

WIRING
RUNNING AND CUTTING
USING R-4145 OR R-4146 MOTOR DRIVEN CABLE PULLER

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1. GENERAL

1.1 Scope

1.11 This section covers information on the use of the R-4145 and R-4146 Motor Driven Wire Pullers. R-4145 is used for pulling power wire over cable rack and R-4146 for pulling power wire through conduit.

1.12 Pulling power wire by hand is covered in Section 6B. Also refer to Section 6A for general rules and requirements regarding the running of power wire.

1.2 Precautions

1.21 The precautions to be taken against personal injury and to prevent damage to equipment and service interruptions are covered in the 6 series of sections with the associated operations. General precautions are covered in Handbook 0 and are to be observed at all times as they apply to the particular operation being performed.

1.3 Lubrication and Maintenance

1.31 All moving parts shall rotate freely. Lubricate at regular intervals to prevent binding. The drive units for both pullers are identical and may require daily lubrication under heavy usage.

2. INSTALLING EQUIPMENT

2.1 Other tools and supplies generally required for cable pulling operations are covered in Section 6A. The drive unit is equipped with adjustable vise chains with hand screws which anchor the unit quickly to cable rack, auxiliary, framing, pipe or conduit boxes. No tools are required. However, an assortment of standard wrenches, available in various tool kits will be needed to attach "U" bolts, threaded rods and other bracing to auxiliary framing, cable rack, etc.

3. SETTING UP THE R-4145 PULLER AND SHEAVES

3.1 Although the puller can be used to advantage on any size job, crowded conditions on smaller jobs may make it

uneconomical to do so because of the setup time involved. The supervisor responsible for the cabling operations shall, therefore, determine when it will be advantageous to use mechanical means instead of pulling the wire manually. Following are some guide lines which may influence his decision.

- (a) Number of runs involved and length of the runs.
- (b) Multifloor wiring which normally would require a large manload.
- (c) Space available on cable rack for mounting sheaves. Det. 2, Horizontal Sheave requires 8 1/2" plus 2" for auxiliary framing bars. The vertical Sheave, Det. 3, requires 15" plus 2" for auxiliary framing bars.

3.2 Locate the puller at or near the terminating end of the cable run in a manner to suit job conditions and arranged so that the operator will work from the floor. See Figures 1 to 4.

CAUTION: The drive unit of the puller has a pulling power in excess of 4000 lbs. The operator should be instructed to release the pulling rope immediately when it becomes apparent that the cable has snagged or is caught some place. This condition can usually be detected by a whining noise in the puller motor. Disregarding the warning signal may result in placing undue strain on supporting members and braces.

3.3 The pulling operations for power wire over cable rack are essentially the same as applicable to switchboard cable. (Handbook 8 Section 213). Because of the larger sizes and heavier weights of power wire, however, it will be necessary to provide additional bracing, particularly where 500 MCM or 750 MCM power wires are concerned. Special attention should be paid to reinforcing bracing at the sheaves where a change in direction occurs.

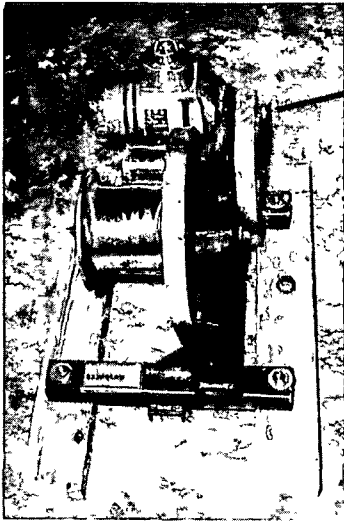


FIG. 1 PULLER DRIVE UNIT MOUNTED ON 2"X4" LUMBER AND ANCHORED TO FLOOR WITH 3/8" BOLTS (PAR. 3.2)

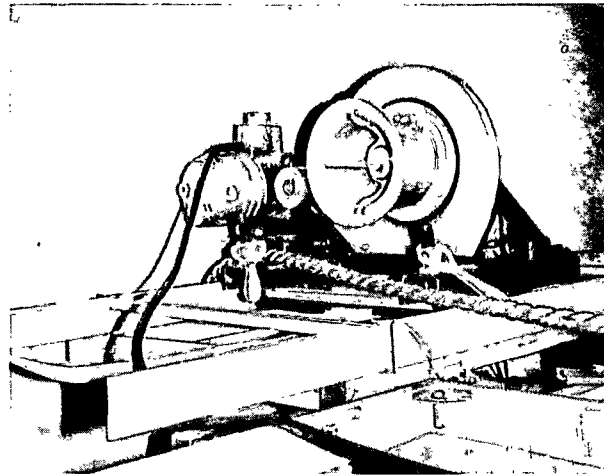


FIG. 3 DRIVE UNIT MOUNTED ON SHORT LENGTH OF CABLE RACK WITH PULLER VISE CHAIN. ARRANGED IN LINE WITH CABLE TO BE PULLED. (PAR. 3.2)

