

HANDLING AND TRANSPORTING LARGE LAND CABLE REELS

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1. GENERAL

1.01 This section covers the equipment and the general methods used to handle and transport large land reels on which standard and maximum length cables are supplied.

1.02 Many models and designs of cable reel trailers and reel pallets are used to transport cable, but the general methods of operation and the safety precautions in this section apply to all cable reel transporting equipment now in general use.

1.03 For the purposes of this section, maximum length cable is considered to be lengths of cable supplied on the 487 reels in lengths exceeding

the "standard" lengths available on the 420T reels. Cable weights, diameters, and lengths are covered in the 626 Division of the Bell System Practices.

1.04 For the purposes of this section, large land reels are considered to be cable reels in the 7- and 8-foot diameter range. Dimensions and weights of cable reels are covered in Section 626-020-100.

1.05 Wire armoured reels are "submarine" cable reels and are excluded from this section. Armoured and other special protective covered cables may occasionally be shipped on land reels, but the weight of these cables may exceed the capacity of the equipment associated with the standard types of sheath covered in this section. Cable reels with weights that exceed the handling equipment limitations in this section require special handling using the techniques associated with placing submarine cable, as outlined in the 630 Division of the Bell System Practices.

1.06 The following shall be considered supplementary to this section:

SECTION	TITLE
620-100-011	Minimum Approach Distances to Exposed Energized Power Conductors
620-135-010	Guarding Work Areas
626-020-100	Cable Reels, Description, Dimensions, and Weights
626-200-103	Cable Sizes and Reel Lengths, Pulp Insulated Cable, Stalpeth Sheath
626-200-104	Cable Sizes and Reel Lengths, Pulp Insulated Cable, PASP Sheath
626-200-107	Cable Sizes and Reel Lengths, 22-Gauge Screened Pulp Insulated Cables

NOTICE

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Pursuant to Judge Greene's Order of August 5, 1983, beginning on January 1, 1984, AT&T will cease to use "Bell" and the Bell symbol, with the exceptions as set forth in that Order. Pursuant thereto, any reference to "BELL" and/or the BELL symbol in this document is hereby deleted and "AT&T" substituted.

SECTION	TITLE	2. PRECAUTIONS
628-200-208	Underground Cable Placing	<p>2.01 All personnel involved in any work operation requiring the handling or transporting of large land cable reels must be thoroughly trained in the operation of any apparatus that is to be used and must know the working load capacities of the apparatus. In addition, each person involved shall be informed of the work plan and the part or role they are to perform.</p> <p>2.02 Safety glasses, safety headgear, and work gloves shall be worn when handling and loading cable reels.</p> <p>2.03 All personnel must be familiar with hand signals used by outside plant construction forces.</p>
628-200-209	Underground Cable Placing High Production Methods	
649-040-100	Electric Brake Control—Description	
649-040-200	Wheel Chocks	
649-210-105	Towing Hooks	
649-210-131	Multispindle Trailers, Garco Model GTMR-21-3	
649-210-132	Cable Removal Unit, Hogg-Davis	
649-210-166	Truco Cable Reel Trailer	
649-210-305	Construction Equipment Trailers	
649-310-111	Cable Reel Slings	

2.04 *Before* attempting to handle or transport cable reels, personnel involved must be aware of the gross weight of the reel to prevent exceeding the capacity of any tools or equipment being used. In most cases the gross weight is furnished on

the shipping tag (Fig. 1) attached to the inside end of the cable, or it may be marked on the inside of the reel drum. If the gross weight is lacking, it can be calculated from sections in the 626 Division.

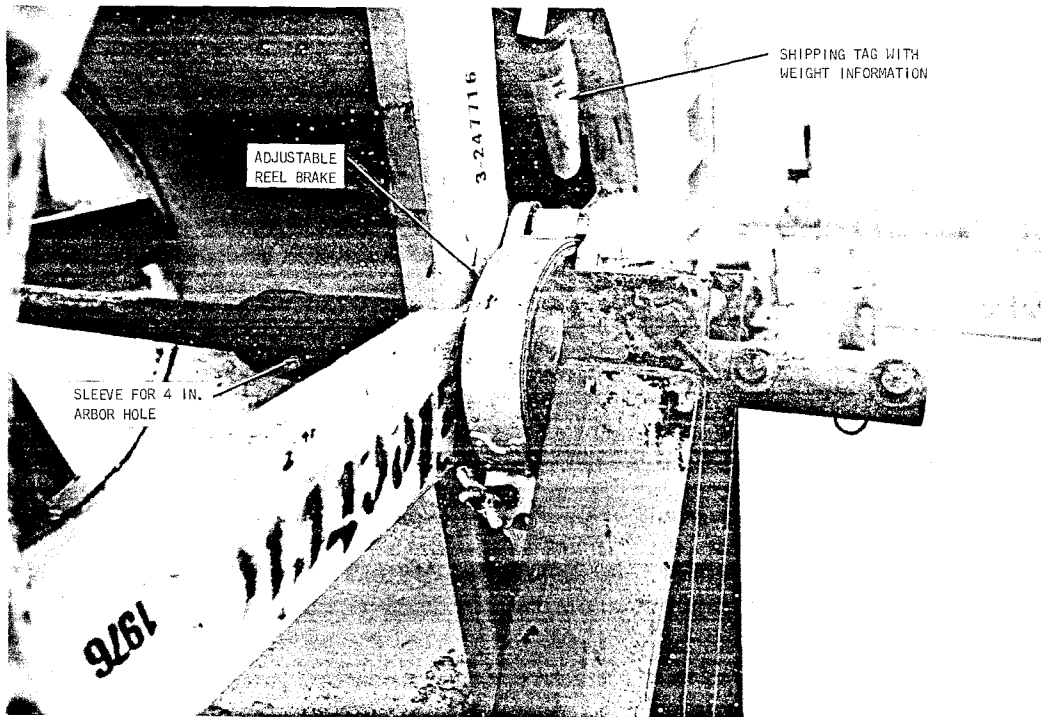


Fig. 1—Reel Pallet Saddle Assembly

2.05 Observe all safety precautions detailed in Section 620-100-011 when operating a crane, boom, forklift, etc, in the vicinity of overhead power conductors.

2.06 *No one shall stand under a cable reel being suspended by a lifting device. Stand at a sufficient distance to be clear in the event the reel or any part of the equipment should fall.*

2.07 When cable reels are transported on flatbed trailers, the operator must be aware of

overhead clearances, especially when hauling the larger diameter reels.

2.08 A detachable ladder with slip resistant rungs should be used to climb on to and off of the deck of a flatbed trailer.

2.09 When large cable reels are moved over curbsings or uneven ground, caution must be used to prevent cable damage because of the small amount of clearance between the cable reel and the ground.

2.10 Care should be exercised when handling cable reels to prevent bending or distorting the reels. In many cases, the equipment used to transport reels leaves minimal width clearance with little or no tolerance for bent or sprung reels.

2.11 Any cable reel loaded on a transporter that utilizes a spindle bar must be prevented from sliding along the bar during transit by use of reel locks or similar devices. The force generated by movement of an unrestrained reel during cornering, stopping, and accelerating the vehicle could damage equipment and/or impose sudden load imbalance. See 4.08 for information on reel collars and locks. Cable transporters **must** have a reel braking mechanism to prevent surging and overspin of the cable during payout. Wooden planks or other improvised arrangements **shall not** be used for reel braking.

2.12 Reel transporting equipment registered for road use must be operated in compliance with applicable state, federal, and local highway regulations. Particular attention should be given to height, length, and weight limitations when transporting large land reels on multireel carriers.

2.13 The precautions in sections that are supplementary to this section (see Part 1) shall apply.

2.14 When ordering a maximum length cable, shipping should be directed to service centers or staging areas that have adequate facilities and equipment to safely handle large reels.

