MCV MOBILE CABLE SALVAGING VEHICLE

DESCRIPTION AND OPERATION

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1. GENERAL

1.01 This section covers the general operating procedures for the MCV Mobile Cable Salvaging Vehicle which is patented by McVaugh Manufacturing, Inc., Harleysville, Pa. The MCV is a machine that in one continuous operation pulls and cuts the cable into 4-foot lengths, and deposits these lengths into a dump truck or other bulk handling vehicle. Although designed primarily for removing cable from the underground, the MCV can be used effectively for aerial cable removal since the necessity for using cable reels as rewinding drums or manually cutting and handling the cable is eliminated. Before removing lead sheath cable, refer to Section 620-100-010, Occupational Exposure to Lead Cable Removal. All requirements in the section for protection against exposure to lead dust must be strictly observed.

1.02 Whenever this section is reissued, the reasons for reissue will be given in this paragraph.

1.03 The MCV is a hydraulically powered, truck-mounted machine consisting basically of a power head, a feed boom, and a cutter. The power head, which is capable of 40,000 pounds maximum pull, pulls cable and feeds it through the boom to the cutter. The cutter cuts all types of cable into short lengths and discharges them from the end of the boom. When taking up aerial cable, there is no need to separate lashed cable from the strand. However, hardware must be removed before the cable and strand enter the pulling wheel.

2. DESCRIPTION

2.01 The main assembly of the MCV (Fig. 1), which includes the power head, the feed boom, and the cable cutter, is supported on hydraulic cylinders. This provides the capability of moving the boom to an infinite number of positions, within the operating range of the hydraulic cylinders, for positioning the power head at the manhole and the discharge end over the scrap hauling vehicle.

2.02 The machine is mounted on a chassis of 23,000 pound minimum gross vehicle weight equipped with a customized body, a 2500 psi operating pressure hydraulic system, full torque split shaft power takeoff (PTO) with electric shift, and auxiliary hydraulic tool outlets.

2.03 ***The power head*** incorporates a capstan assembly for pulling the cable end clear of the manhole and for pulling the cable out of the duct and feeding it into the feed boom and cutter. A hydraulically controlled gripping cam is used to apply pressure on the cable in the pulling wheel and a grip drive or nip roller assists in feeding the cable into the feed boom and to the cable cutter. The power head can be tilted side-to-side (by rotating the boom) and moved right or left and up or down which provides complete positioning flexibility for alignment with the pull.

2.04 ***The feed boom*** is a twelve-foot long fixed guide tube through which the cable passes to the cable cutter. The telescopic section can be extended twelve feet and the discharge end can be moved laterally and vertically for distributing the scrap as it is deposited in a truck.

2.05 ***The cable cutter*** is completely enclosed in the discharge end of the feed boom. The cable cutter is a reciprocating shear that exerts a 20-ton cutting force. The forward thrust motion of the cutter provides positive discharge and automatic clearing of the cut lengths of cable.