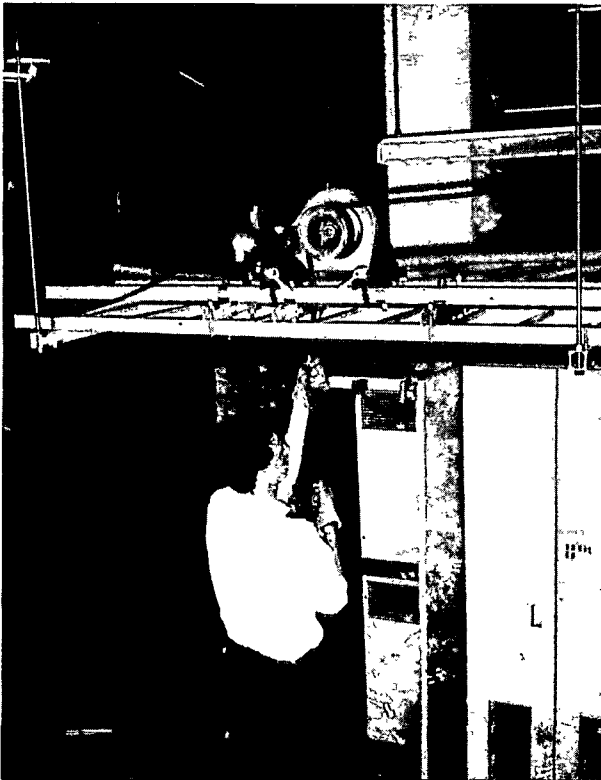


FIG. 2 DRIVE UNIT FASTENED DIRECTLY TO CABLE RACK WITH PULLER VISE CHAIN (PAR. 3.2)

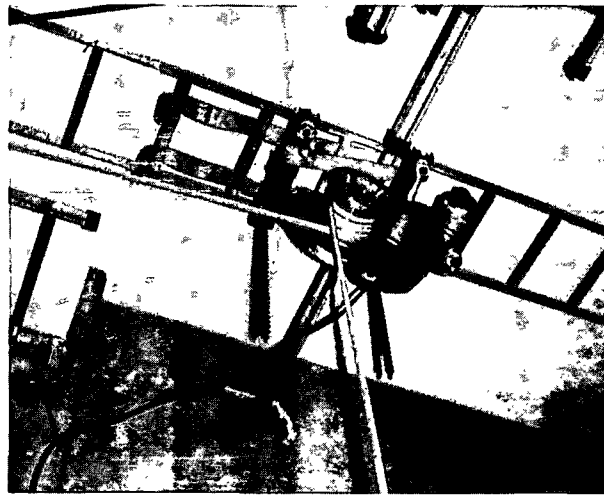


FIG. 4 DRIVE UNIT ATTACHED TO UNDERSIDE OF CABLE RACK WITH THE PULLER VISE CHAIN (PAR. 3.2)

3.4 The puller can be operated at two pulling speeds. With the pulling rope 2 to 3 turns around the large capstan a speed of 15 ft. per minute is maintained. This is the recommended rate of pulling. Winding the rope around the small pulley will increase the rate of speed to 30 ft. per minute. This faster speed may be used on straight runs or on runs having no appreciable change in direction.

3.41 Releasing the pulling rope will cause slippage at the capstan. This places the pulling operation under control and will enable the installer to stop the operation in case of trouble.

CAUTION: NEVER LEAVE THE DRIVE UNIT UNATTENDED UNLESS THE LINE CORD HAS BEEN DISCONNECTED FROM THE APPLIANCE OUTLET.

3.5 An assortment of sheaves is furnished with the puller. They are arranged to mount vertically or horizontally from superstructure or above cable racks for guiding the cables either in a straight run or around turns as dictated by job conditions.

3.51 Detail 2 sheave is mounted horizontally from existing or temporary framing bars erected in the required location. Temporary framing bars should be installed diagonally from corner to corner on the high type superstructure above the cable turn. Locate the sheave as close to the ceiling insert supported end to provide secure anchorage. The open end of the yoke should face toward the outside of the turn. The yoke is provided to enable the installer to lift out the cable and place it on the rack when the pulling operation has been completed. Figures 5, 6 and 7 show typical mounting arrangements.

NOTE: Auxiliary framing bars, threaded rods, nuts and bolts required for temporary setups may be used from surplus stock on the job or may be requisitioned from the local Service Center as supplies. See Handbook 250.

