANE COMPONENTS



BRIDGE CRANE COMPONENTS



LIVE Load

- So, what is the LIVE load?

- **The load that moves relative to the crane and its parts……**

- **The load attached to the hook, block or any permanent device that is an integral part of the crane**

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DEAD Load

- What is meant by DEAD load?
- **The load imposed by the weight of the bridge, trolley, block, hook etc, etc.**

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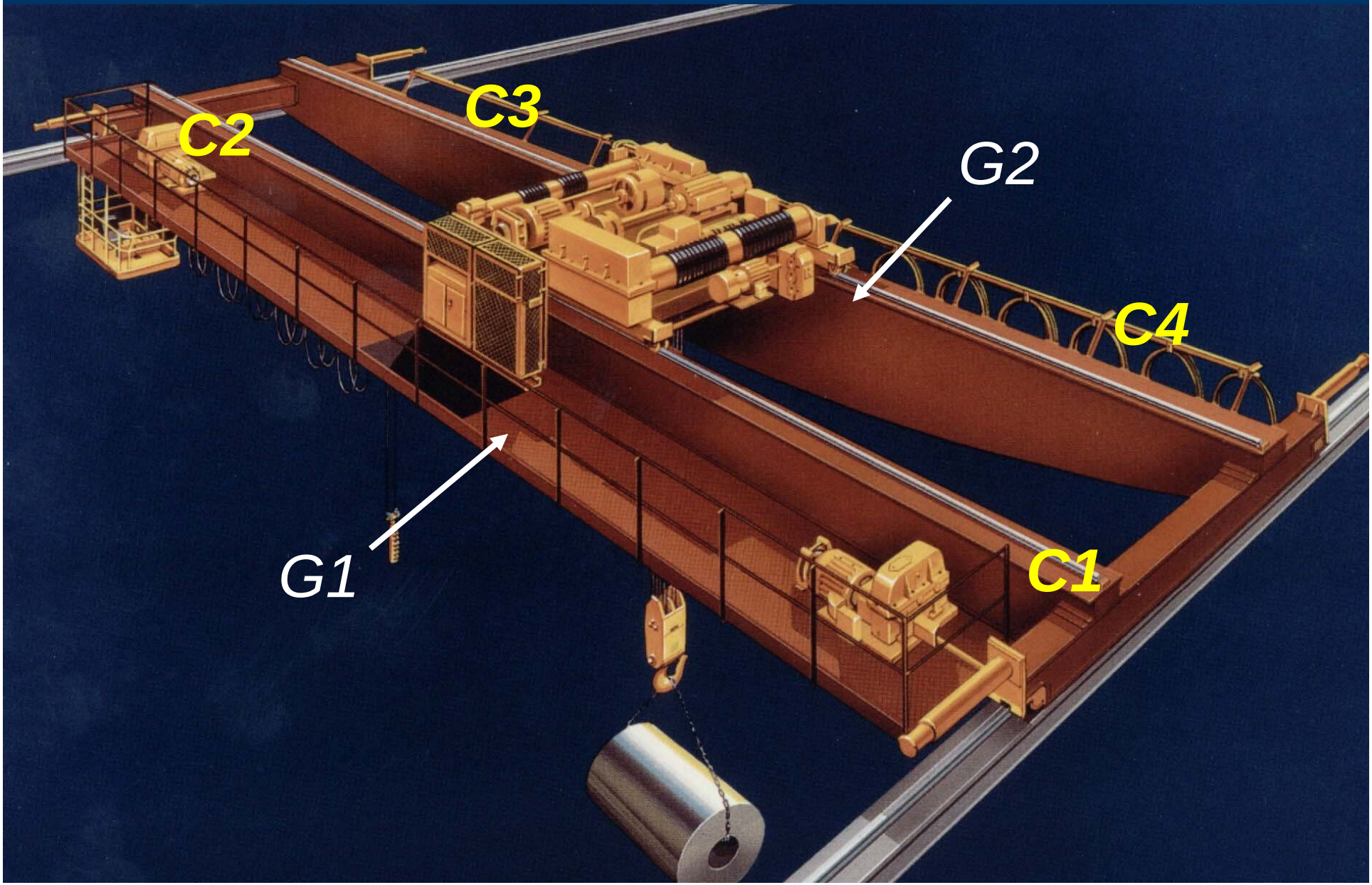
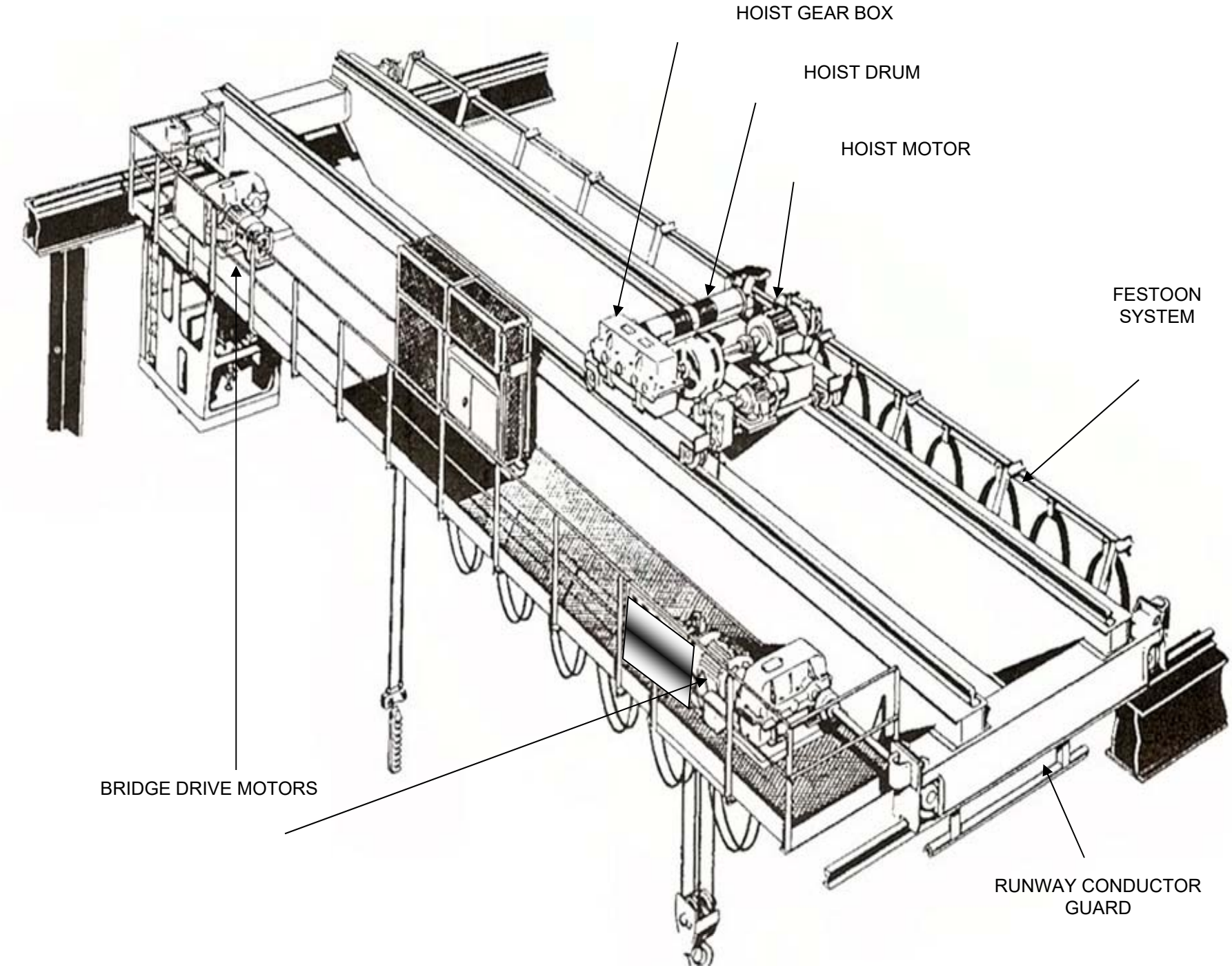
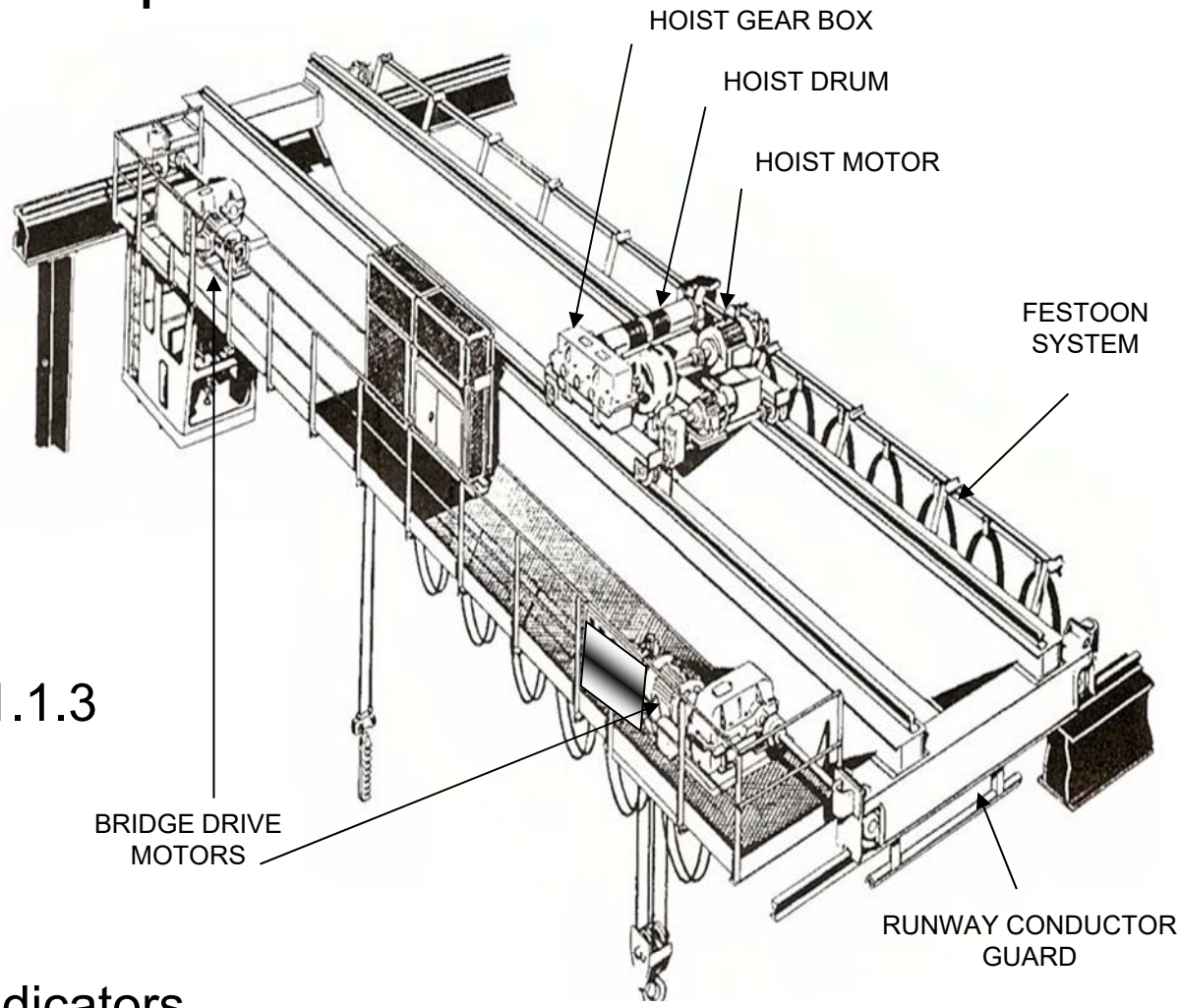
BRIDGE CRANE COMPONENTS