2.15 Cable reels stored on loading docks or staging areas shall be securely chocked to prevent rolling.

2.16 Cable reels being transported in the bed of any vehicle shall be securely chocked and bound to prevent reel movement.

2.17 Do not stand below or close to any truck bed or loading dock after reel chocks have been removed.

3. FLATBED TRAILERS

3.01 Flatbed trailers are used for multireel transporting and as support systems for the high production underground placing method. For maximum productivity, use a trailer that can

accommodate the maximum number of reels consistent with size and weight limitations set forth by applicable highway regulations.

3.02 Flatbed trailers may be categorized as standard trailers, which have a single-level flat deck approximately 4-1/2 feet high (Fig. 13), or as drop-deck trailers, which have a short deck at the point where coupled to a tractor and then steps down to a lower deck (Fig. 3). Deck heights may vary with tire size and wheel arrangement. The drop-deck trailers are more stable when loaded than the standard trailers because of a lower center of gravity. Also, they are easier to unload.

3.03 Several devices are in use for transporting reels on flatbed trailers: reel pallets, articulated crane with reel grapple, hydraulic reel lift with transfer arms. The mode of operation, general field conditions, budgetary, and placing volume enter into the selection of the appropriate equipment.

Pallet Design

3.04 Reel pallets used with high production equipment should be designed to accommodate land reels up to 8 feet in diameter. Pallets should incorporate the following design features:

- (a) 14,000 pound capacity.
- (b) Clearance for a 96-inch diameter reel but with as low a profile as possible to clear overhead obstructions and maintain a low center of gravity.
- (c) Frame width to accommodate a 53-inch wide reel plus clearance for collars and a suitable reel brake.
- (d) Overall dimensions that will permit six pallets to be transported on a 40-foot trailer (side payout).
- (e) Designed to be handled by forklifts (see Fig. 2).
- (f) Reel collars or sleeve to accommodate various size arbor holes up to 4 inches.
- (g) Means for securing the spindle bar in the saddle (see Fig. 1).
- (h) Load binder hold-down points positioned to allow free rotation of the reel.
- (i) A reel brake that can be adjusted to apply drag during pull operations.

3.05 A suitable pallet is available from the Arnco Equipment Company of Youngstown, Ohio.

Model ARC-20 will accommodate the 487 reel and meet other criteria outlined in 3.04 (see Fig. 2).

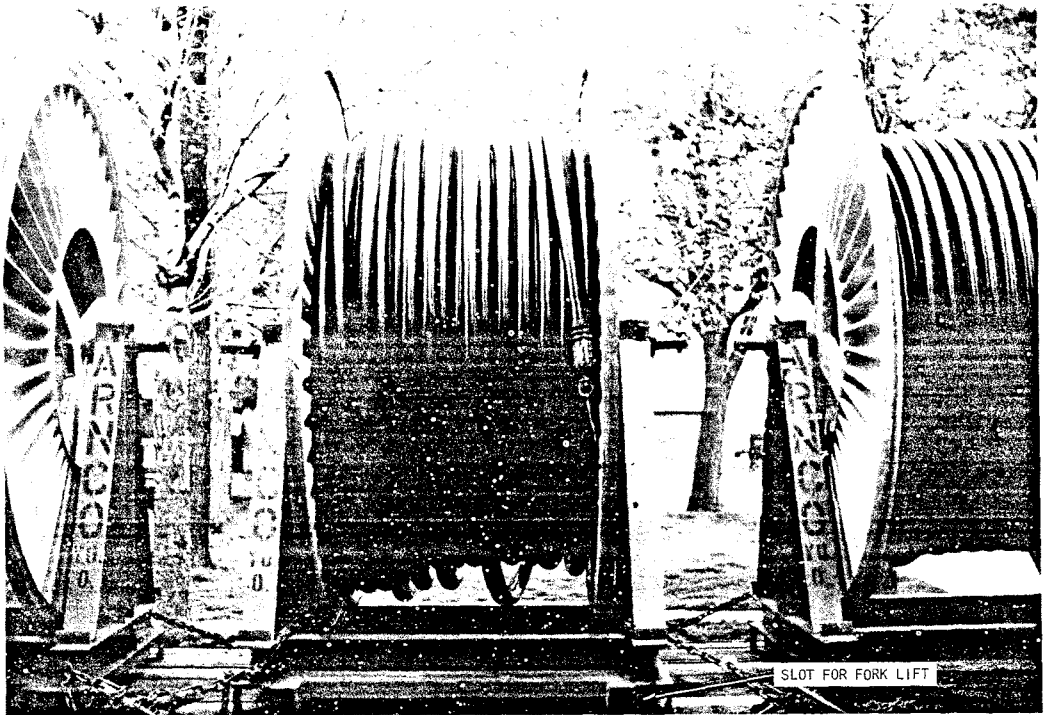


Fig. 2—ARC-20 With Mounted 487 Reel

Trailer Mounted Crane

3.06 Crane type reel handlers mounted on a drop-deck trailer are used to transport and pay out cable. The articulated boom provides mobile self load/unload ability plus job site payout of the cable by suspending the reel over or as near as is practical to the manhole. This type unit is particularly advantageous where off road manholes are prevalent.

3.07 These trailers are custom built to suit the needs of the user; therefore, many variations of the basic design have evolved, eg, boom size and capacity, axle configuration, reel stowage, boom location, grapple size, etc. Information contained herein is intended for the general operation of this type trailer and **does not** replace the operation and maintenance instructions furnished by the manufacturer.

3.08 Typical of this type trailer is the Klebs unit (Fig. 3). A hydraulic loader with an articulated knuckle boom is mounted approximately midway on a 40-foot drop-deck trailer. The hydraulic

pump that drives the system is powered by an auxiliary gasoline engine mounted at the base of the main boom turret. A reel grapple suspended from the boom tip is hydraulically operated to grasp

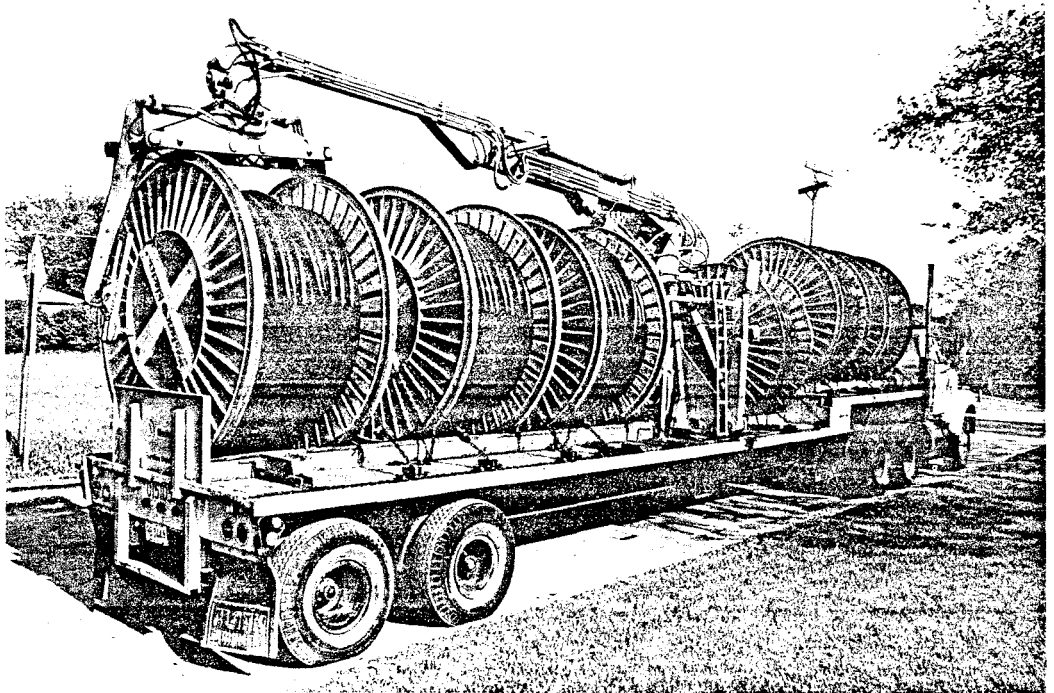


Fig. 3—Trailer Mounted Crane (Drop-Deck Trailer)

the reel, claw fashion, for load/unload or payout by the suspended reel method (Fig. 4). The operator's controls are positioned atop the main boom turret to provide full circle visibility and an

unrestricted view of the operation. A steel pipe frame built around the crane provides protection against accidental damage during work operations.