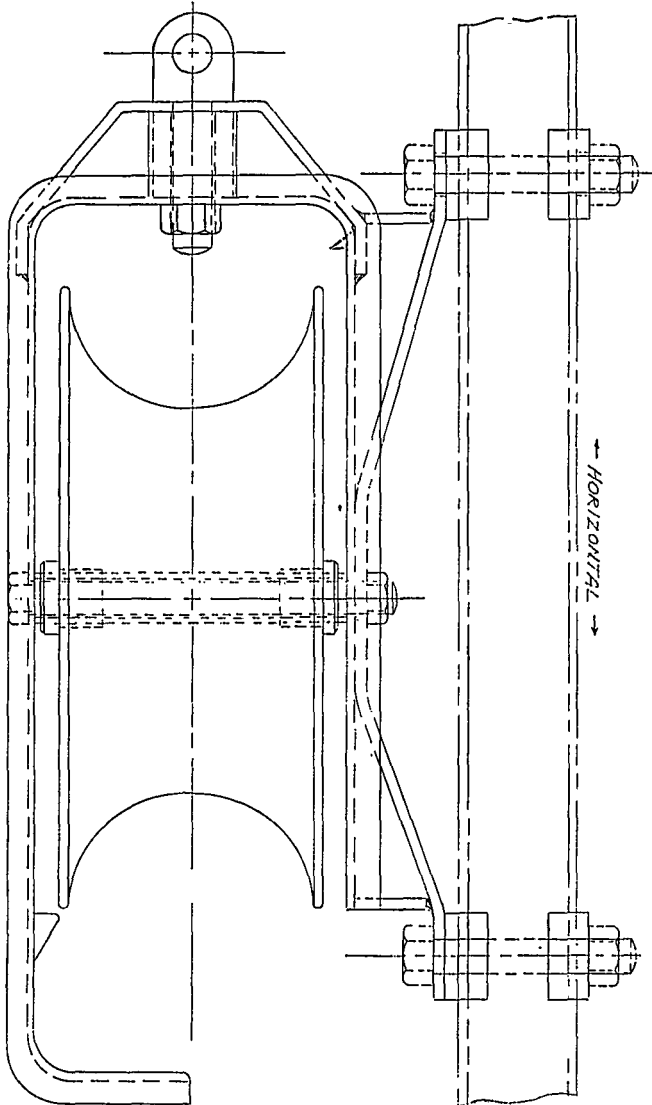


FIG.5 DET.2 SHEAVE ATTACHED TO AUXILIARY FRAMING (PAR. 3.51)

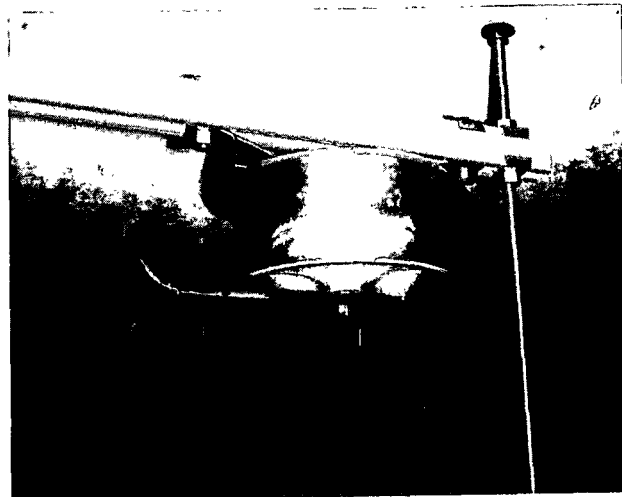


FIG.6 DET.2 SHEAVE FASTENED TO UNDERSIDE OF FRAMING BARS (PAR. 3.51)

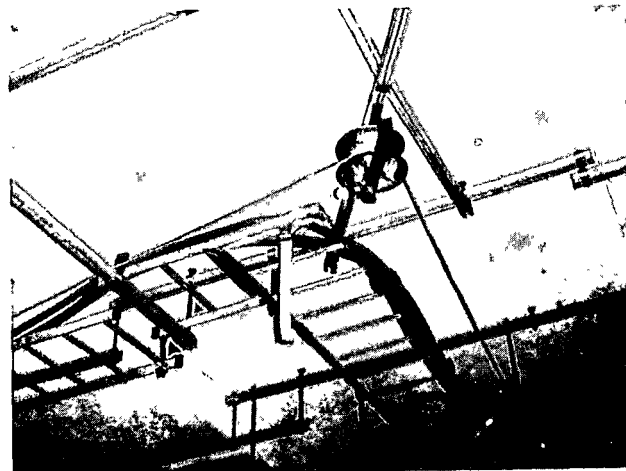


FIG.7 DET.2 SHEAVE SUPPORTED FROM TEMPORARY FRAMING BARS ARRANGED DIAGONALLY ACROSS A 90 DEGREE TURN (PAR. 3.51)

3.52 Details 3 and 4 sheaves are arranged to mount vertically from existing auxiliary framing, pipe or temporary framing bars. An optional swivel hook is provided with the sheave for alternate means of fastening when auxiliary framing is not used. Figures 8 to 12 show typical mounting arrangements. Det. 4, 6" sheave is generally used as additional support for long runs.