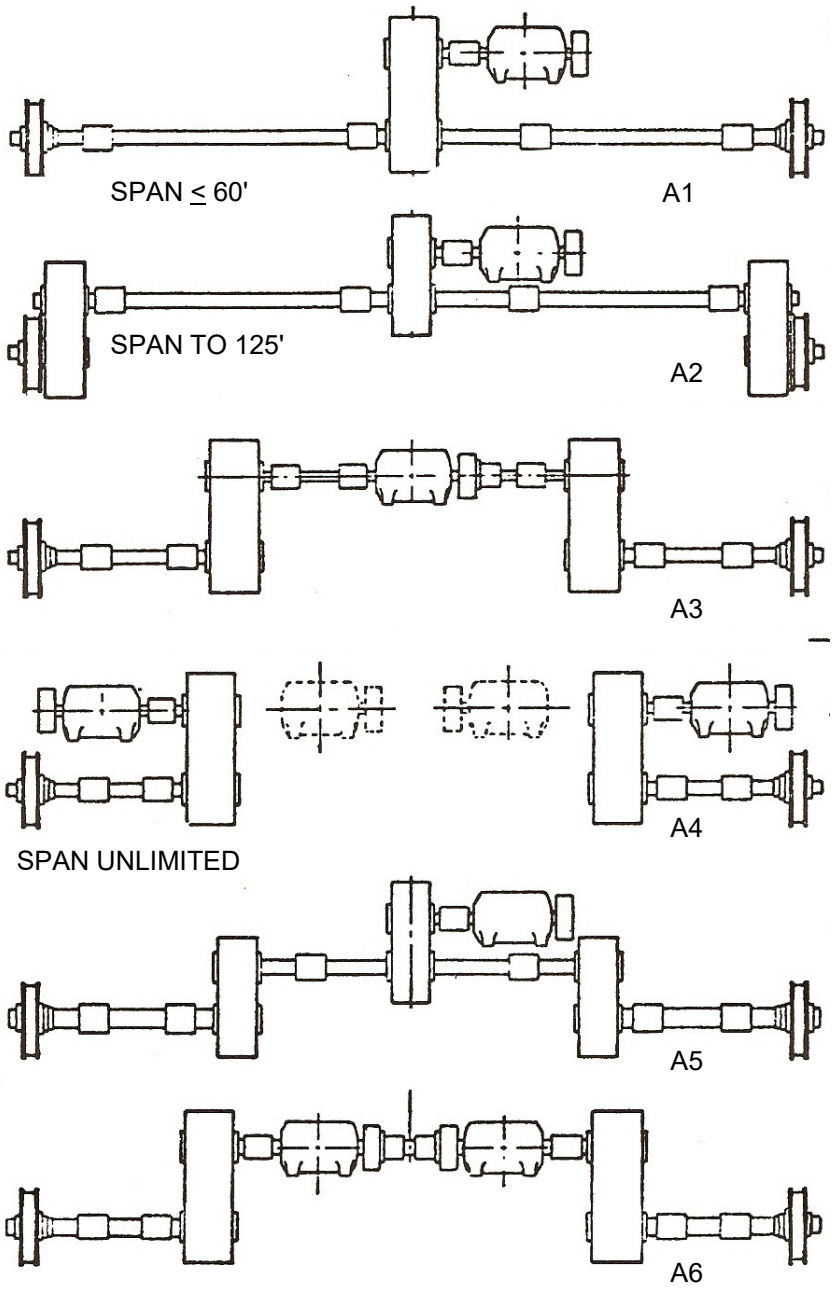



HOIST GEAR BOX
HOIST DRUM
HOIST MOTOR
FESTOON SYSTEM
BRIDGE DRIVE MOTORS
RUNWAY CONDUCTOR GUARD

Bridge Crane Components

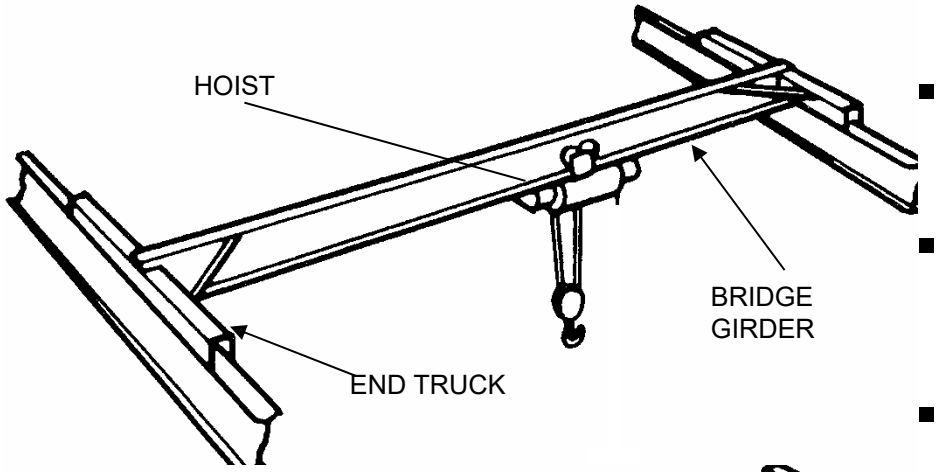


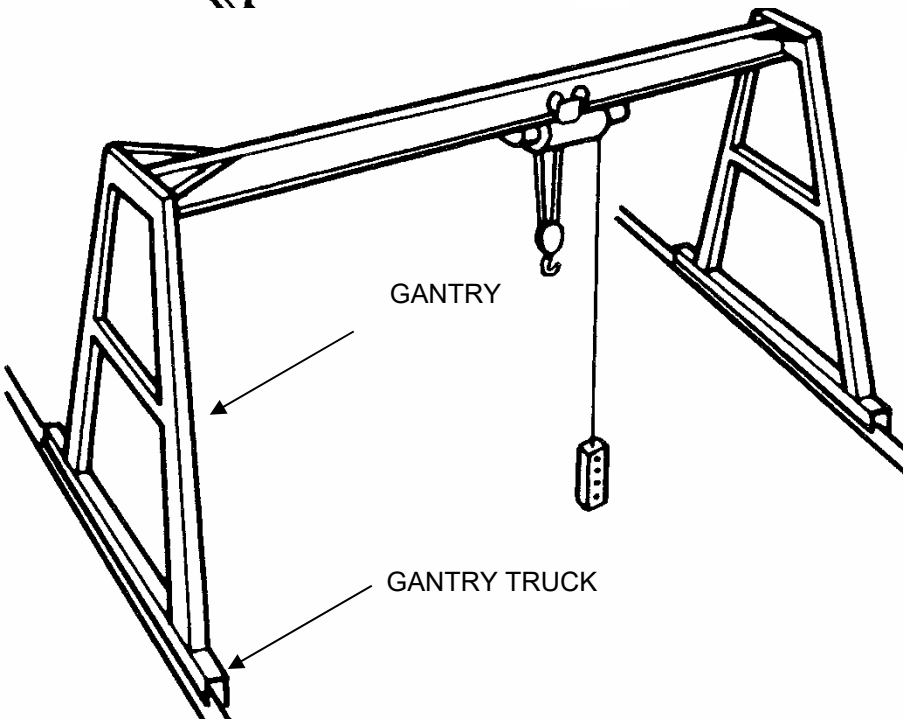
- Load markings
- Mfg. ID (ASME B30.2-1.1.3
- Block markings
- Controller marked
- Clearances
- Storm brakes & wind indicators (ASME B30.2-1.3.1(g))
- Stops
- Modified cranes



- **A1 MOST COMMON AND LEAST EXPENSIVE**
- **A2 GOOD TRACKING CHARACTERISTICS**
- **A3 UNCOMMON**
- **A4 MOST COMMON AMONG LONG SPAN HIGHER DUTY CYCLE CRANES**

Single Girder Bridge Underhung Hoist





- Load markings ASME B30.17/11-1.1.1(a)(b)
- Mfg. ID
  ASME B30.17/11-1.1.3(a)(b)
- Block markings
- Controller marked
- Clearances
- Storm brakes & wind indicators
  ASME B30.17/11-1.3.3(e)
- Stops
- Modified cranes

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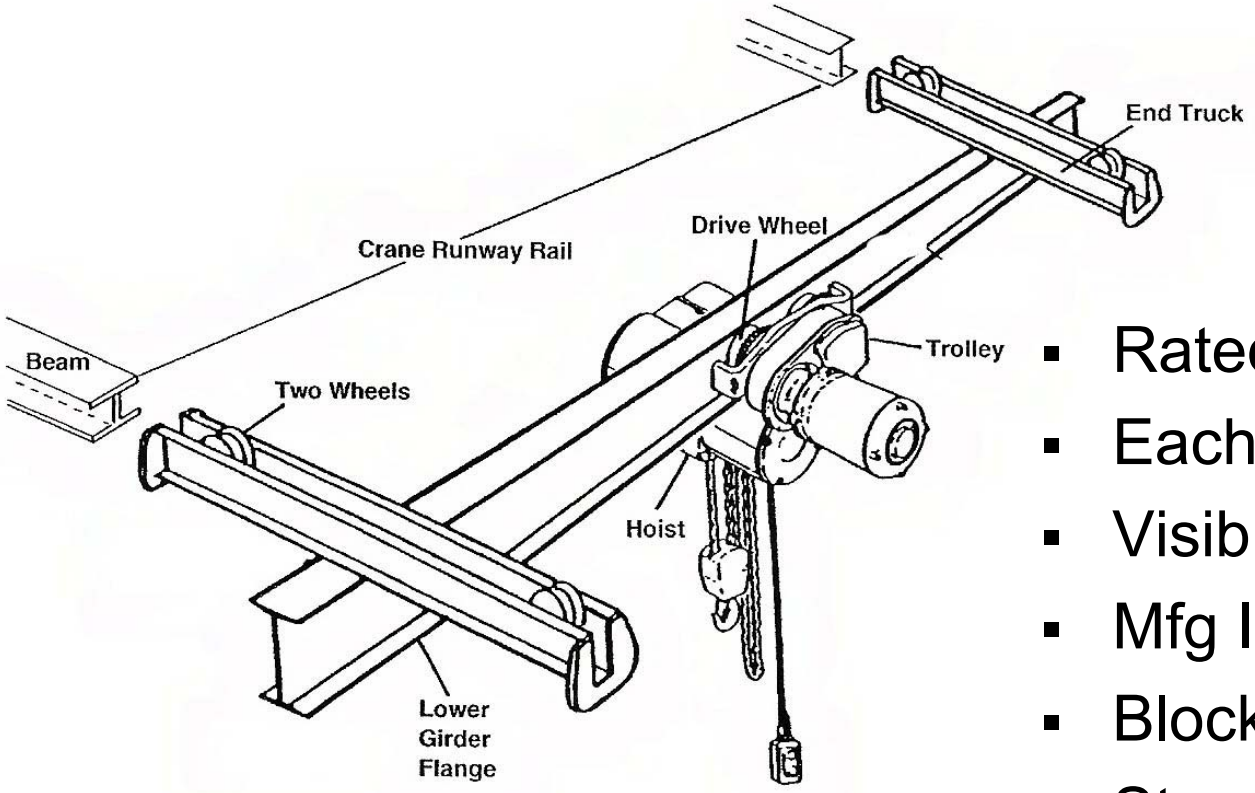
Underhung Crane

ASME B30.11/17
ASME B30.16
CMAA Spec #74



- Rated Load on Markings
- Each Hoist If Monorail
- Visible From Floor
- Mfg ID
- Blocked Marked
- Stops
- Modified Cranes
- Drop Lugs

Electric, Air Powered & Hand Chain Hoists
Overhead Hoist Underhung

ASME B30.16

- Rated load markings (ASME B30.16-1.1.1)
- Visible from the floor
- Manufacturer's ID (ASME B30.16-1.1.3)

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Electric Powered Hoists

ASME B30.16

Frequent Inspection

ASME B30.16-2.1.(b)

- Operating mechanisms
- Limit switch
- Hoist braking system
- Hooks (B30.10)
- Hoist rope or chain

RECORDS NOT REQUIRED

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ELECTRIC POWERED HOISTS

- **Frequent Inspection** (16-2.1.4(b))

- Operating mechanisms
- Limit switch
- Hoist braking system
- Hooks (B30.10)
- Hoist rope or chain

- **RECORDS NOT REQUIRED**

Electric Powered Hoists

ASME B30.16

Periodic InspectionASME B30.16-2.1.5(b)

- Frequent Inspection items
- Hooks and hardware
- Load and idler sprockets
- Motor and load brake
- Electrical items
- Supporting structure
- Labels ASME B30.16-1.1.4(a)

RECORDS REQUIRED

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Air Powered Hoists

ASME B30.16

Frequent Inspection

ASME B30.16-2.1.4)(a)(b)

- Operating mechanisms
- Limit switch
- Hoist brake
- Lines, valves and other air systems parts
- Hooks
- Hoist Chain

RECORDS NOT REQUIRED

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Air Powered Hoists

ASME B30.16

Periodic Inspection

ASME B30.16-2.1.4(a)(b)(c)

- Items in ASME B30.16-2.1.4(c)
- Limit switch
- Hooks & retaining hardware(B30.10)
- Load & idler sprocket
- Motor brake / Load brake
- Lines, valves and other air systems parts
- Hoist Chain
- Labels ASME B30.16-1.1.4(a)(b)(c)
- Supporting structure (trolley, hook etc)

RECORDS REQUIRED ASME B30.16-2.1.7

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Hand Chain Hoists

ASME B30.16

Frequent Inspection ASME B30.16-2.1.4

- All operating mechanisms
- Hoist braking system
- Hooks, latches (B30.10)
- Hoist Chain

RECORDS NOT REQIUIRED

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Hand Chain Hoists

ASME B30.16

Periodic Inspection ASME B30.16-2.1.5

- Fasteners
- Hoist braking system
- Load block, housing, gears shafts, etc
- Hooks, latches ASME B30.10
- Load sprocket
- Brake Mechanism
- Labels ASME B30.16-1.1.4

RECORDS REQUIRED

NOTE: Disassembly not required

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Inspections

SECTION 16-2.1: INSPECTION

16-2.1.1 General

(a) All inspections shall be performed by a designated person in accordance with the manufacturer's recommendations and requirements of this Volume. Any deficiencies identified shall be examined and a determination made by a qualified person as to whether they constitute a hazard and, if so, what additional steps need to be taken to address the hazard.