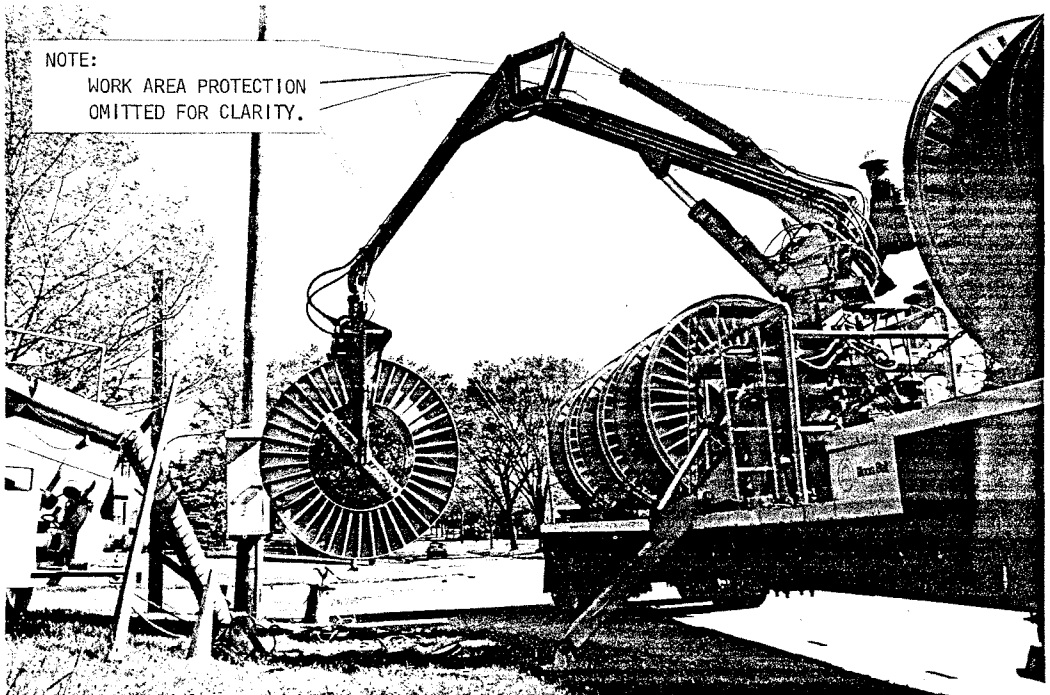


Fig. 4—Suspended Reel Cable Placement

3.09 Reels are stowed in a trough formed by two parallel wooden beams running the length of the trailer and spaced to conform with the reel diameter. Ratchet chain binders are used to secure

the reels during transit. Channels extending along the edge of the deck provide variable fastening positions for the binders to accommodate various reel sizes and load distribution (Fig. 5).

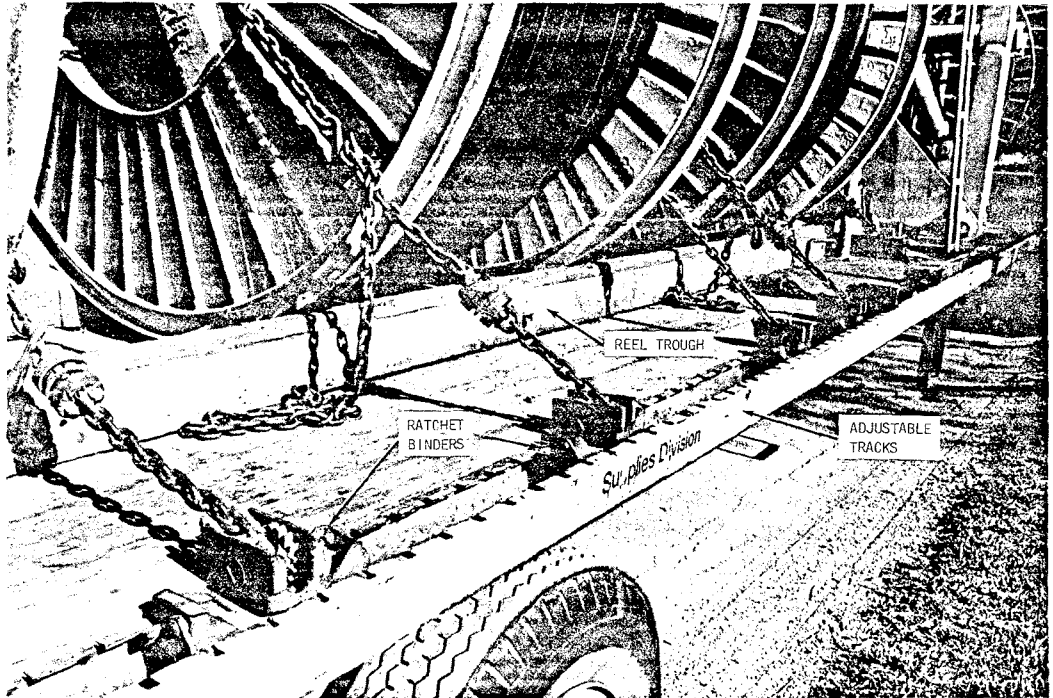


Fig. 5—Reel Tie-Down System

3.10 Reel capacity is generally considered to be six 420 size reels; however, payload must be determined and the gross combination weight of the tractor trailer **must not** be exceeded.

3.11 Only trailer/cranes specifically designed to handle 487 reels should be used for these larger reels. When loading reels of cable, the steel pins on the grapple arms must engage the arbor hole. **Do not** attempt to load a 487 reel with an undersized reel grapple by grasping the upper section of the reel.

3.12 The operator shall examine the area for power hazards before moving the boom from the stowed position. **Minimum approach distances to power conductors**, as specified in Section 620-100-011, **shall be observed**.

3.13 Both stabilizers must be in firm contact with the ground before the boom is moved from the stowed position. If soft ground is encountered, place hardwood planks or steel plates under the stabilizers to provide firm support.

3.14 The vehicle should be positioned as nearly level as possible. Excessive canting of the trailer may cause difficulties with boom slippage when the boom is rotated toward the low side. The operator must take this into consideration and reduce the boom reach.

3.15 The capacity of the boom shall be posted on a chart in full view of the operator. As the articulated boom is extended, the lifting capacity is reduced. As an example, a typical boom has a 14,600 pound capacity at a 10-foot radius (knuckle boom closed) and a 6000 pound capacity when at the maximum radius of 22 feet (knuckle boom fully open).

3.16 Reel braking during payout is accomplished by pressure being exerted on rollers inside the grapple arms which bear against the reel drum (Fig 6). The degree of braking is determined by hydraulic pressure. Gauges at the operator's position indicate the amount of hydraulic pressure giving an indication of braking effort.