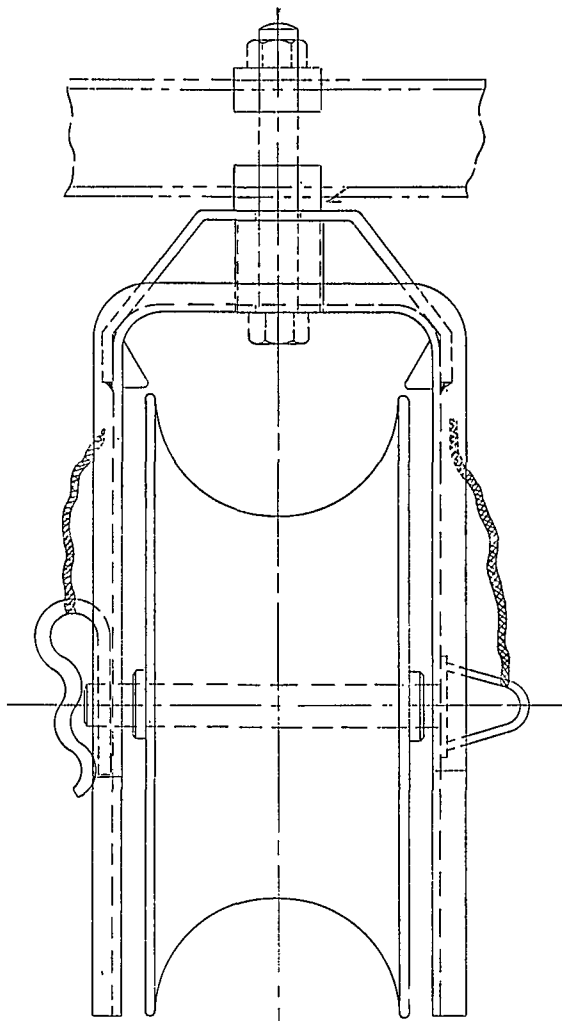


FIG.8 DET. 3, 12" SHEAVE MOUNTED TO UNDERSIDE OF FRAMING BARS. (PAR. 3.52)

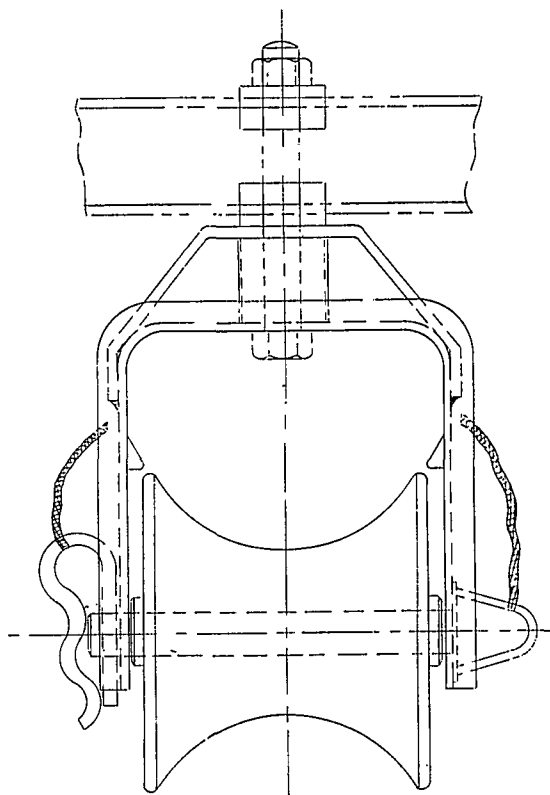


FIG.9 DET.4, 6" SHEAVE MOUNTED TO UNDERSIDE OF FRAMING BARS (PAR. 3.52)

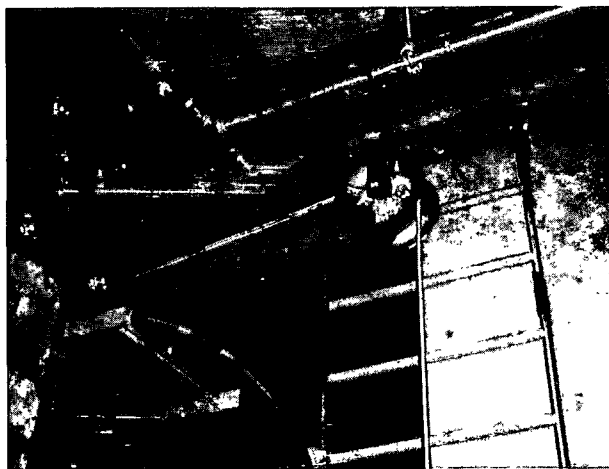


FIG.10 DET.3 SHEAVE MOUNTED TO GUIDE CABLE FROM HORIZONTAL TO VERTICAL CABLE RACK (PAR. 3.52)