(b) Inspection Frequency. The intervals shall be determined by a qualified person based on intended operating conditions and their effects on critical hoist

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Records

16-2.1.7 Inspection Records

(a) Dated inspection reports and records should be maintained at time intervals specified in para. 16-2.1.2(b)(3). Records should be stored where they are available to appointed persons.

(b) A long-range rope or chain inspection program should be established and should include records on examination of ropes or chains removed from service so a relationship can be established between visual observation and actual condition of the rope or chain.

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CM CYCLONE DISASSEMBLY & INSPECTION

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CM CYCLONE DISASSEMBLY & INSPECTION

BE SURE THAT THE HOIST IS PROPERLY MARKED WITH CAPACITY, WARNINGS & SERIAL NUMBER PER ASME B30.21

CM CYCLONE DISASSEMBLY & INSPECTION

REMOVING THE HANDWHEEL COVER

REMOVE THE THREE SCREWS THAT SECURE THE COVER TO THE HOIST FRAME

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CM CYCLONE DISASSEMBLY & INSPECTION

REMOVING THE HANDWHEEL COVER WILL EXPOSE THE HANDWHEEL & HAND CHAIN

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CM CYCLONE DISASSEMBLY & INSPECTION

REMOVE THE HAND CHAIN
THE HAND CHAIN WILL HAVE A LINK THAT IS NOT WELDED-THIS LINK CAN BE FOUND BY DROPPING A PORTION OF THE HAND CHAIN ONTO A HARD SURFACE & LISTENING FOR A HIGH PITCH SOUND, THIS WILL INDICATE THE LOCATION OF THE UN-WELDED LINK. THIS PROCESS MAY BE REPEATED UNTIL YOU FIND THE LINK.
ONCE REMOVED PLACE OFF TO THE SIDE
INSPECT THE HAND CHAIN FOR ANY DAMAGE-
I.E.: BROKEN, BENT OR TWISTED LINKS
ALTHOUGH THE HAND CHAIN IS NOT A LOAD BEARING COMPONENT IT STILL REQUIRES INSPECTION

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CM CYCLONE DISASSEMBLY & INSPECTION

ONCE THE COVER HAS BEEN REMOVED YOU WILL SEE THE HANDWHEEL AS WELL AS THE LOAD LIMITER.
PRIOR TO 1975 – 1976 A LOAD LIMITER WAS AN OPTIONAL ITEM FOR THIS HOIST.
THE LOAD LIMITER CAN BE RETROFITTED TO OLDER UNITS.

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CM CYCLONE DISASSEMBLY & INSPECTION

REMOVING THE HANDWHEEL

IN THE CENTER OF THE HANDWHEEL WILL BE A ¾” NY-LOC NUT & WASHER. REMOVE THIS NUT WITH A RATCHET WRENCH & SOCKET. REPLACE THIS NUT WITH A NEW ONE WHEN RE-ASSEMBLING.

CM CYCLONE DISASSEMBLY & INSPECTION

REMOVING THE HANDWHEEL

TURN THE HANDWHEEL COUNTER CLOCK-WISE TO REMOVE THE HANDWHEEL FROM THE SHAFT.
THIS SHOULD SPIN RATHER EASILY.

.

COLUMBUS McKINNON CORPORATION

CM CYCLONE DISASSEMBLY & INSPECTION

REMOVING THE HANDWHEEL

ONCE THE HANDWHEEL IS REMOVED THE WESTON STYLE BRAKE WILL BE EXPOSED. CAUTION: THE BRAKE DISKS, FLANGE & RATCHET MAY STILL BE FIXED TO THE BACK OF THE HANDWHEEL. IF THEY ARE, SLOWLY TURN THEM IN THE CCW DIRECTION TO REMOVE.

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CM CYCLONE DISASSEMBLY & INSPECTION

BRAKE INSPECTION

WITH THE WESTON STYLE BRAKE EXPOSED, REMOVE THE FIRST FRICTION DISK & INSPECT, YOU ARE LOOKING FOR GLAZING, CHIPS OR A BROKEN DISK.

CHECK THE THICKNESS PER THE MANUFACTURE REQUIREMENTS. IF YOU SEE GLAZING, A GLASSY LOOKING SURFACE, IF YOU HAVE ENOUGH MATERIAL, YOU CAN PLACE THE DISK ON SANDPAPER TO REMOVE THE GLAZING.

CM CYCLONE DISASSEMBLY & INSPECTION

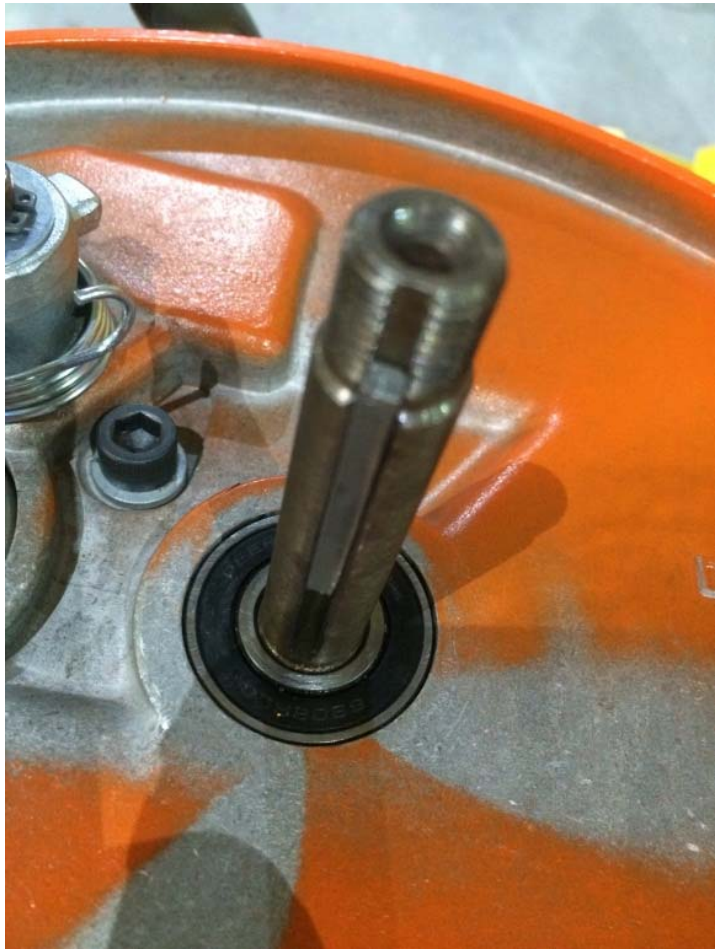
BRAKE INSPECTION

REMOVE THE RATCHET & INSPECT FOR MISSING OR CHIPPED TEETH, LOOSE CENTER BUSHING OR ANY OTHER DAMAGE THAT MAY BE PRESENT.
THERE WILL BE A SECOND FRICTION DISK BELOW THE RATCHET, FOLLOW THE INSPECTION FOR THE PREVIOUS DISK.

CM CYCLONE DISASSEMBLY & INSPECTION

BRAKE INSPECTION

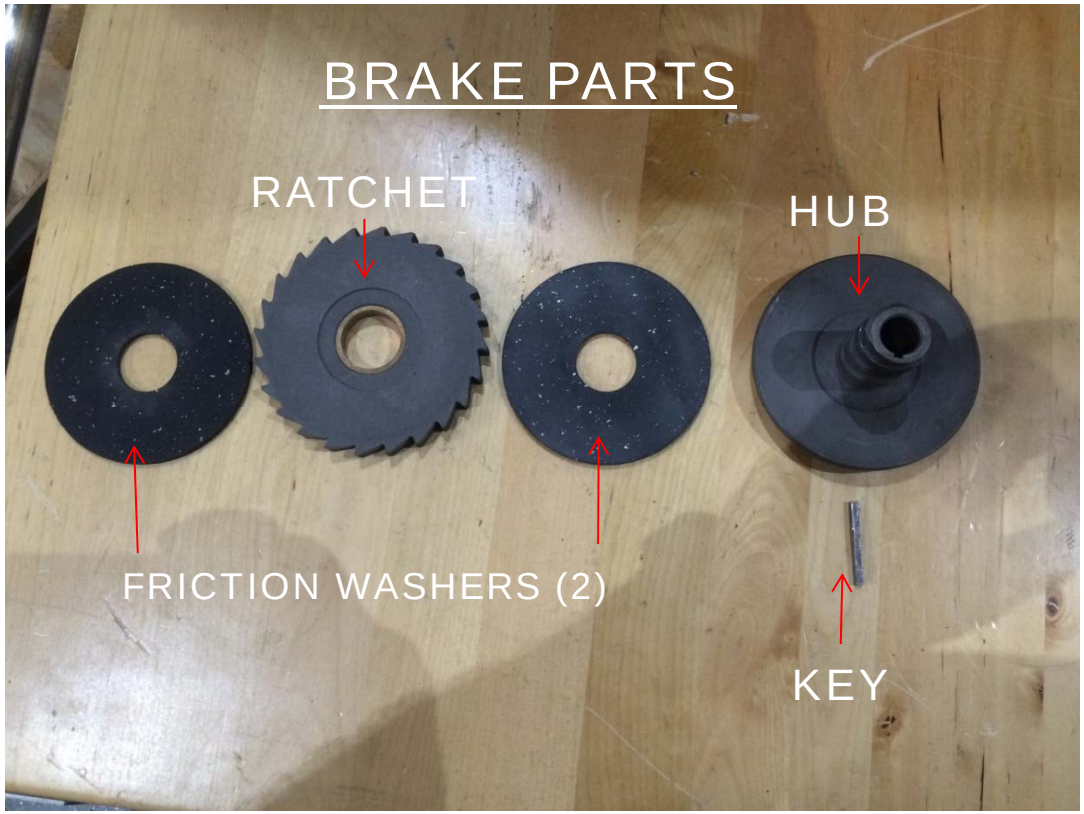
NOW THE BRAKE HUB CAN BE REMOVED & INSPECTED, CHECK FOR CRACKS OR DAMAGE TO THE THREAD OR INTERNAL KEYWAY. INSECT THE SHAFT FOR DAMAGE, BENT OR DAMAGED THREADS. INSPECT THE KEY, INSURE THE KEY IS STILL SQUARE IS NOT BENT & THERE IS NO DAMAGE TO THE KEYWAY ON THE SHAFT.



CM CYCLONE DISASSEMBLY & INSPECTION

BRAKE INSPECTION

BELOW ARE THE BRAKE COMPONENTS REMOVE BRAKE FRICTION DISKS, WHEN THEY ARE WORN TO A THICKNESS OF 0.100” OR LESS, OR CRACKED, SCORED OR COVERED WITH A FOREIGN MATERIAL.



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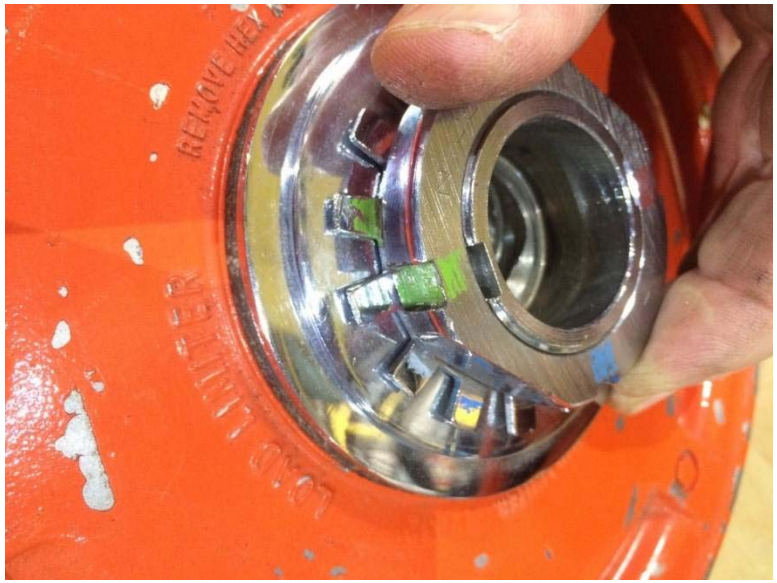
CM CYCLONE DISASSEMBLY & INSPECTION

CYCLONE LOAD LIMITER

THE LOAD LIMITER IS LOCATED ON THE OUTSIDE OF THE HAND WHEEL.