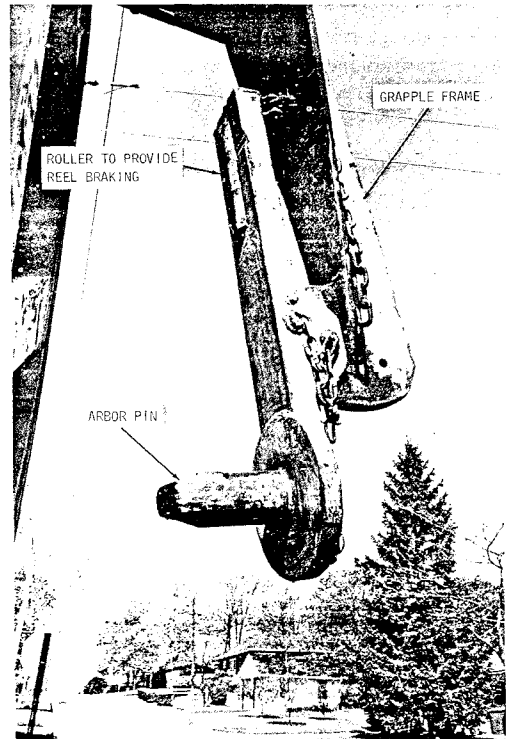


Fig. 6—Reel Grapple

Weight Distribution

3.17 The distribution of the weight of cable reels when maximum length cable is being transported is critical, as the greater weight of a large reel can concentrate the load in a particular area of the trailer thereby imposing excessive loads on springs, axles, and the trailer frame. Steering can also be adversely affected by a poorly distributed load.

3.18 Reel pallets should be equally spaced when gross weight restrictions limit the load to fewer reels than space permits.

3.19 Field conditions will often result in an intermix of reel sizes, with standard length and maximum length cables being transported on the

same load. Placing sequence must be taken into consideration when loading to prevent load imbalance.

Load Binders

3.20 Chain-type load binders are in general use to secure pallets and reels to the deck of a flatbed trailer. Binders should be of the *ratchet* type that provide continuous take up and have reversing capabilities. Examples of ratchet load binders are illustrated in Fig. 5, 7, and 8. Single take up *lever-type* binders that are adjusted in increments based on the link length are not recommended for this application. Problems with slack or jammed loads are common with lever binders and their use may present a hazard with the weight of maximum length cables.

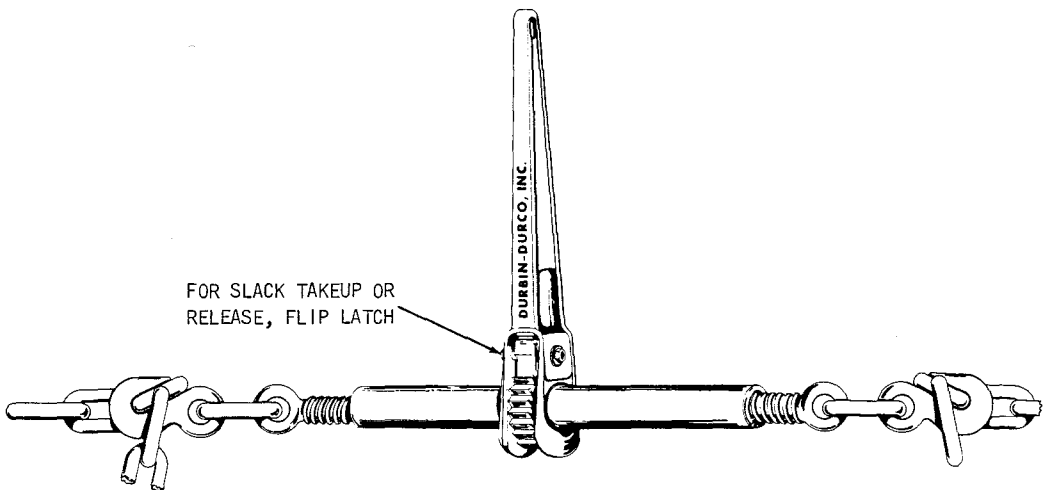


Fig. 7—Ratchet Load Binder (Turnbuckle Type)

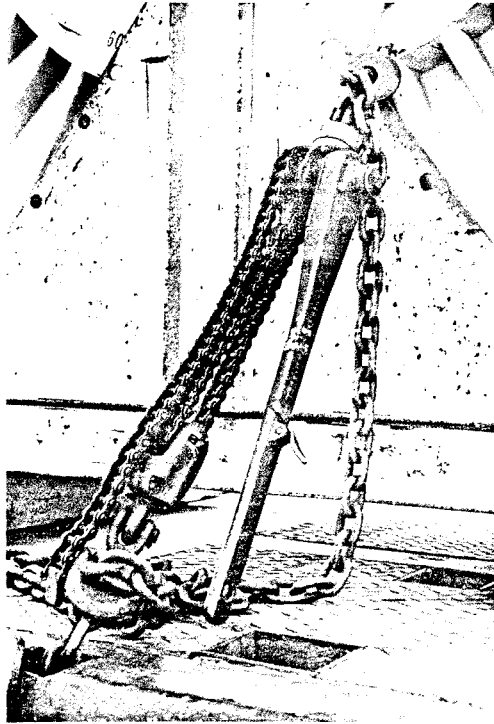


Fig. 8—Ratchet Load Binder (Chain Hoist Type)

3.21 Two chain binders are required to secure each pallet or reel to the transporter to prevent movement in any direction. Each chain and load binder and its associated hardware must

have a breaking strength at least 1-1/2 times the weight of the article being secured. Breaking strengths of various chains are shown in 3.29 and Table A.

TABLE A

BREAKING STRENGTHS OF CHAINS
AND WIRE ROPE IN POUNDS

DIAMETER (INCHES)	ALLOY STEEL CHAIN	6 X 19 WIRE ROPE EXTRA IMPROVED PLOW STEEL
9/32	14,200	—
3/8	23,000	—
7/16	—	22,800
1/2	32,500	26,600

3.22 The driver of the vehicle should check the complete tiedown system periodically during transit and tighten any loose binders detected.

Size and Weight Limitations

3.23 The size and weight limitations for truck-trailer combinations are set by state law and will differ between states. In some cases, local ordinances will be even more restrictive. Operating companies must observe all applicable laws and ordinances

for the geographic area served by the transporting equipment.

3.24 Vehicle gross combination weight may limit the number of reels which may be transported. To determine the maximum laden weight, the light weight of the tractor trailer combination must be known including any additional equipment carried as part of the trailer (pump, blower, take up reel, ladder, etc). In addition, the weight of a complete reel pallet assembly must be determined, including brake, collars, and load binders. For example:

Allowable combined gross combination weight	73,000 lbs
A tractor trailer combination (5 axles) weight	<u>27,000 lbs</u>
Maximum allowable load	46,000 lbs
The proposed cable load is comprised of four 487 reels:	
Reel #1 — 10,500 lbs	Reel Pallet Assembly 1,300 lbs
Reel #2 — 9,600 lbs	Reel Pallet Assembly 1,300 lbs
Reel #3 — 10,800 lbs	Reel Pallet Assembly 1,300 lbs
Reel #4 — <u>8,900 lbs</u>	Reel Pallet Assembly <u>1,300 lbs</u>
Total 39,800 lbs	5,200 lbs
Total Laden Weight, Cable, Reels, and Pallets	45,000 lbs
Combination Light Weight	<u>27,000 lbs</u>
Gross Combination Weight	72,000 lbs

This load is under the allowable G.C.W. by 1000 pounds but could not accommodate any more reels although the space is available.

3.25 Tractor trailers generally used to transport cable do not usually present any problem with length and width limitations; however, the height of a 487 reel on a standard flatbed trailer can present clearance problems at bridges and

railroad overpasses. The delivery route should be studied and selected to avoid any clearance problems.

Loading/Unloading Methods and Equipment

3.26 The preferred method of loading cable reels onto pallets is with a forklift truck. A crane or similar overhead lift may be used but does not provide the mobility of the forklift.