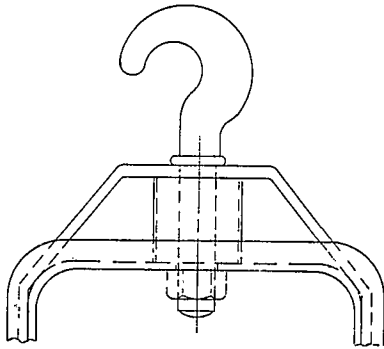


FIG. 11 SWIVEL HOOK FOR USE WITH DETAILS 3 OR 4 SHEAVES (PAR. 3.52)

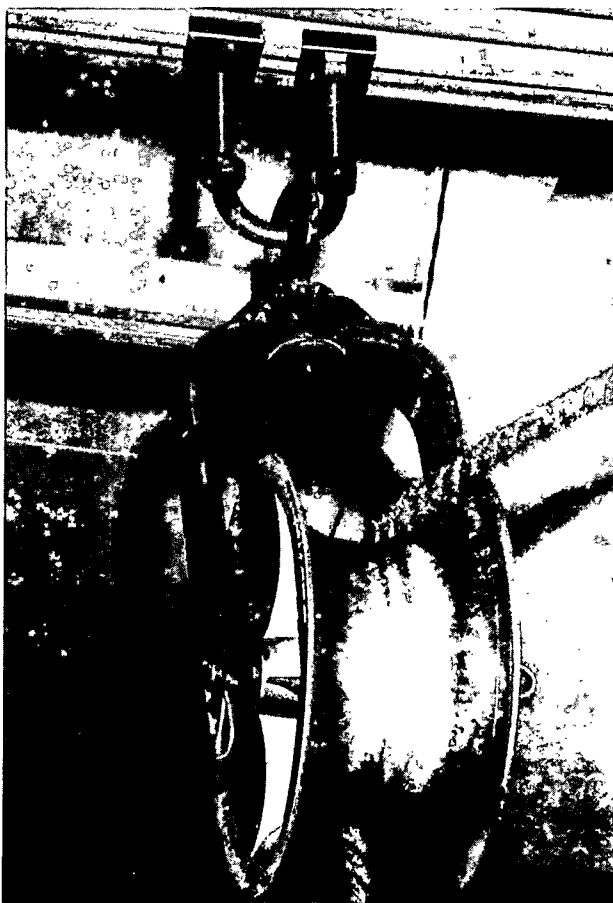


FIG. 12 DET. 3 SHEAVE USING SWIVEL HOOK AND "U" BOLT ATTACHED TO UNDERSIDE OF FRAMING BARS (PAR. 3.52)

3.53 Details 5 and 6 sheaves, equipped with a twin yoke may be used at horizontal turns where there are no framing bars available and conditions are such that temporary bars cannot be installed. The twin yoke frames should be fastened with R-2849 or R-2118 straps to any available structure with the sheaves centered over the intersection. See Figure 13.

CAUTION: Since the cable will pass through the closed end of of the yoke on Details 4 and 5, consideration must be given to removal of the sheave pin after completing the run, when the sheaves are mounted. There should be no obstructions to prevent access to the sheave pin.

3.531 The number of sheaves furnished with the R-4145 puller is usually adequate to serve the average size job. Should additional sheaves be required, they may be ordered separately.