PICTURED BELOW IS THE LOAD LIMITER. THE LARGE SPANNER NUT HAS 4 SLOTS ON THE OUTSIDE DIA. OF THE NUT. THE SLOTS WILL BE COLOR CODED. BELOW THE NUT THE FLAT SERRATED WASHER WILL HAVE CORRESPONDING COLOR CODING. ALSO ONLY IN 4 PLACES. THESE COLORS WILL CORRESPOND TO THE SETTING THE LOAD LIMITER MUST BE AT FOR THE RATED CAPACITY OF THE HOIST. REFER TO THE MANUAL FOR THE CORRECT SETTING.



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CM CYCLONE DISASSEMBLY & INSPECTION

CYCLONE LOAD LIMITER CALIBRATION

Minimum Hoist Loads & Pull		
Hoist Capacity (Tons)	Minimum Load (lbs)	Average Pull To Slip Load Limiter (lbs)
1/4	650	33
1/2	1,300	67
1	2,600	100
1-1/2	3,900	113
2	5,200	117
3	7,800	118
4	10,400	121
5	13,000	106
6	15,600	127
8	20,800	133
10	26,000	139

WITH THE LOAD CHAIN TAUT, APPLY A STEADY PULL TO THE SCALE TO SLIP THE HANDWHEEL ONE REVOLUTION, APPROX. 2FT. OF HAND CHAIN TRAVEL. RECORD SEVERAL PULL VALUES & OBTAIN THE AVERAGE. DISREGARD THE INITIAL "BREAK FREE" PULL, USE ONLY VALUES OBTAINED AFTER THE HANDWHEEL HAS STARTED TO SLIP. WHEN PROPERLY ADJUSTED, THE AVERAGE PULL SHOULD BE INDICATED IN THE ABOVE TABLE.

IF THE AVERAGE PULL IS LOW, TURN THE ADJUSTER NUT ONE NOTCH CLOCKWISE & REPEAT THE PULL OPERATION. DO THIS UNTIL THE CORRECT VALUE IS OBTAINED. THEN BEND THE TANG INTO THE LOCKNUT NOTCH. THE LOAD LIMITER IS NOW READY FOR SERVICE.

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CM CYCLONE DISASSEMBLY & INSPECTION

LOAD CHAIN REMOVAL

REMOVE THE LOOSE END SCREW & WASHER REMOVE THE CHAIN FROM THE HOIST INSPECT THE CHAIN FOR NICKS, GOUGES, WEAR, HEAT DAMAGE, WELD SPATTER OR STRETCHING. INSPECT THE CHAIN FOR WARE, NICK, GOUGES, HEAT DAMAGE & STRETCH.

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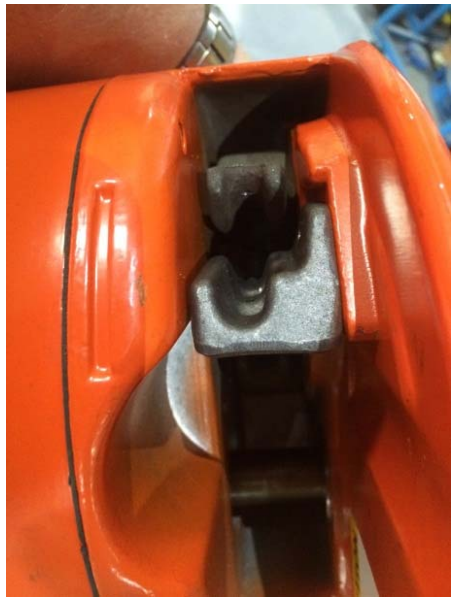
CM CYCLONE DISASSEMBLY & INSPECTION

STRIPPER REMOVAL

REMOVE THE 3 SCREWS HOLDING THE STRIPPER IN PLACE. ONE SCREW WILL HAVE A WASHER/SPACER UNDER THE HEAD OF THE SCREW. NOTE: ON OLDER UNITS THESE SCREWS WILL BE DIFFERENT IN LENGTH, ONE WILL BE SHORTER THAN THE OTHER TWO WITH NO WASHER/SPACER ON ANY OF THE SCREWS.




CM CYCLONE DISASSEMBLY & INSPECTION

LOAD CHAIN GUIDE REMOVAL

REMOVE THE TWO CHAIN GUIDE SCREWS. THE CHAIN GUIDE WILL BE LOOSE & MAY COME OUT AT THIS POINT, IF NOT IT WILL HAVE TO COME OUT AT THE SAME TIME AS THE LIFT WHEEL.

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CM CYCLONE DISASSEMBLY & INSPECTION

GEAR COVER REMOVAL

REMOVE THE THREE SCREWS FROM THE GEAR COVER. REMOVE THE COVER CAREFULLY AS TO NOT TEAR THE GASKET.

CM CYCLONE DISASSEMBLY & INSPECTION

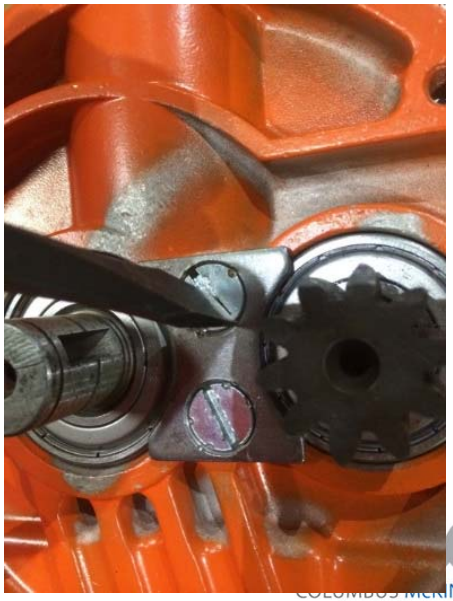
<u>GEAR REMOVAL</u>

CAREFULLY REMOVE THE GASKET. WITH A SET OF SNAP RING PLIERS, REMOVE THE SNAP RING THAT SECURES THE LIFT WHEEL. REMOVE THE LIFT WHEEL GEAR EXPOSING THE WOODRUFF KEY OF THE LIFT WHEEL.

CM CYCLONE DISASSEMBLY & INSPECTION

BEARING RETAINER REMOVAL

REMOVE THE WOODRUFF KEY FROM THE LIFT WHEEL SHAFT. WITH A SCREWDRIVER REMOVE THE TWO SCREWS FROM THE BEARING RETAINER.



CM CYCLONE DISASSEMBLY & INSPECTION

BEARING RETAINER REMOVAL

REMOVE THE TWO SCREWS & THE RETAINER.

CM CYCLONE DISASSEMBLY & INSPECTION

HANDWHEEL SHAFT REMOVAL

GRAB THE HANDWHEEL GEAR & SHAFT & PULL ON IT TO REMOVE IT FROM THE HOIST FRAME THAN REMOVE THE BEARINGS.

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CM CYCLONE DISASSEMBLY & INSPECTION

LIFT WHEEL REMOVAL

REMOVE THE LIFT WHEEL & THE BEARINGS, SOME PRESSURE MAY BE REQUIRED.

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CM CYCLONE DISASSEMBLY & INSPECTION

HOIST FRAME INSPECTION

INSPECT FRAME FOR CRACKS, WEAR, UNAUTHORIZED WELDS & CHIPS.

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CM CYCLONE DISASSEMBLY & INSPECTION

UPPER HOOK INSPECTION

REMOVE THE UPPER HOOK USING A DRIVE PIN TO EXTRACT THE COLLAR PIN. THE HOOK COLLAR WILL THAN BE ABLE TO BE REMOVED. REMOVE THE HOOK & INSPECT FOR NICK, GOUGES, WARE, HEAT DAMAGE & THROAT OPENING PER ASME B30.10 OR THE MANUFACTURES RECOMMENDATION.

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Manual Hoist Break Assembly

Inspect Friction Disks For:

- Glazing
- Grease
- Oil
- Minimum Thickness

(see maint. manual for each hoist)

NO CLEANERS TO BE USED ON FRICTION DISKS

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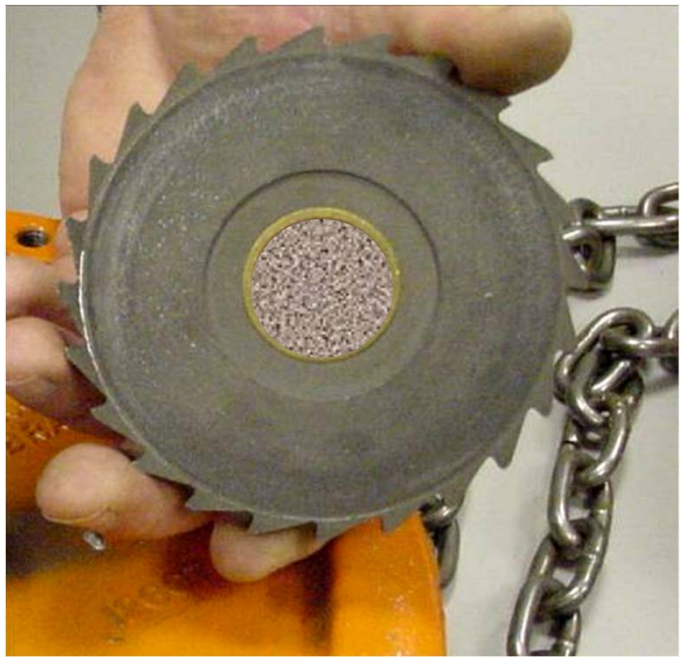
Manual Hoist Break Assembly



Inspect Ratchet For:

- Glazing
- Grease
- Oil
- Scoring
- Position of bushing (flush)
- Missing broke teeth

Load Brake

- Ratchet & pawl rotates freely
- Pawl properly engages when rotating clockwise direction as you are looking at brake flange end
- Pawl spring engages pawl
- Oil grooves are visible on both friction discs (if applicable)

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Lever Hoists

GENERAL REQUIREMENTS

ANSI/ASME B30.21

- Rated load markings(ASME B30.21-1.1.1)
- Control actuator marked to indicate direction (ASME B30.21-1.1.2)
- Manufacturer's ID (ASME B30.21-1.1.3)
- Warning labels (ASME B30.21-1.1.4)
- Overtravel restraint (ASME B30.21-1-2.9)

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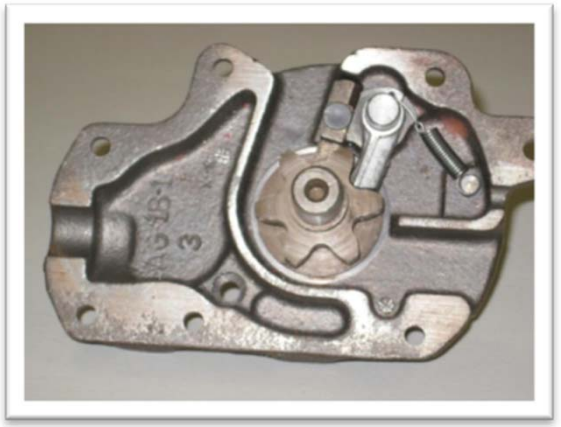
Lever Hoists fall into Two Major Categories