3.27 Lift trucks shall have the rated capacity of the lift posted on the vehicle so as to be clearly visible to the operator (Fig. 9).

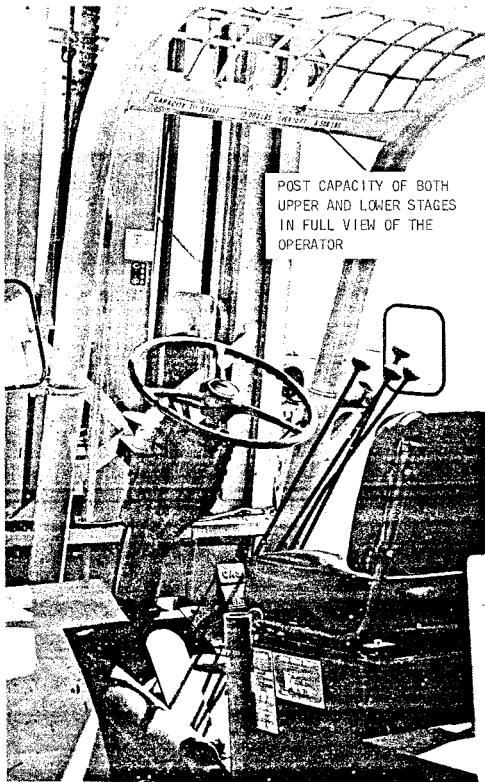


Fig. 9—Lift Operator's Position

3.28 The equipment used to handle cable reels shall be inspected daily by a competent person. Equipment found to be unsafe or in need of repair shall be removed from service.

3.29 Chain or wire rope slings used to suspend cable reels must have a rated capacity equal to no less than the maximum capacity of the lifting device. Breaking strength is generally several times the working load. Breaking strengths of various chains and wire ropes are shown in Table A.

3.30 Loading and unloading may be accomplished by suspending slings or chains from the ends of the forks and attaching the free ends to the spindle bar which has been pre-positioned in the reel. The forks should have an attachment on the end to prevent the chain or sling from sliding off the fork (Fig. 10).

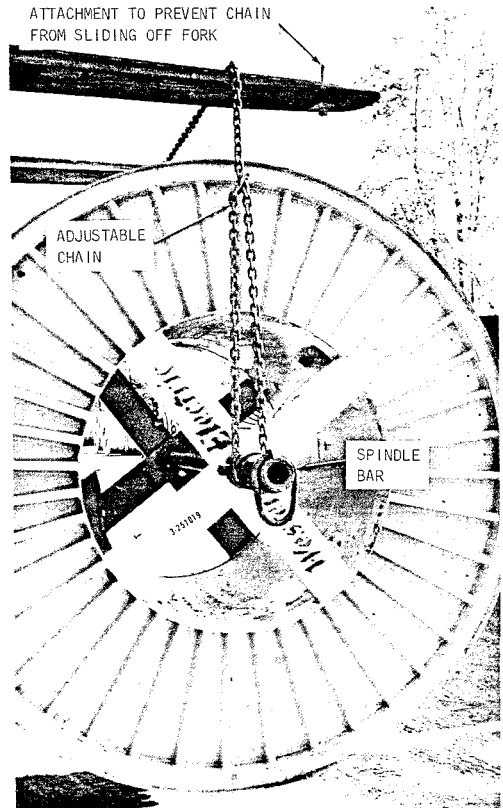


Fig. 10—Reel Suspended From Forks

3.31 Wire rope and chains shall be inspected daily. See Section 649-310-011 for wire rope inspection procedures. Chains shall be visually inspected for signs of wear, cracks, bent or deformed links, or wear spots from dragging.

- 3.32 Hardware shall have a rating at least equal to that of its associated wire rope or chain.
- 3.33 Do not suspend reels of cable from an overhead device by placing a wire rope sling or chain through the reel drum. This may cause bending of the outer rim and present problems when the cable is being placed.
- 3.34 The operator of any lift equipment *shall not* leave his position at the controls while the load is suspended.
- 3.35 Good housekeeping shall be maintained in the cab of the lift vehicle. Extra clothing, tools, or materials shall not be stored in the cab.
- 3.36 Do not drop loaded reels from loading docks, tractor trailers, or railroad cars.
- 3.37 The lifting capacity of the equipment used to lift and place reels onto the pallets will determine the method of loading. The following are examples of acceptable methods:

(a) Loading Dock

- (1) Place flatbed trailer adjacent to loading dock.
- (2) Place spindle bar, complete with centering cones and reel brake, into arbor holes.
- (3) Suspend a reel from the forks of the lift truck (see Fig. 10).
- (4) Position forklift at dock edge adjacent to pallet.
- (5) Lower reel onto pallet.

(b) Pallet Removal

- (1) Remove pallets from the flatbed.
- (2) Place spindle bar, complete with centering cones and reel brake, into arbor holes.
- (3) Lift a reel on the forks of the lift truck (see Fig. 11).

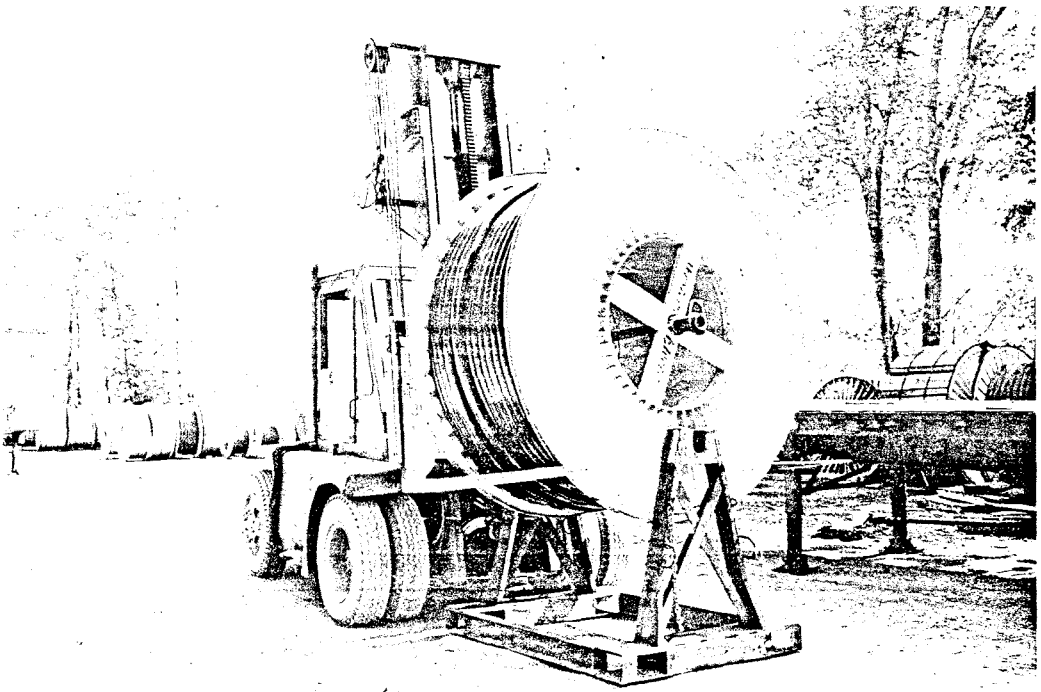


Fig. 11—Ground Loading of Reel Pallet (Pallet Removal Method)

- (4) Place reel on pallet.
- (5) Replace and secure loaded pallet on flatbed (see Fig. 12).