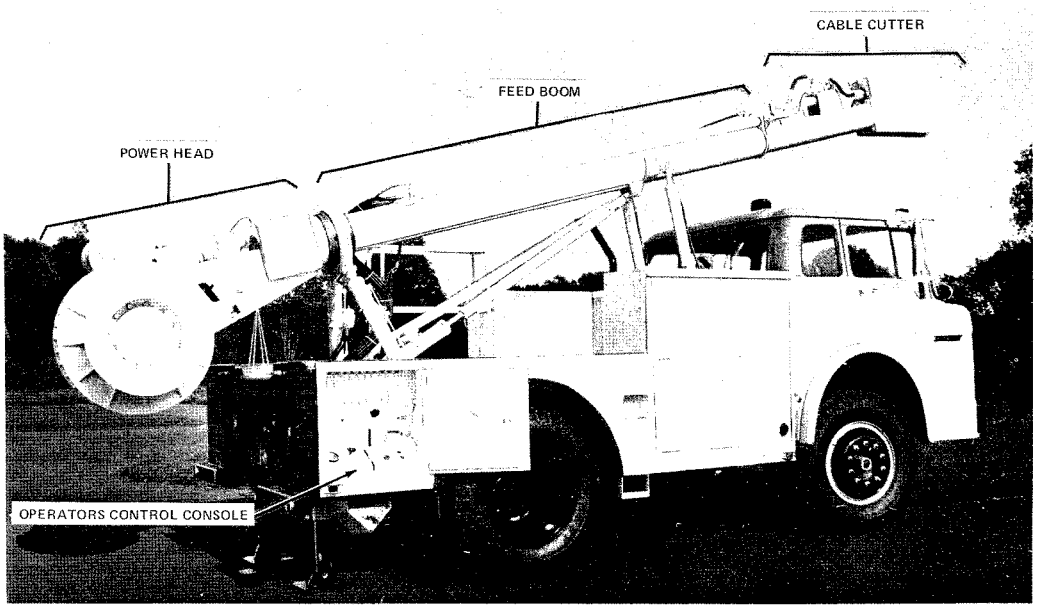

Fig. 1—MCV Mobile Cable Salvaging Vehicle

2.06 The operators control console (Fig. 2) is located on the curb-side rear of the truck body. All machine functions are hydraulically controlled and all controls are incorporated in the console. A tachometer, engine throttle, hydraulic pressure gauges, engine start/stop, emergency stop button, footage counter, shear on/off, and accessory switches are included. The hydraulic control levers in the control console are:

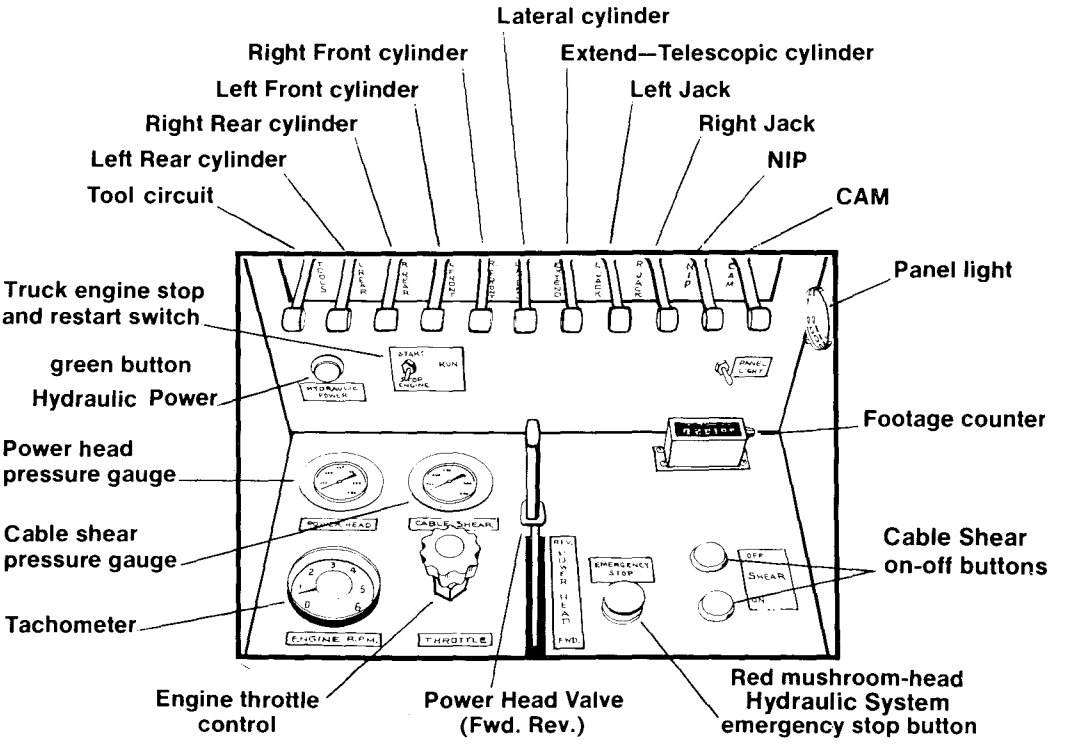

Fig. 2—Control Console

CONTROL MARKING	FUNCTION
TOOLS	Controls auxiliary hydraulic tool outlet.
L REAR	Controls left rear hydraulic cylinder that supports the main assembly.
R REAR	Controls right rear hydraulic cylinder that supports the main assembly.
L FRONT	Controls left front hydraulic cylinder that supports the main assembly.
R FRONT	Controls right front hydraulic cylinder that supports the main assembly.
LATERAL	Controls side-to-side boom movement, discharge end.
EXTEND	Controls extension and retraction of boom.
L JACK	Extends and retracts left rear stabilizer.
R JACK	Extends and retracts right rear stablizer.
NIP	Controls pressure exerted by nip roller. Speed is synchronized with power head.
CAM	Controls rotation of gripping cam, and therefore the confinement pressure on cable in the pulling wheel.
POWER HEAD	Controls forward and reverse operation of the power head.

2.07 A crew controlled ***safety cutoff switch*** (Fig. 3) is located on the rear of the drive head. The spring wire rod, that extends rearward several inches, will upon the slightest touch activate the cutoff switch and immediately stop the power head and shear. The safety cutoff switch can be operated by a crew member, when the pull is being started and the machine is being loaded, for immediate response to any potential problem.

3. PRECAUTIONS

3.01 The MCV shall be operated only by trained and authorized individuals. The crew who will work with the operator should be familiar with the operation of the unit, particularly the safety shutdown controls.

3.02 Keep bystanders away from the equipment and clear of all work operations. Work locations must be guarded in accordance with the requirements in the 629 Division of the Bell System Practices.

3.03 Be certain the boom is ***never*** elevated where it can make contact with power conductors. The operator stands on the ground and, therefore, is not protected against electrical shock.

3.04 Never enter a manhole, even monentarily, until it has been tested and ventilated in accordance with the instructions in Section 620-140-501.

3.05 ***For specific precautions that must be observed when removing lead sheathed cable, refer to Section 620-100-010.***

3.06 Before operating the MCV at the job site, be sure the parking brake is set, wheel chocks are in place, and the stabilizers are in firm contact with the ground.

3.07 Once the end of the cable has been engaged in the pulling wheel, the pulling-cutting-loading phase is controlled by the operator. Other crew members should stand clear of the work operation during this phase.

3.08 Never reach into the machine or place hands on the cable near the pulling wheel while the machine is running. If the cable should become jammed in the machine, stop the machine. Before attempting to clear jammed cable, depress the red emergency stop button on the control console to disable the hydraulic control levers. Depress the green hydraulic power button to restore hydraulic power after the jam has been cleared.