Pawl And Ratchet Type



Friction Brake Type

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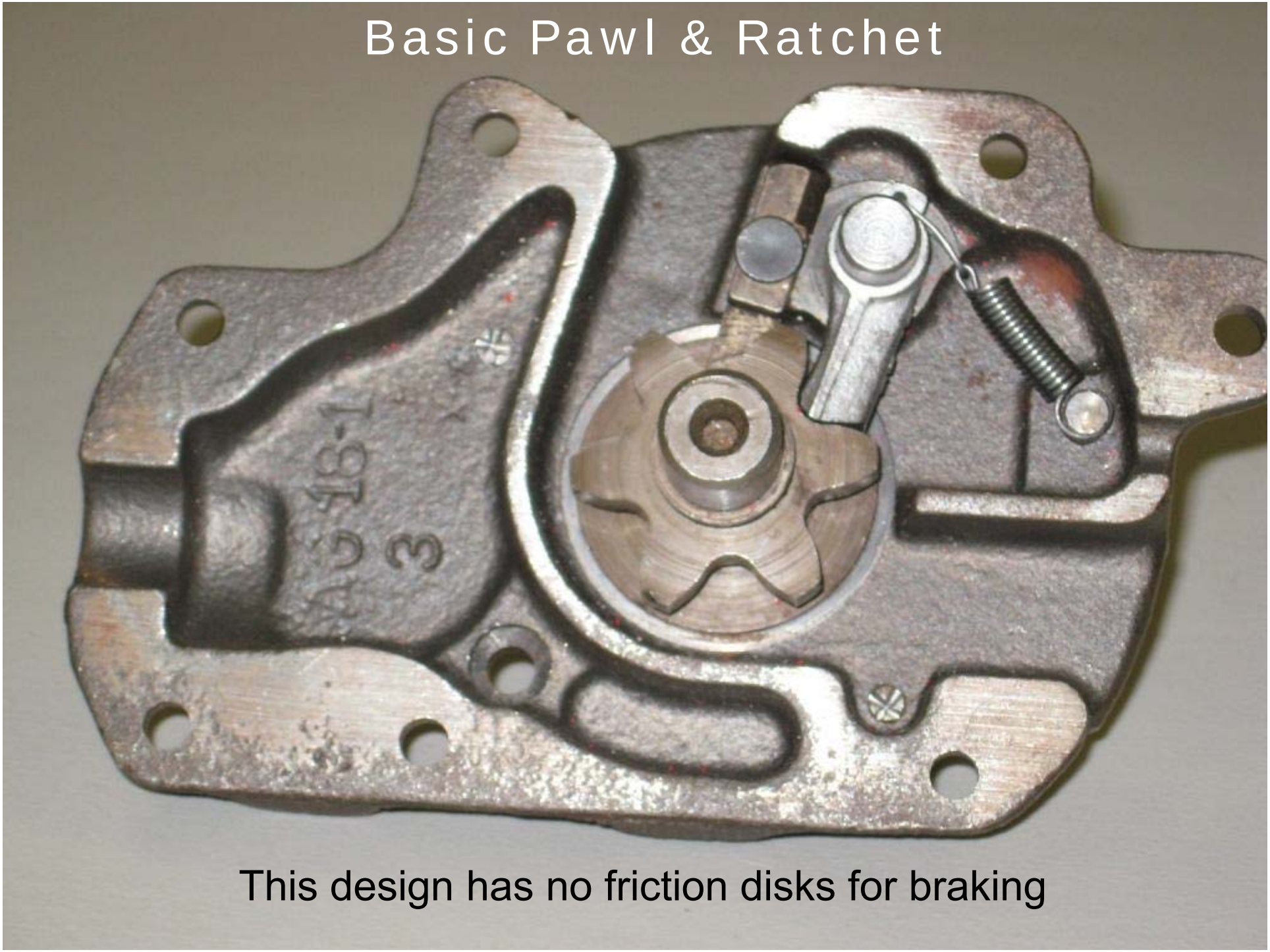
Basic Pawl & Ratchet



This design has no friction disks for braking

Strap Hoist

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Transmission & Distribution

Transmission & Distribution

Strap Hoist

ANSI/ASME B30.21

ASME B30.21-2.1.4

FREQUENT INSPECTIONS

The following items SHALL be inspected:

- Operating mechanisms
- Hook, Latches
- Web Strap
- Hoist Lever (Bent, Cracked or Deformed)
- Web Reeving (No Twist)

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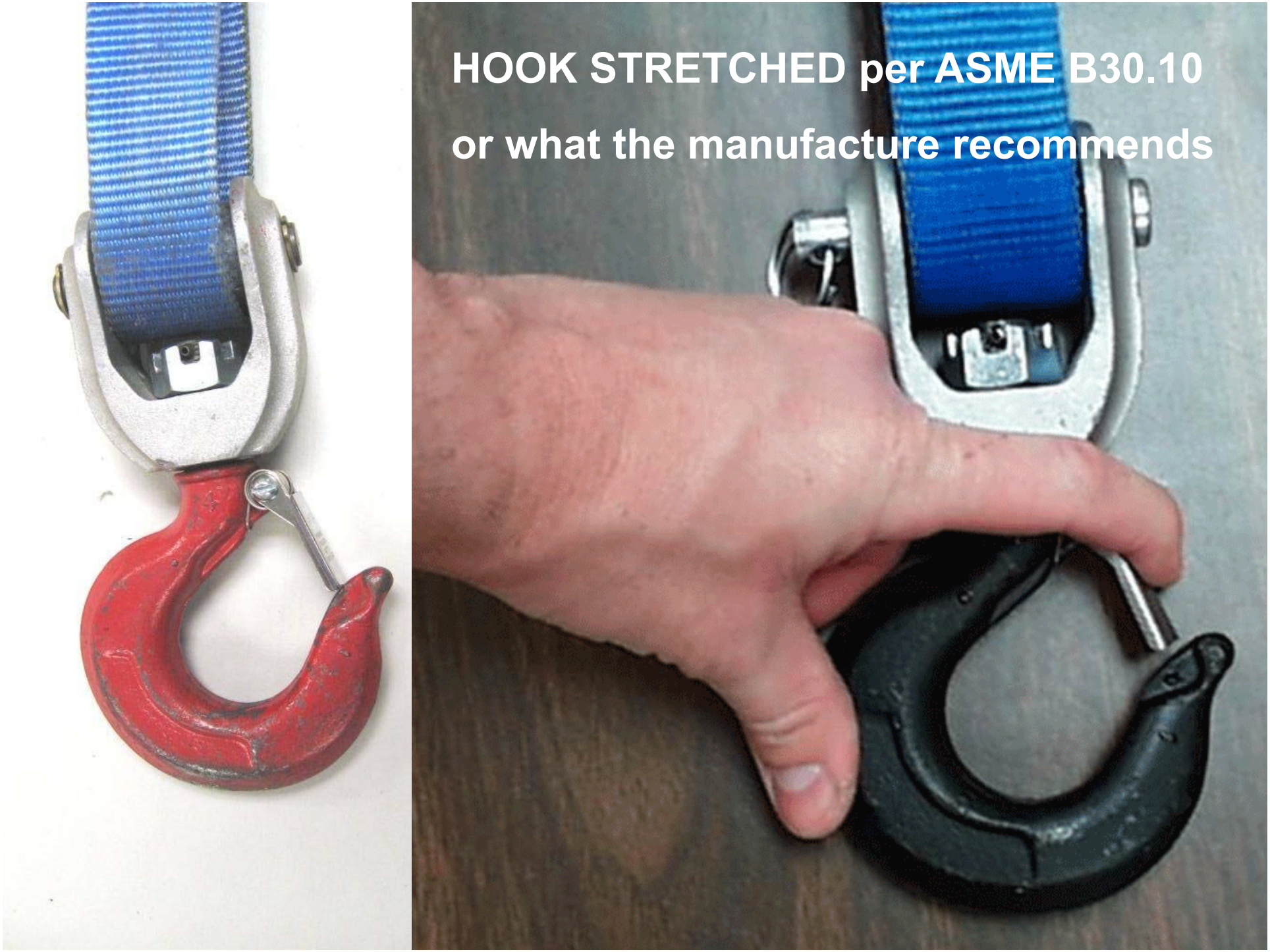
ASME B30.21-2.1.5

PERIODIC INSPECTIONS

The following inspections SHALL be performed:

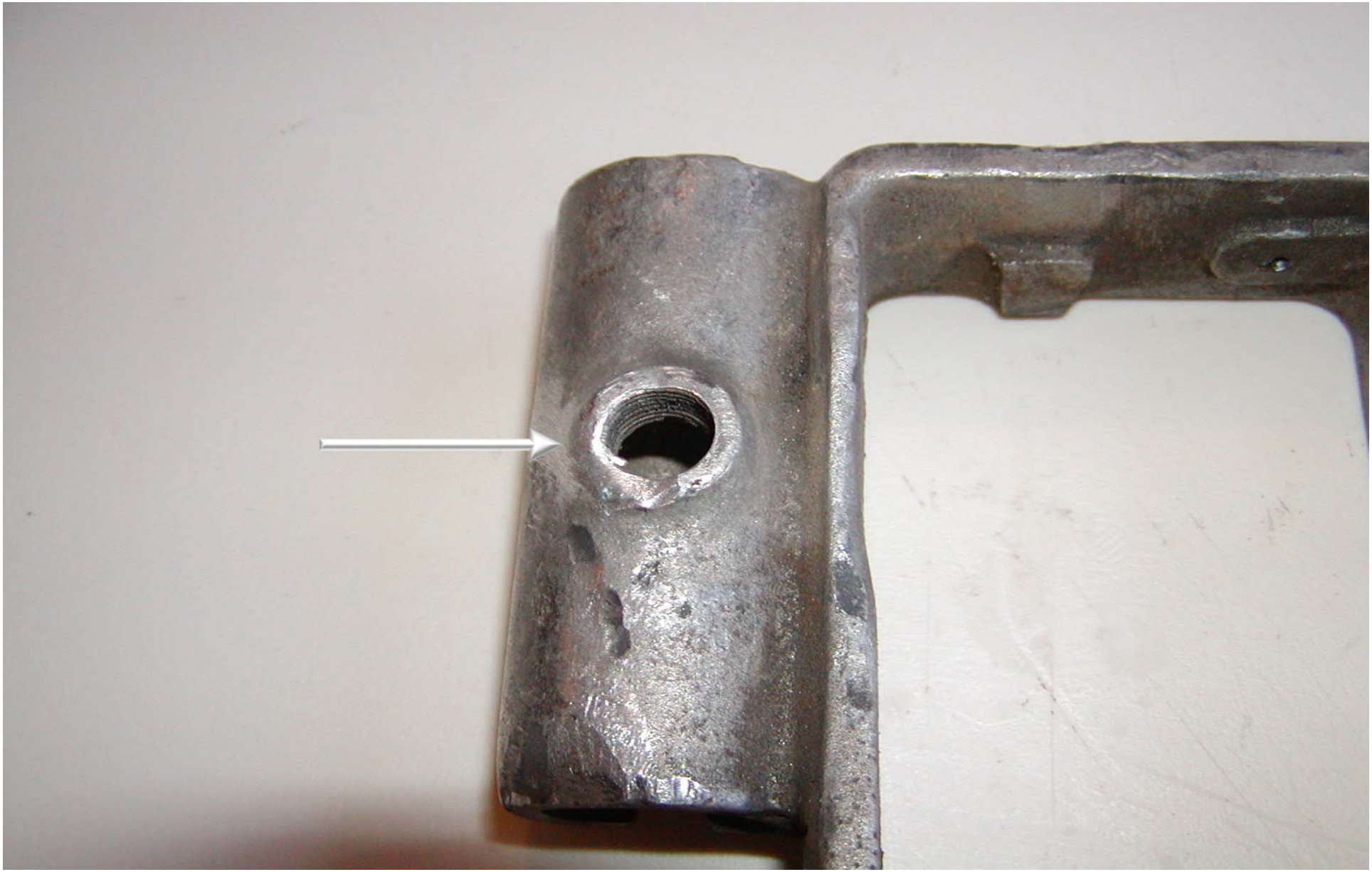
- Everything from the Frequent Inspection
- Web strap, suspension, levers, yokes, snap rings, shafts, gears, pins, etc……
- Load & idler hook, drums and gears.