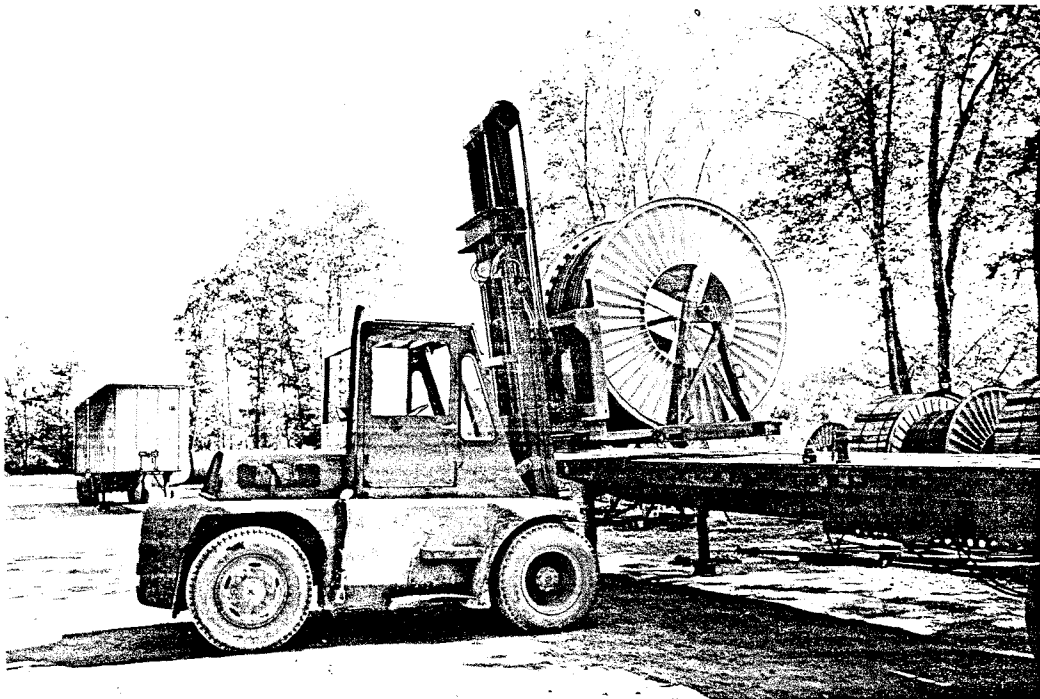


Fig. 12—Loaded Reel Pallet Placed on Flatbed Trailer (Pallet Removal Method)

(c) Overhead Crane

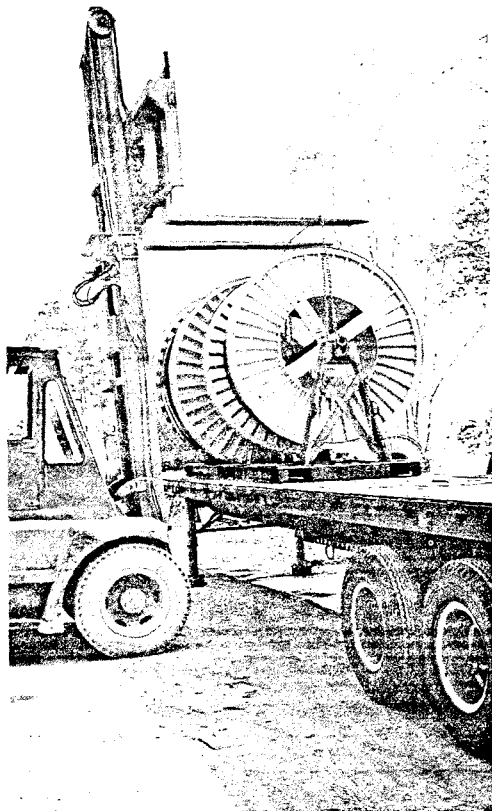
- (1) Reels are positioned adjacent to trailer.
- (2) Place spindle bar, complete with centering cones and reel brake, into arbor holes.
- (3) Using a reel sling, lift the reel and place it on the reel pallet.

(d) Nonremoval of Pallets

- (1) Place spindle bar, complete with centering cones and reel brake, into arbor holes.
- (2) Suspend reel from the forks of the lift truck.
- (3) Position forklift adjacent to pallet.

- (4) Raise reel to required height.
- (5) Move forklift forward and lower onto pallet (see Fig. 13).

Note: This method is for side payout only and is best suited to drop-deck trailers.



**Fig. 13—Reel Loaded by Suspending From Forks
(Non-Pallet Removal Method)**

3.38 Wire ropes or chains used to suspend reels from a forklift truck should be as short as possible to prevent excessive swinging of the reel.

3.39 The forks of a forklift vehicle shall be lowered to the ground when the machine is unattended.

3.40 The steering and balance of a forklift truck is adversely affected as the load is increased and raised. When in motion, keep the reel as low as possible. Position the forklift as close to the vehicle as practicable. With the lift stopped, raise the reel and place it onto the pallet saddles.

Forklift Tagalong

3.41 In areas where traffic congestion and off-road manhole conditions restrict the use of the

flatbed trailer, an alternate method is to equip a forklift for road use and tow it to the job site to complement the transporter. Due to its relatively small size and excellent maneuverability, a forklift can effectively place reels for payout while utilizing the multi-reel transporting features of the flatbed trailer.

3.42 Job site utilization of a forklift is accomplished in the following manner:

1. Park the flatbed trailer near the work location where it may be unloaded safely (see Fig. 14).
2. Remove the chain binders and, using the forklift, remove the pallet containing the first reel to be placed.

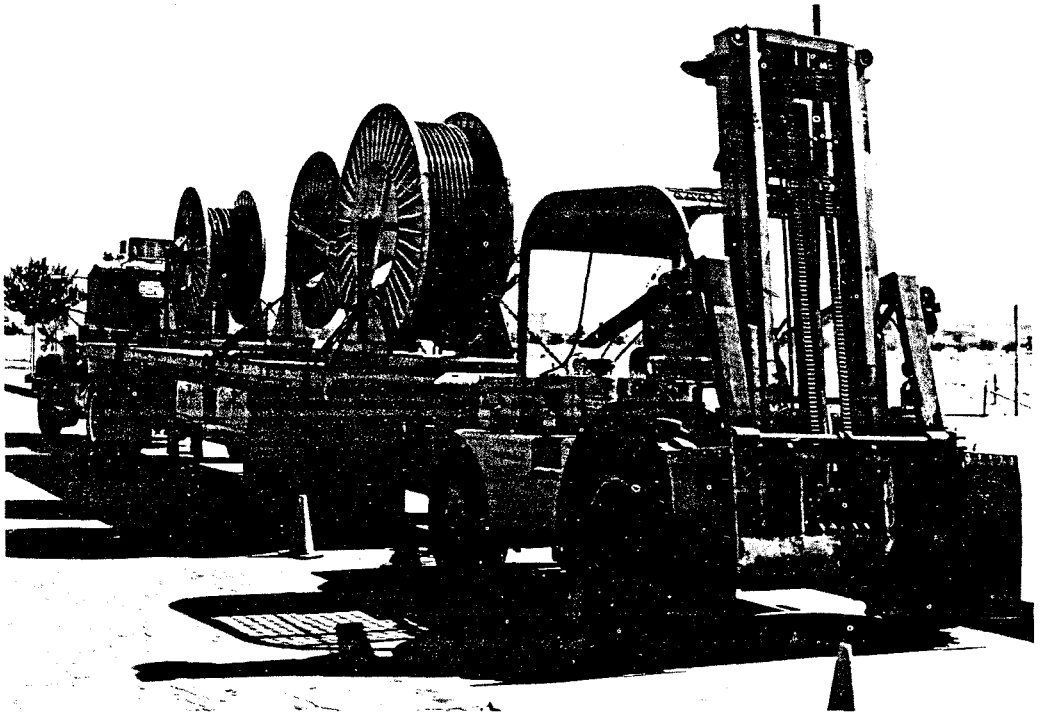


Fig. 14—Forklift Towed to Job Location

3. Drive the forklift with the loaded pallet to the manhole location.
4. Place the pallet as near the manhole as practical for payout (see Fig. 15).
5. Pay out the cable in the normal manner.
6. Return empty reel and pallet to the flatbed.
7. Secure pallet with load binders.
8. Repeat above steps for remaining reels.