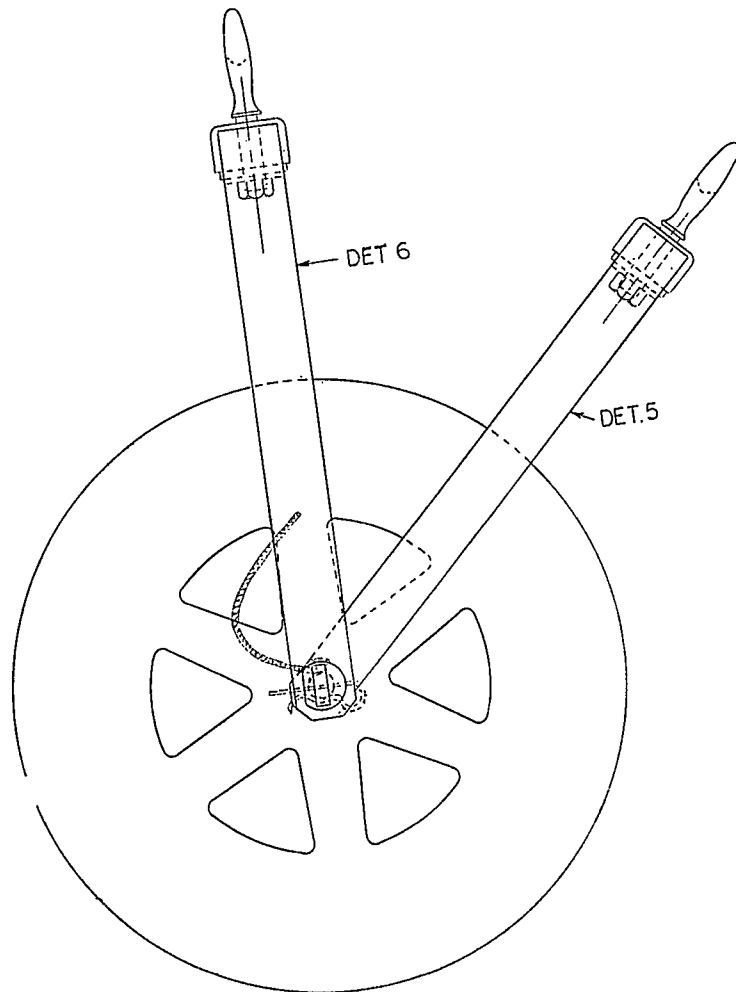


FIG. 13 DETS. 5 AND 6 TWIN YOKE (PAR. 3.53)

4. PULLING WIRE AND CABLE

4.1 General Procedure

4.11 The basic requirements and methods as outlined for pulling power wire in Section 6B shall be followed in running power wire with the R-4145 Motorized Cable Puller.

4.2 Determining Direction of Pull

4.21 After the sheaves have been placed in the required locations, the polypropylene rope shall be fed through them starting at the lower numbered floor, or at the terminating end if the run is on the same floor. If job conditions are such that would not permit mounting the puller on the lower numbered floor, or the cable reels can not be set up on the higher numbered floor, the process may be reversed and the cables may be pulled up. This procedure may be used to advantage when there is a long vertical drop in the run. In this case, the puller will act as a brake while running the power wire.

4.3 Attaching Cable Grips

4.31 Two sizes of cable grips are furnished with the puller. These are the "Chinese Finger" type which are suitable for various sizes of wire. Select the grip which fits tightest to the ends of the wire or group of wires to be pulled. Couple Detail 14, Swing Link to the cable grip as shown in Figure 14. If the polypropylene rope is not spliced to the swivel, it should be fastened by means of an eye splice.

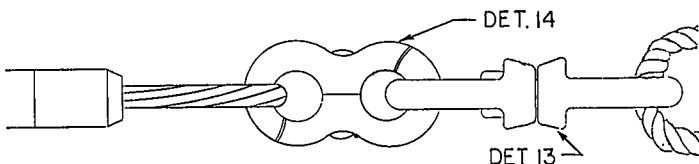


FIG. 14 COUPLING OF WIRE GRIP, SWING LINK AND POLYPROPYLENE ROPE (PAR. 4.31)

4.4 Pulling Power Wire

4.41 The installer operating the drive unit should take up the slack in the pulling rope and wrap it several turns around the larger capstan. It is recommended that a talking line be set up where the entire run is not on the same floor to provide communication between men stationed in various locations along cable run.

4.42 The operator at the drive unit should start the motor after the "O.K." signal has been received from the originating end. During the pulling operation, the rope should be taut at all times to prevent snagging. The cables to be run should be under observation along the entire run to insure that the pulling rope and cables do not snag and that there is no undue stress placed on the sheaves or their supports.

4.421 Should there be an excessive amount of twist on a sheave it should be counterbraced by an R-2849 or R-2118 Strap or some additional auxiliary framing bar bracing.

CAUTION: During the pulling operation, the man stationed at the cable puller should be alert at all times to any excessive pull. This would also be indicated by a change in the sound of the puller ratchet. Should this occur, the puller motor should be stopped and the cause investigated.

4.422 The operator at the cable reels can assist the running operation by helping to pull the wire off the reels.

4.443 When the cables reach their destination on the run, the cable grips should be detached from the swing link and the swing link should be uncoupled from the swivel. Tie the 3/16" return rope to the swivel for returning the 5/8" pulling rope to the originating end. The men stationed along the run should remove the cables from the sheaves leaving the 3/16" return line in the sheaves for returning the pulling rope.

5. SETTING UP THE R-4146 PULLER AND ACCESSORIES

5.1 Refer to preliminary information on preparing a run through conduit or pipe in Section 6B. Also refer to paragraphs 1 through 4 in this section.