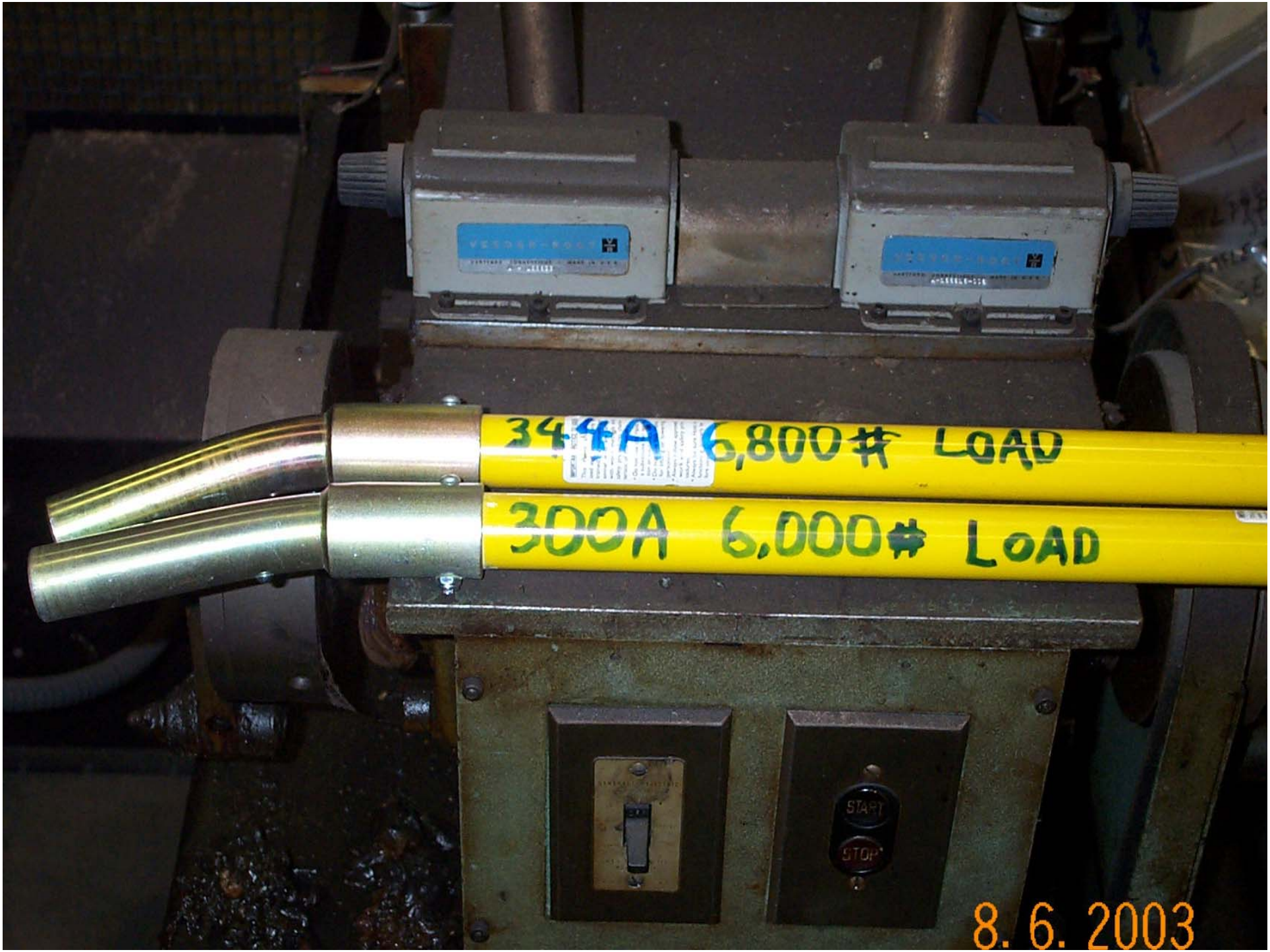

HOOK STRETCHED per ASME B30.10
or what the manufacture recommends


HANDLE RETAINER &
LOCKING SCREW
CHECK HOOK SHANK NUT
& RETAINER

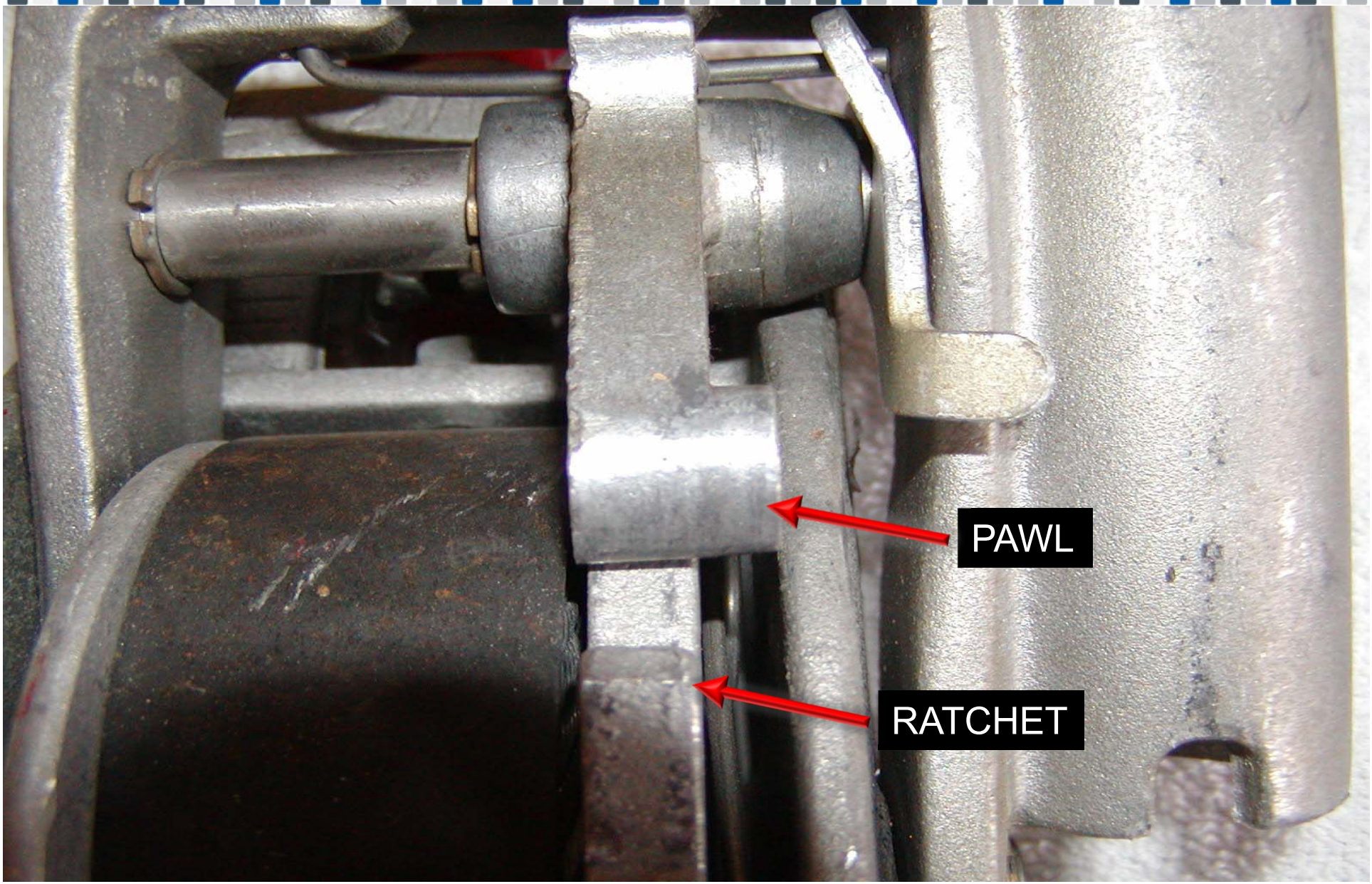
What's wrong with this picture?

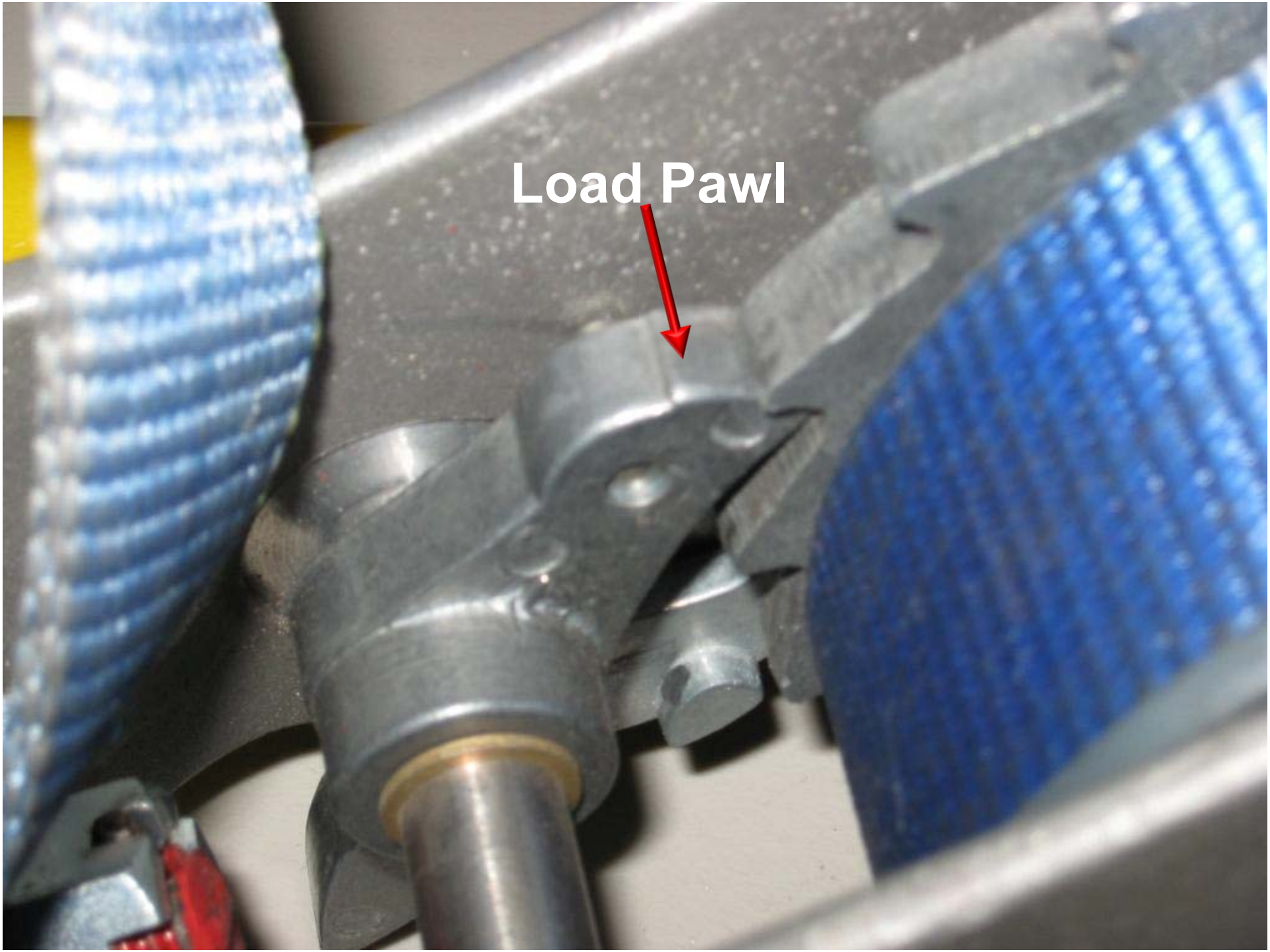
What's wrong with this picture?




344A 6,800# LOAD
300A 6,000# LOAD
START
STOP
8. 6. 2003

Ratchet & Pawl




Load Pawl

ANSI/ASME B30.21

ASME B30.21-2.1.4 FREQUENT INSPECTIONS

The following items SHALL be inspected:

- Operating mechanisms
- Hook, Latches
- Web Strap
- Hoist Lever (Bent, Cracked or Deformed)
- Web Reeving (No Twist)

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ANSI/ASME B30.21

ASME B30.21-2.1.5 PERIODIC INSPECTIONS

The following inspections SHALL be performed:

- Everything from the Frequent Inspection
- Web strap, suspension, levers, yokes, snap rings, shafts, gears, pins, etc……
- Load & idler hook, drums and gears.

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Web strap ASME B30.21-2.2.4

Replace the web strap when the following conditions exist:

- Melting or charring
- Acid or caustic burns
- Weld splatter
- Broken stitching
- Cut or tears
- Damaged eyes or fittings
- Abrasive wear
- Knots

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Strap stitching coming apart.
Hoist held 16,050-pound load.

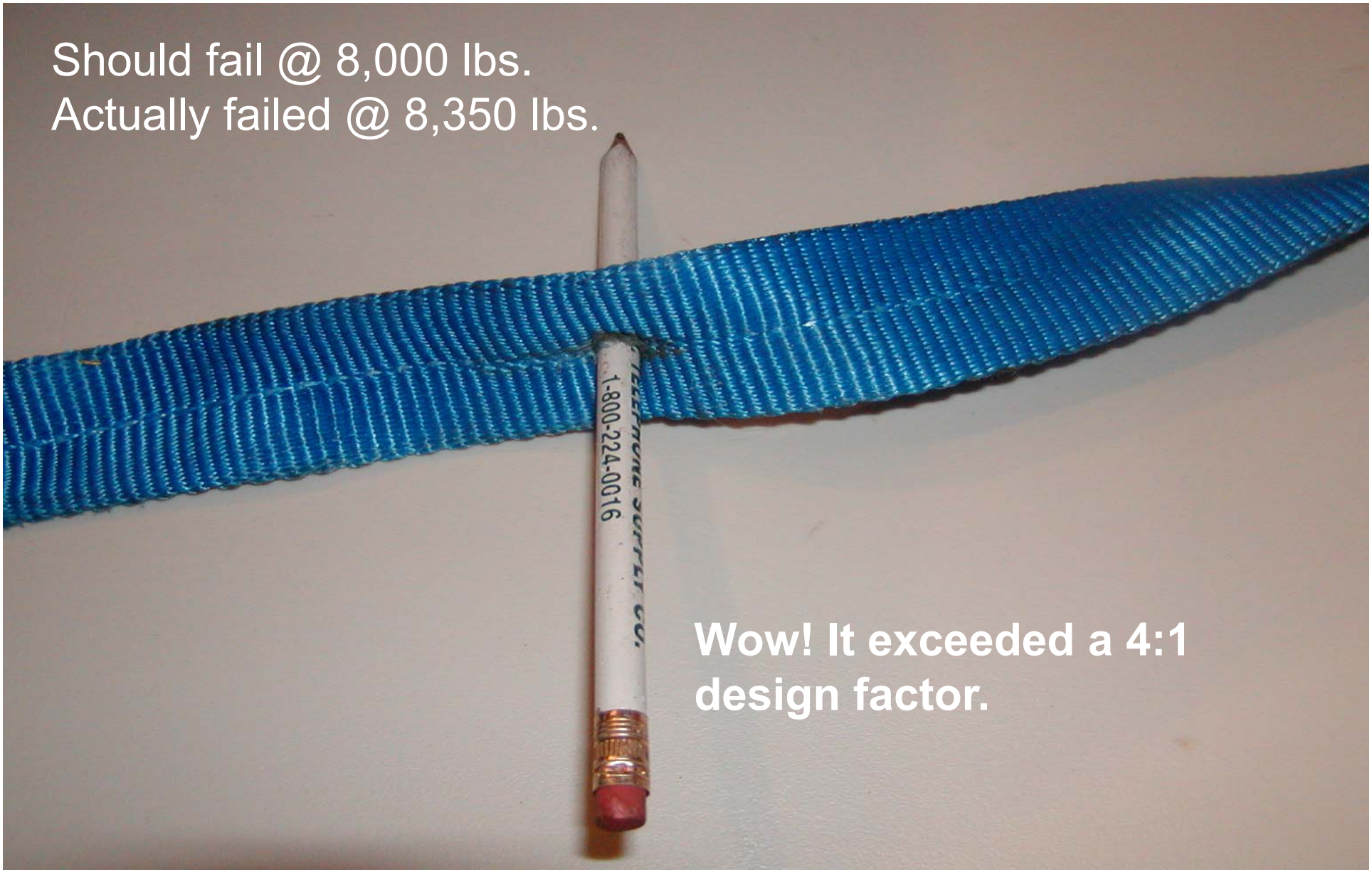
Strap Side-Cut

Should Fail @ 8,000 lbs.
Actually Failed @ 5,320 lbs.