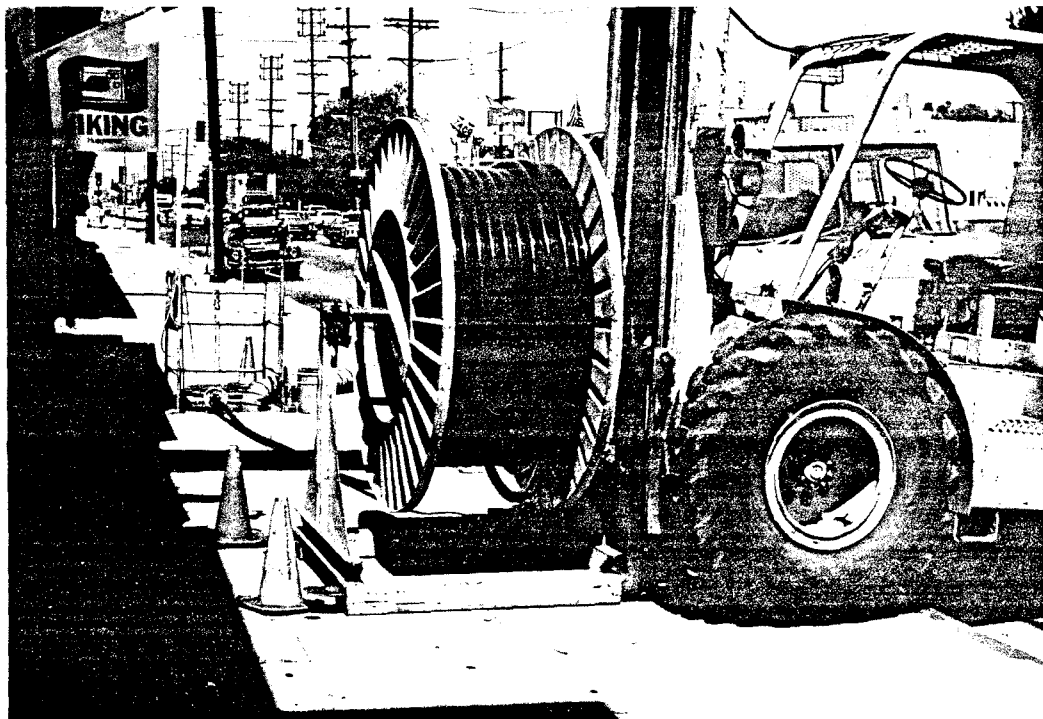


Fig. 15—Pallet Removed and Positioned for Cable Payout

3.43 As an alternative to the above method, a saddle designed to accommodate the spindle bar may be placed on the forks thereby permitting payout directly from the forks (Fig. 16). Pallet removal is not necessary with this method.

3.44 Before attempting to drive a forklift over an unpaved area for cable payout at an

off-road manhole, a careful inspection of the terrain should be made to determine if a safe transit is possible. If any doubt exists, the reel should be positioned as close as practical and the cable payed out over the ground to the manhole.

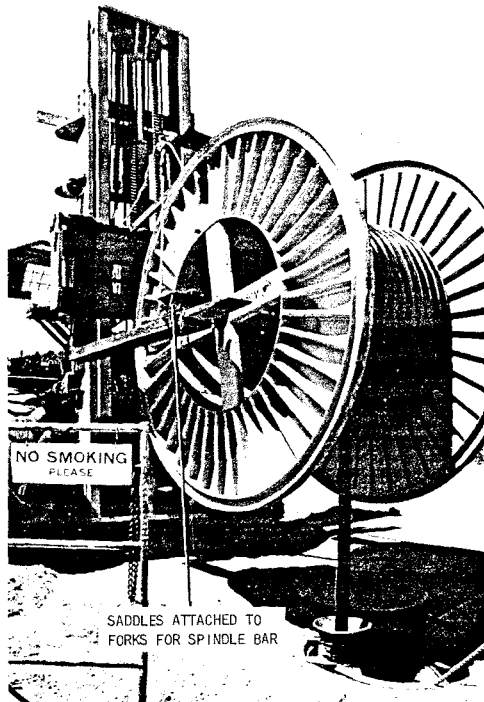


Fig. 16—Cable Payout With Forklift

3.45 Observe local laws as to overall length and gross combination weight when towing a forklift with another vehicle. An effective braking system, safety chains, and all required running

lights shall be provided (Fig. 17). Detailed information on the proper use of "tagalong" equipment can be found in Section 649-210-305.

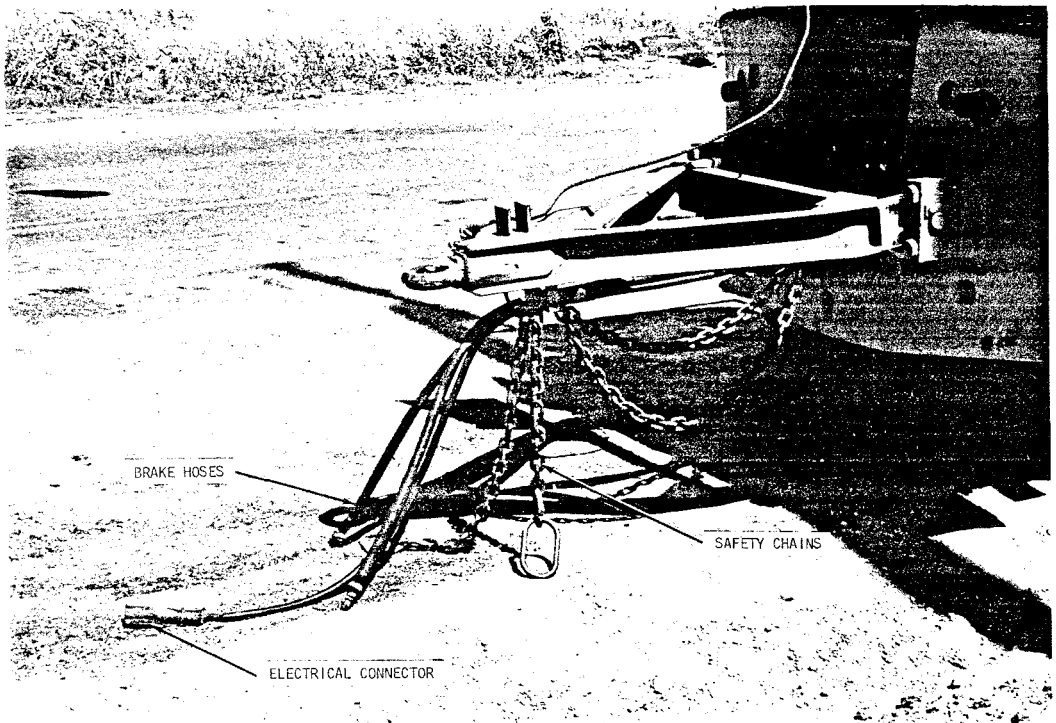


Fig. 17—Forklift Tagalong Assembly

4. SINGLE SPINDLE TRAILERS

4.01 The single spindle trailer serves as a standard means of transporting and paying out cable when multireel trailers associated with high production methods are not practical. Many of the trailers in use are designed primarily for reels up to and including the 420T; however, later models may accommodate larger reels.