3.09 Personnel must not be in the manhole when the cable is in motion.

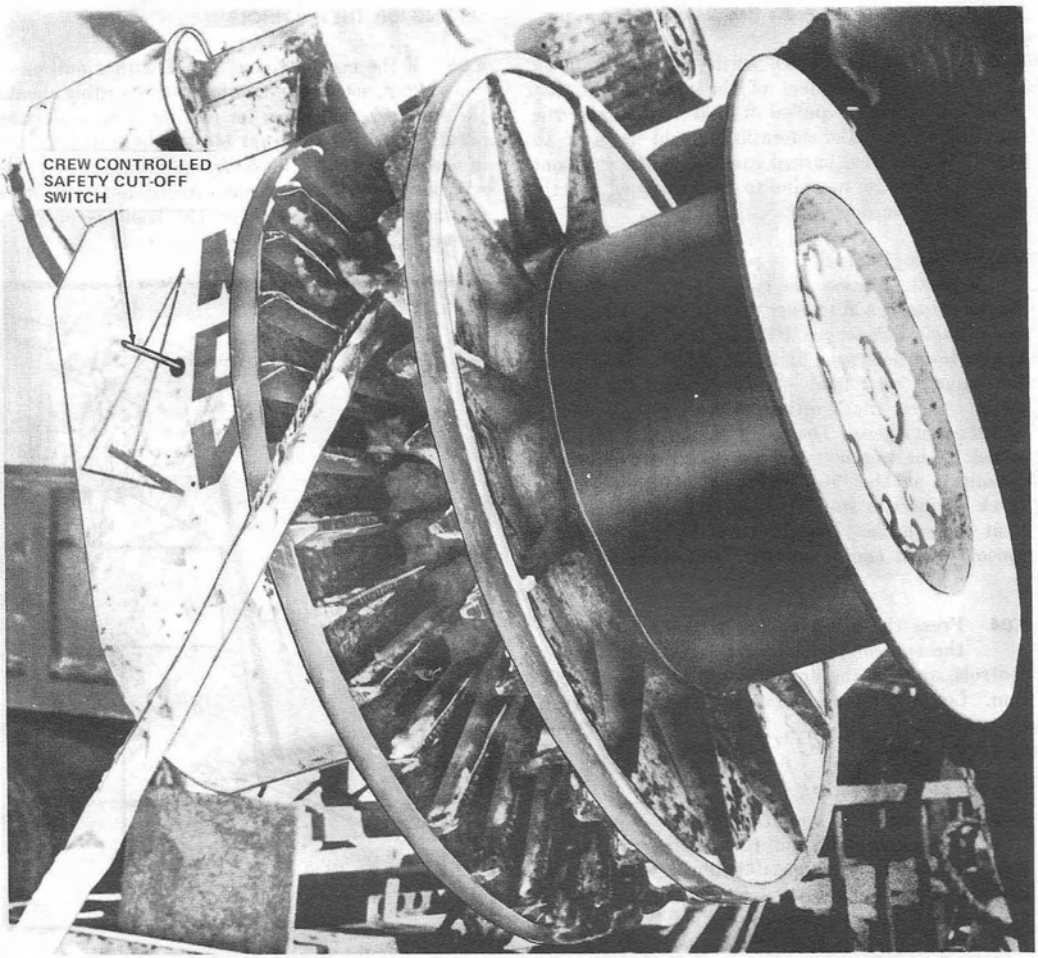

Fig. 3—Safety Cutoff Switch

4. OPERATING PROCEDURES—UNDERGROUND CABLE REMOVAL

4.01 Before moving the MCV to the work site, all preparatory work in the manhole should be completed. Cable identificaion and cutting out splices, load coils, etc, to leave a clearly identified cable end in advance of the actual cable removal operation is normally the most efficient method. Manholes that will require pumping should be pumped down just before the MCV is moved to that manhole to keep machine idle time to a minimum.

POSITIONING THE MCV AT THE MANHOLE

4.02 Position the truck with the power head within a few feet of the manhole so that when the cable is pulled it will not scrape the manhole frame. Consideration should be given to traffic obstruction, parked cars, etc, since it is not necessary for the machine to be positioned exactly parallel to the duct run.

4.03 When the truck is in position, set the parking brake, depress the clutch pedal, engage the side-opening (S.A.E.) power takeoff knob and engage the electric full-torque PTO switch by moving it to the down position. Shift the truck transmission into fourth gear and slowly release the clutch pedal. Turn the ignition switch to "accessory" and leave it there. The truck engine will continue to run if the engine "start-run-stop" switch in the console is in the "run" position. Otherwise, the truck engine will stop. If the engine stops, restart it at the console. Use the throttle control in the console to set engine speed to the desired rpm.

4.04 Press the green hydraulic power button on the control panel to activate the hydraulic controls, and set the engine speed at 1200 to 1500 rpm. Lower the stabilizers until they are in firm contact with the ground. Maintain tire to ground contact.