Strap Burned

Should fail @ 8,000 lbs.
Actually failed @ 2,224 lbs.

Strap Center Punched



Knot

Cross-Cut

Should fail @ 8,000 lbs.
Actually failed @ 2,224 lbs.

Can we all agree that this strap should be replaced?

Where are chain type lever hoists used?

- On guy wires in conjunction with two wire grips.


Pulling guy wire

OSHA 1910.269…

- **1910.269 (q)(2)(vi)** Load ratings of stringing lines, pulling lines, conductor grips, load-bearing hardware and accessories, rigging, and hoists may not be exceeded.

- **1910.269 (q)(2)(vii)** Pulling lines and accessories shall be repaired or replaced when defective.

- **1910.269 (q)(2)(viii)** Conductor grips may not be used on wire rope, unless the grip is specifically designed for this application.

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If you base a lever hoist training program on OSHA 1910.269, it will be a short story consisting of three slides.

LEVER HOISTS
welded link chain

ASME B30.21

Periodic Inspections 21-1.3.3

- All operating mechanisms for binding or unusual noise (.21-1.3.2(C)(1)
- Control actuator marked to indicate direction(21-1.1.2)
- Hooks (B30.10)
- Hook retaining nuts or collars
- Load Chain (Stretch > 2½% - REJECT) (21-1.6.2(a))
- Hoist lever
- Damage to hoist support
- Chain over travel restraint
- Fasteners
- Load blocks, suspension housings, levers, chain attachments, clevises, yokes, suspension bolts, shafts, evidence of wear corrosion, cracks and distortion
- Load and idler sprockets
- Brake mechanism, pawls, cams and ratchet

RECORDS REQUIRED

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LEVER HOISTS
roller chain

ASME B30.21

Periodic Inspections ASME B30.21-2.1.5

- Roller chain for twist, bows, binding or kinking ASME B30.21-2.2.2
- Gouges, nicks weld splatter, corrosion and distortion
- Stretch or elongation ASME B30.21-2.2.2(b)(3) (Check Inspection Manual)
- Twist ASME B30.21-2.2.2(b)(4) (Check Inspection Manual)
- Bow ASME B30.21-2.2.2(b)(5) (Check Inspection Manual)
- Condition of pawls, ratchet and springs
- Lever / handle (bent, cracked or broken)
- Chain over travel restraint

RECORDS REQUIRED

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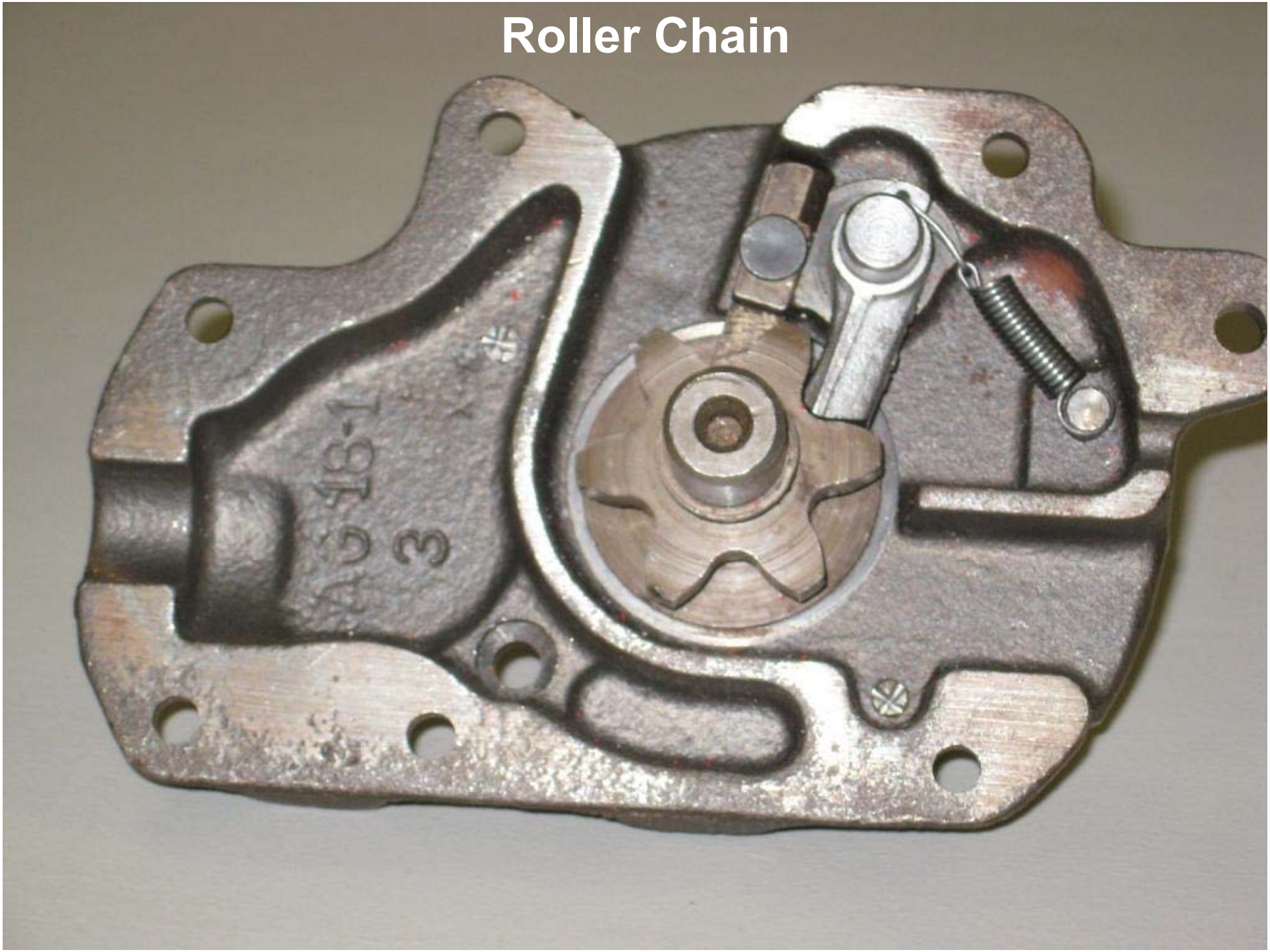
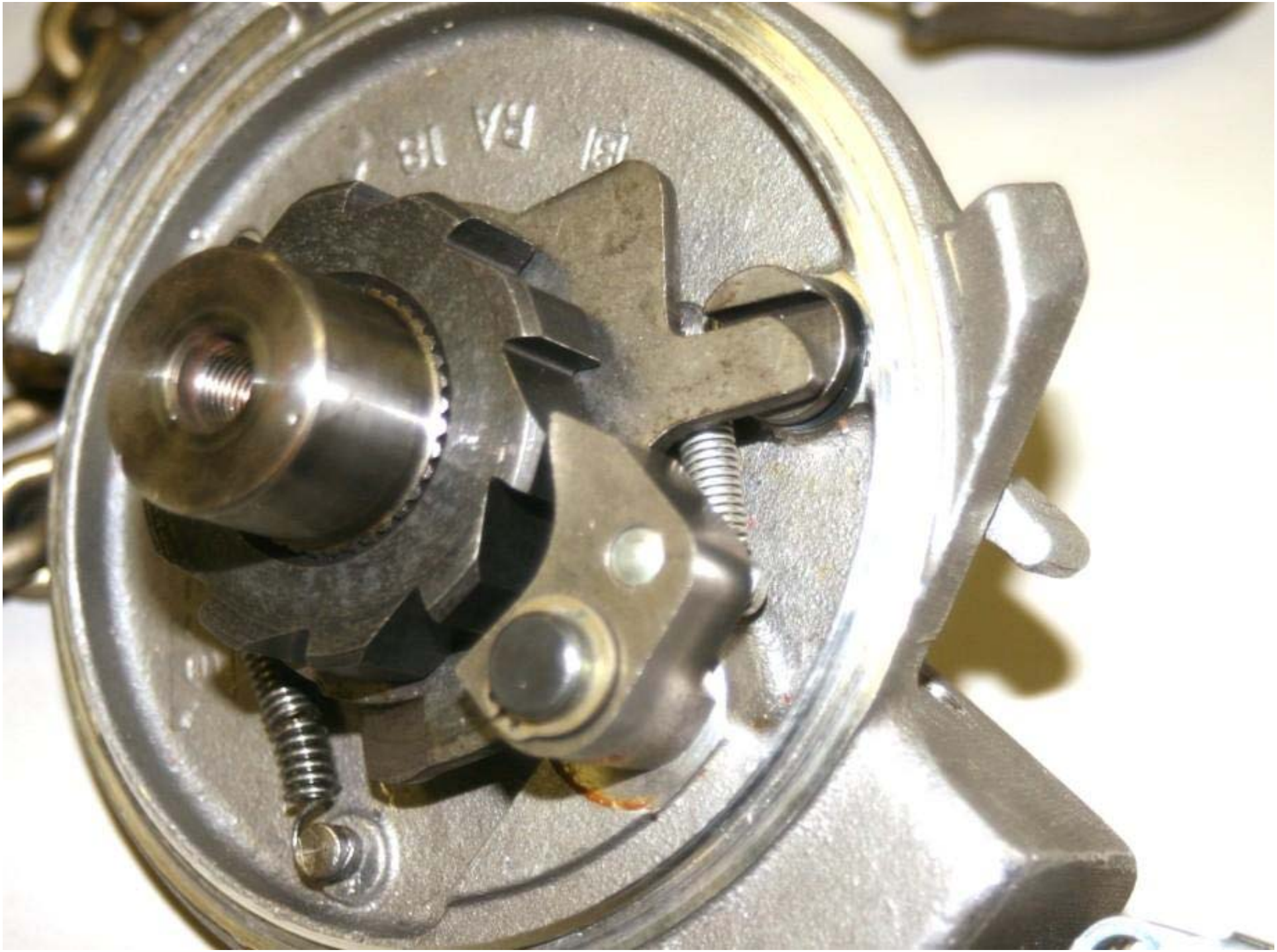
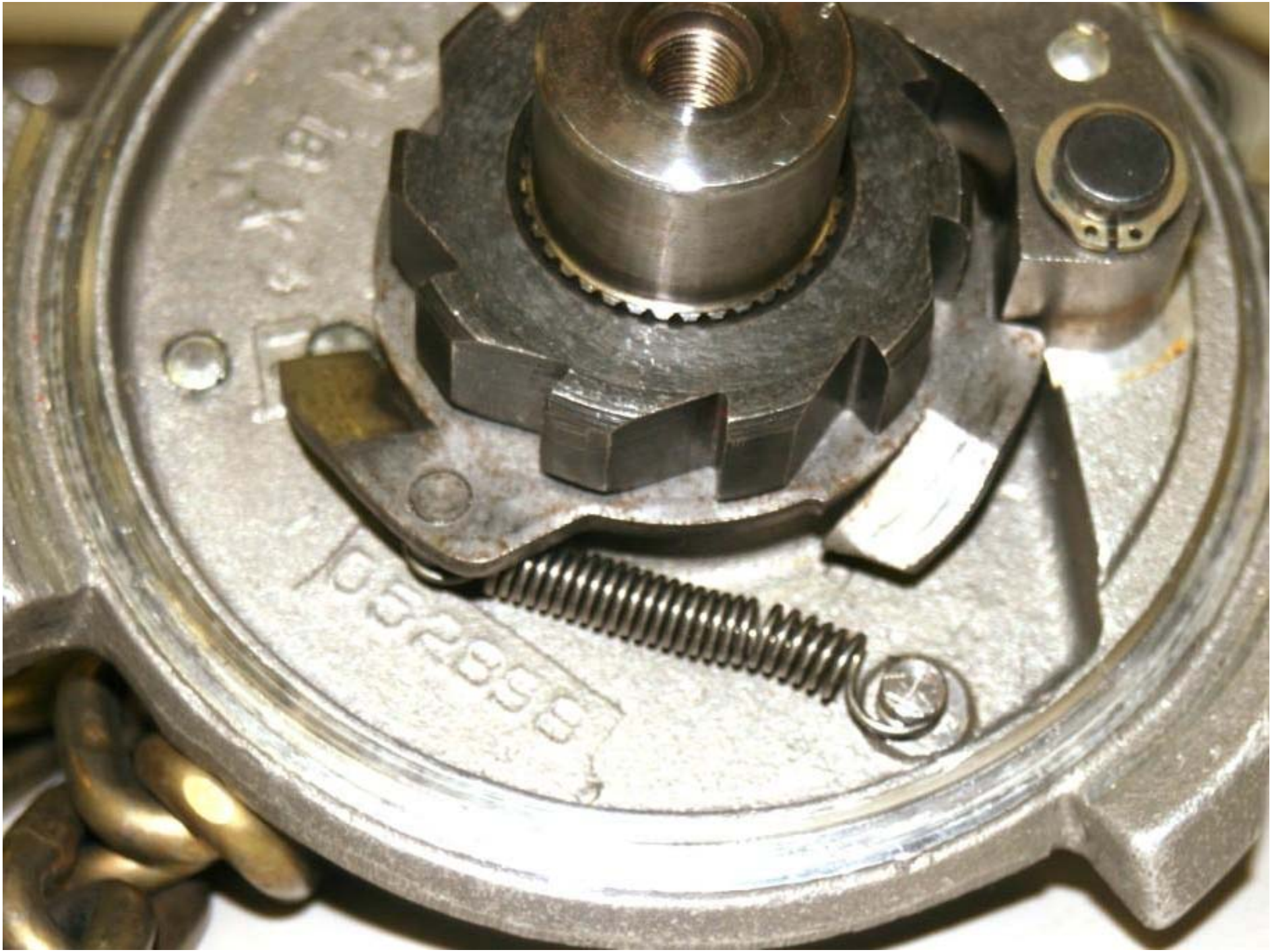
Roller Chain