5.2 The R-4146 cable puller was especially standardized to aid the installer in running power wires through pipes and conduit. While the drive units for both pullers are identical, their associated parts differ greatly. On large jobs, where power wire is run simultaneously through conduit and over cable rack, it is quite possible to have one of each an R-4145 and an R-4146 puller on hand.

NOTE: Refer to the general precautions under other paragraphs in this section as they apply to all types of pulling operations.

5.3 As previously pointed out, the requirements regarding the pulling of wire through conduit are covered in Section 6B and they apply whether the wire is run manually or by mechanized means. For this reason, they are not repeated here.

6. ATTACHING CABLE GRIPS

6.1 The cable grips used for pulling wire through conduit differ from those provided for pulling wire over cable rack. Three sizes are provided, small for 2" and 2-1/2", medium for 3" and 3-1/2" and large for 4" and 5" conduit. Up to 4 wires may be pulled simultaneously. Figure 15 shows a wire grip with several conductors attached to the pulling rope and rope clevis.

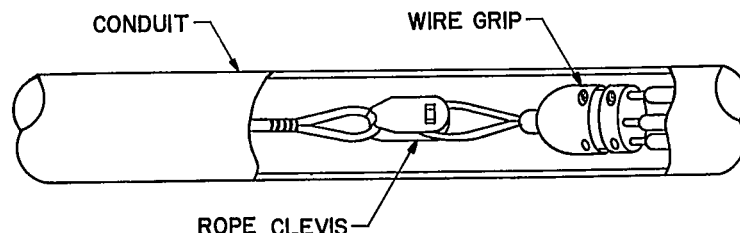


Fig. 15 Cable Grip Attached to Power Wire (Par. 6.1)

6.11 Select the proper size wire grip for the conduit to be used. With an Allen wrench loosen both screws in each hole used. Strip 6" of insulation from wire, insert the wire into the holes and retighten the screws. The grip hole must be filled from 50% to 75% with wire. Add additional strands where small sizes of wire are being pulled or remove excess strands from large sizes. All wire grips can be pulled through 45° or 90° bends.

CAUTION: If the grip hole is filled over 75% the wire strands may become wedged and may have to be drilled out.

6.12 The rope clevis is fitted with a removable pin to facilitate re-moving and attaching the wire grip and rope.

6.2 After the pull has been completed, pull the wire grip to within 6" of the capstan loosen the set screws and use the puller to remove the wire grip from the cable.

IMPORTANT: Should any set screws become lost on the job, they must be replaced by cone point Allen head type screws.

7. PULLING POWER WIRE THROUGH CONDUIT

7.1 The attachments furnished with the R-4146 puller permit a wide variety of arrangements. Det. 2 Pipe Adapter sheave is used to pull cable or wire from an open box or a dead end pipe. Figure 16 and 17 show a typical application. Adjustable vise chains with hand screws quickly anchor to conduit, pipe, pull boxes or structural beams. No wrenches or special tools are needed.

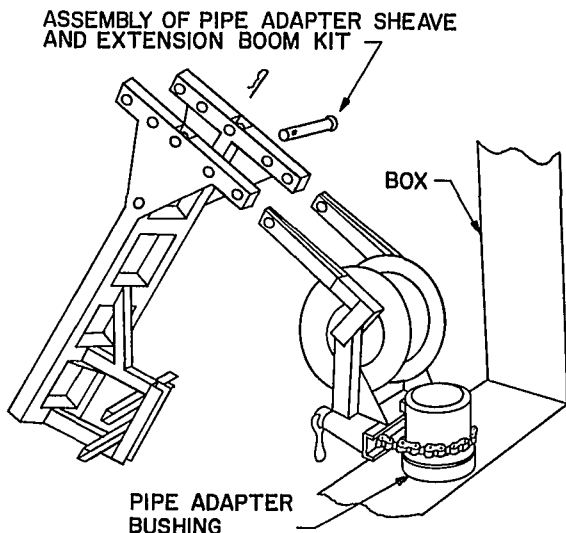


FIG. 16 ASSEMBLY OF PIPE ADAPTER SHEAVE AND EXTENSION BOOM KIT (PARS. 7.1, 7.2)