4.02 A trailer being considered for use with a 487 reel must be designed to accept the 96-inch diameter and 53-inch width of the reel with

sufficient room on the spindle bar for a reel brake. The recommended minimum weight capacity is 14,000 pounds; however, trailers in the 8,000- to 12,000-pound capacity range may be used, but in all cases, *the capacity shall not be exceeded.*

4.03 The appropriate 649—210 Section of the Bell System Practices should be referenced for safe trailer use. Due to the high weight factors associated with maximum length cables, particular attention should be given to the inspection and maintenance procedures as well as to the selection of an adequate tow vehicle.

4.04 Winch loading tilt trailers such as the old system standard PWD, PCP, and PWCP will **not** accommodate the 487 reel.

4.05 The weight carrying capacity of a Truco trailer is determined by the type and size of the tires. (See Section 649-210-116, Table A). The lower capacity trailers can be upgraded to 14,000 pounds by replacing the tires with the sizes recommended.

4.06 Use the towing vehicle or powered caster wheel on the trailer (if provided) to maneuver the trailer into position for loading the reel.

4.07 Select the highest possible position for the spindle bar to provide the maximum road clearance.

4.08 Reel collars of the proper size shall be used to center the reel on the spindle bar. The 487 reel has a 4-inch arbor hole which requires special collars. The model #487 AL, manufactured by HUML BROS., (Fig. 18) are combination collars and reel locks designed for arbor holes up to 4 inches in size. The lock/collar can be positioned on the inside of the reel drum to lock the reel against the brake. In some cases, it may be necessary to position both collars on the inside due to overall width restrictions (Fig. 19).

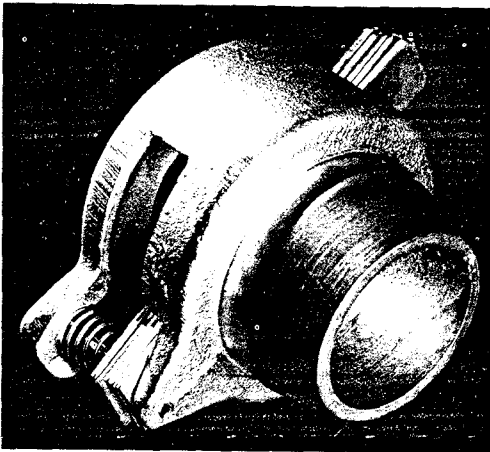


Fig. 18—Reel Collar With Locking Device

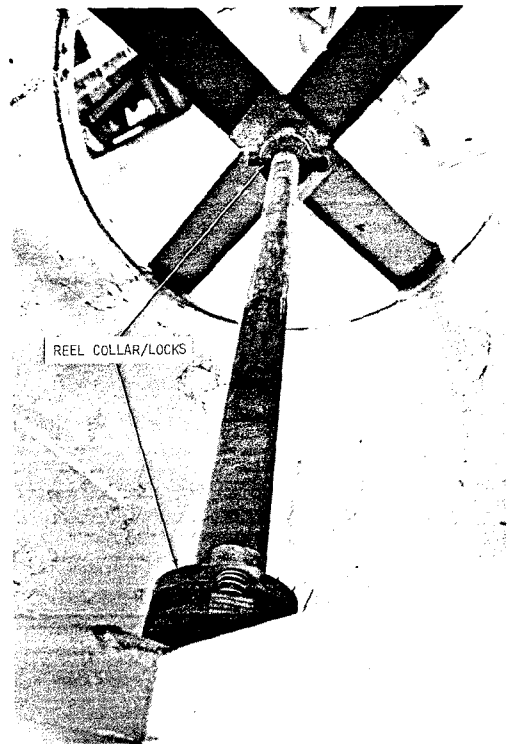


Fig. 19—Reel Locks Positioned Inside the Reel

5. MULTISPINDLE TRAILERS

5.01 Multispindle trailers have inherent limitations in flexibility, maneuverability, loading, cable feeding, and the capability for side payout. In addition, the largest reel accommodated by most multispindle trailers is the 420T.

5.02 Since multispindle trailers are of the tagalong type, load capacities and towing vehicle restrictions should be carefully reviewed before use (see Section 649-210-305).

5.03 The Garco GTMR-21-3 trailer is a commercially available multispindle trailer. The Garco **will not** accommodate the size and weight associated with 487 reels. Detailed information on this trailer can be found in Section 649-210-131.

6. LIFT ARM AND TRANSFER ARM LOADERS

6.01 Hydraulic powered lift arms mounted on the rear of some line construction vehicles, are used as a means of providing self-contained reel handling ability. With the addition of powered

transfer arm assemblies, a vehicle can be designed to carry two 487 reels or an intermix of smaller sizes (Fig. 20). This lift-transfer arm concept can be applied to a semi-trailer with up to five positions possible on a 40-foot trailer.

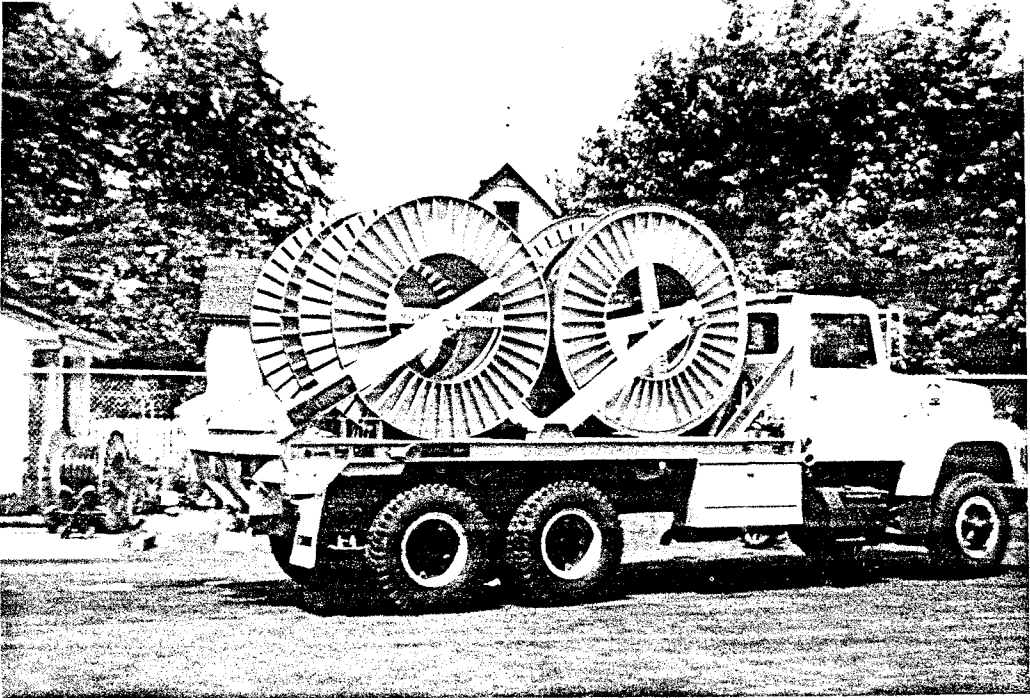


Fig. 20—Reel Transporter With Hydraulic Lift and Transfer Arm

6.02 Several makes are in common use, but generally only the most recent models designed specifically for maximum length cables will accommodate the 487 reels. Be certain that both the lift and transfer arm assembly capacities are adequate to handle anticipated loads.

6.03 This type reel handler is restricted to rear payout of the cable. The limitations on flexibility, reel loading sequence, and cable feeding inherent with rear feed multireel trailers as detailed in Section 628-200-209 also apply to lift arm loaders.

Although rear feed equipment is not as flexible as rear/side payout, the use of a multireel transporter as illustrated in Fig. 20 has an advantage in congested areas where tractor trailers would obstruct traffic.

6.04 An effective reel brake, centering cones, and reel locks must be used when transporting and paying out cable with hydraulic lift equipment. These items generally are listed as optional equipment with most lift manufacturers.