LEVER HOISTS
friction brake

ASME B30.21

Periodic Inspections ASME B30-21-2.2.1

- All items in Frequent Inspection
- Hook retaining nuts, pins, etc
- Load Chain
- Load block, clevises, chain attach.,etc…
- Load & idler sprockets
- Brake parts: pawls, ratchets, springs, discs
- Chain end connections
- Supporting structure
- ID Labels ASME B30.21-1.1.3 for legibility

RECORDS REQUIRED

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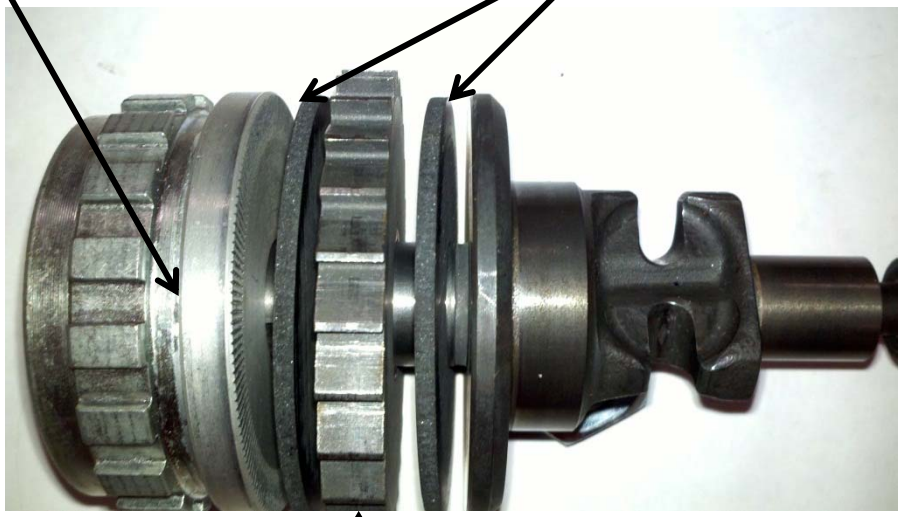
Friction Brake Design

Friction Hub
With Cam

Two Friction
Disks



Rachet

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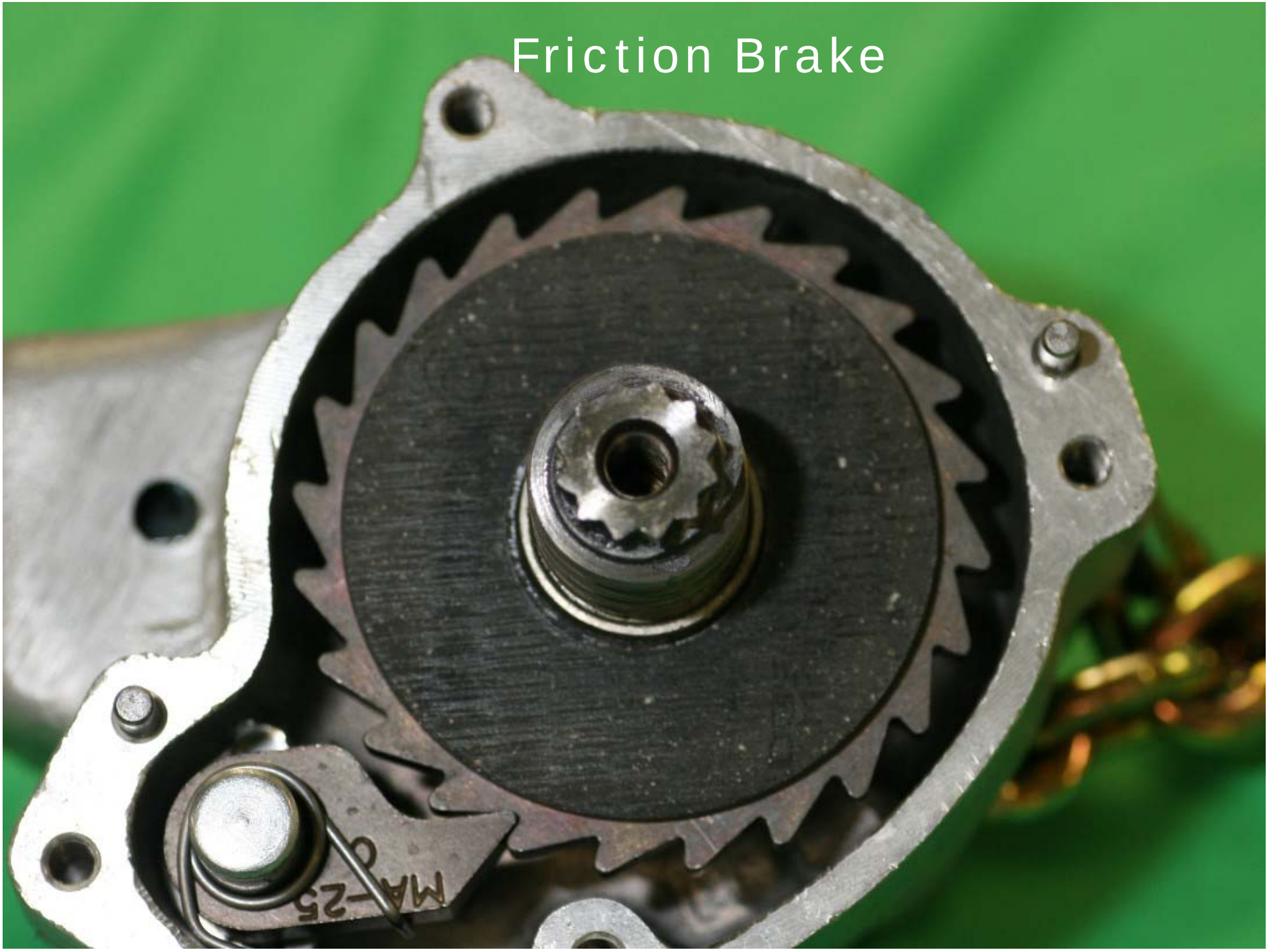
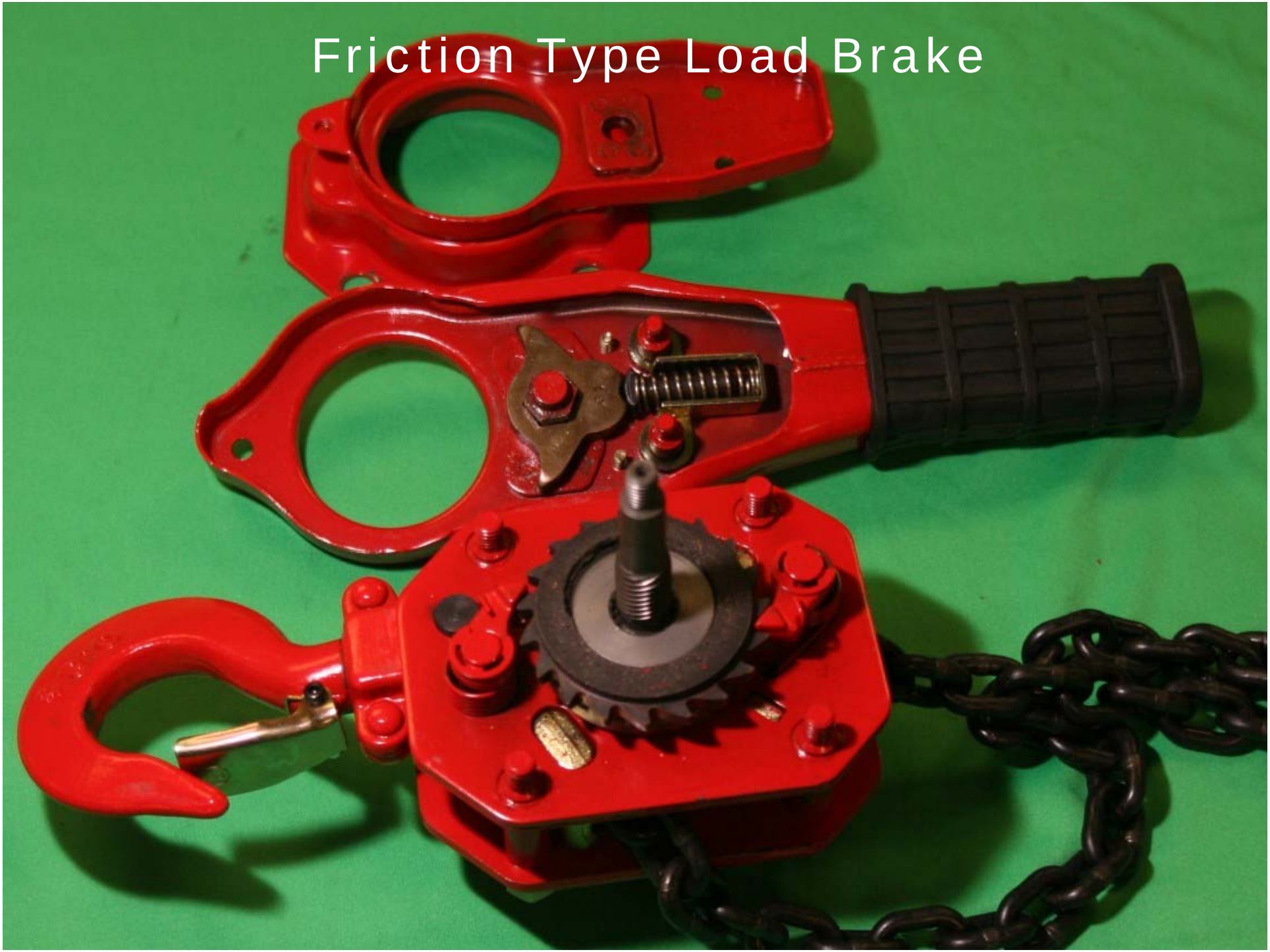
Friction Brake



Friction Type Load Brake



Questions??

Thanks for your attention,
let's take a break!

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