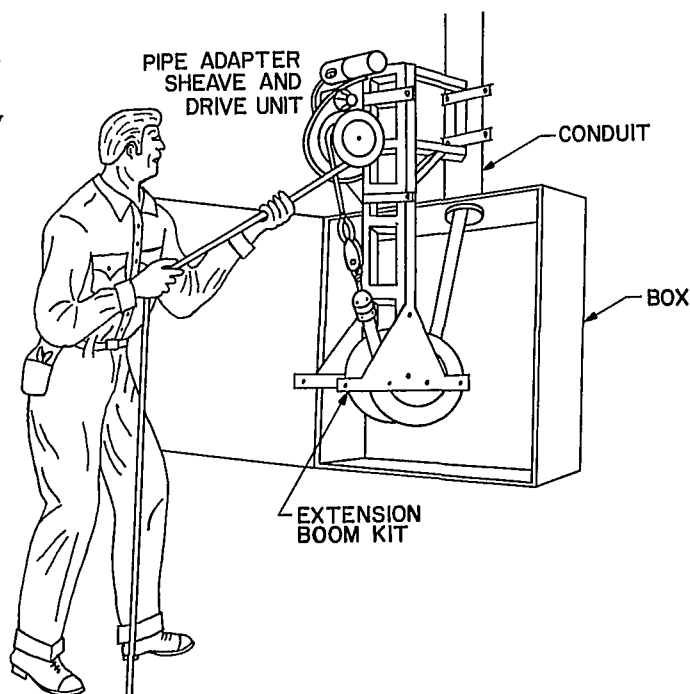


FIG. 17 PIPE ADAPTER SHEAVE AND DRIVE UNIT MOUNTED ON PULL BOX (PAR. 7.1)

7.2 The extension boom kit consists of the pipe adapter, bushings and "T" boom. It is used to pull wire or cable at flush mounted boxes. See Figures 16, 18 and 19. The bushings furnished with the Bit are 2", 2-1/2", 3" and 4". The "T" boom extension provides for height adjustments and provides stability.

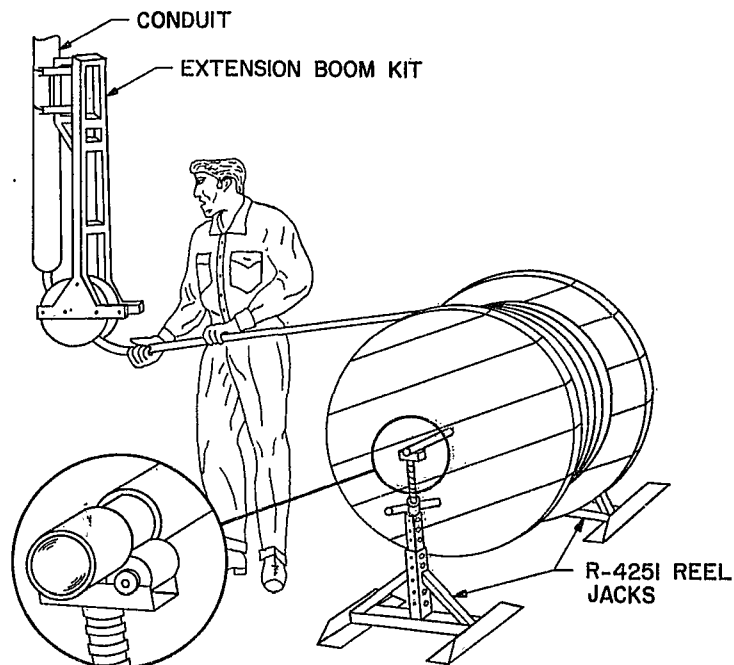
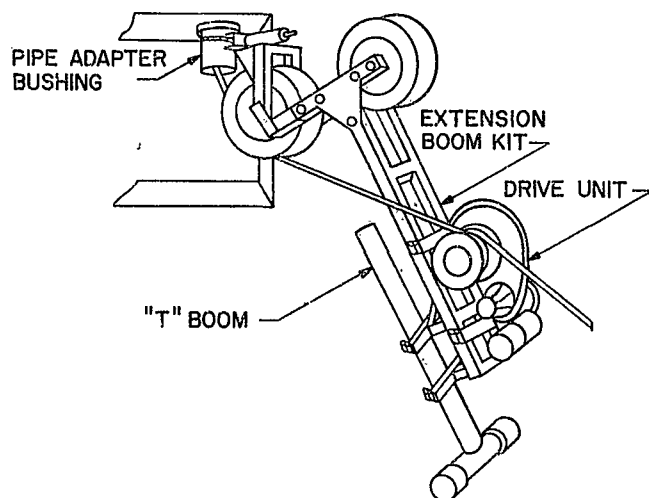


FIG. 18 EXTENSION BOOM MOUNTED TO CONDUIT (PAR.7.2)



7.3 The newly standardized Cable Reel Jack, R-4251 will facilitate the pulling operation. It is light weight, has telescopic height adjustments and is equipped with a grooved spindle running on roller bearings which prevent creeping as the reel turns.

FIG. 19 EXTENSION BOOM KIT AND DRIVE UNIT MOUNTED ON "T" BOOM (PAR. 7.2)

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