4.05 During work operations such as manhole rigging that do not require the use of the machine, reduce engine speed to idle or, for extended periods, stop the engine. Engine speed during machine setup and positioning should be 1200 to 1500 rpm. Engine speed for breakaway of the cable and normal pull should be approximately 2300 rpm (full throttle).

SETTING UP THE MANHOLE

4.06 If the manhole is equipped with a pulling-in iron, set up the manhole with a cable sheave the same way as shown for pulling cable in Section 628-200-208. No quadrant block or manhole sheave is needed on the manhole frame because the cable will pass from the manhole directly onto the MCV pulling wheel (Fig. 4) when the boom is properly aligned.

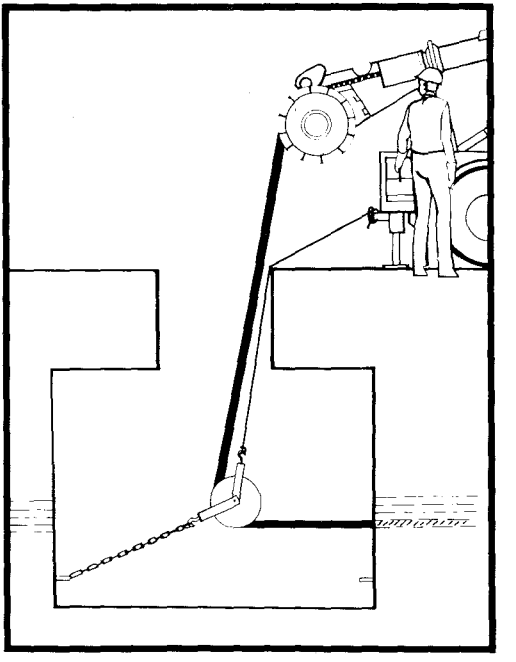

Fig. 4—Manhole Setup With Cable Sheave

4.07 If there is no pulling-in iron in the manhole, or as an alternative to using a cable sheave and cable sheave shackle, use the adjustable manhole frame (Fig. 5) available as an accessory item with the MCV. The manhole frame is adjustable in length from 47 inches up to 140 inches and is equipped with a 20-inch diameter by 5-inch wide cable sheave.

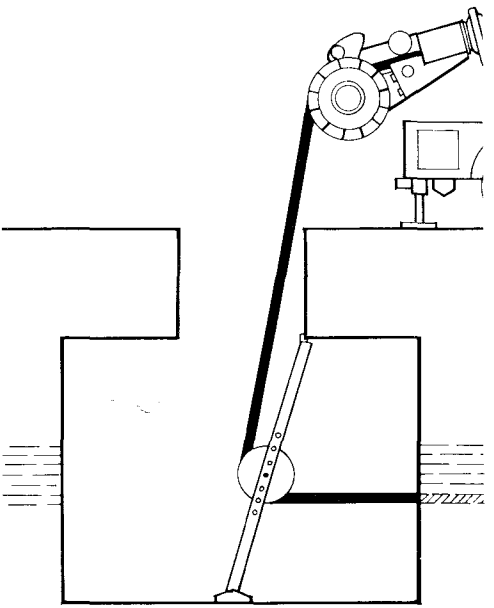

Fig. 5—Manhole Setup With Adjustable Frame

FINAL POSITIONING

4.08 Position the power head so it is aligned with the expected cable pull. The L REAR and R REAR controls are used to raise and lower the power head by extending or retracting the rear hydraulic cylinders. These controls also move the power head from side to side when one cylinder is extended while the other is retracted.

4.09 Use the R FRONT and L FRONT controls to raise the discharge end of the boom so the dump truck can be backed into position for loading (Fig. 6). Position the boom for loading by using the EXTEND control to extend the boom and the LATERAL control to move the discharge end from side to side. After the discharge end is in position, the power head position may have to be adjusted slightly.

4.10 Open the cam and the nip roller (Fig. 7) by operating the CAM and NIP control levers. Press SHEAR ON button and watch the cutter cylinder motion. Press SHEAR OFF button to stop cutter cylinder when it is in its high position (Fig. 8).

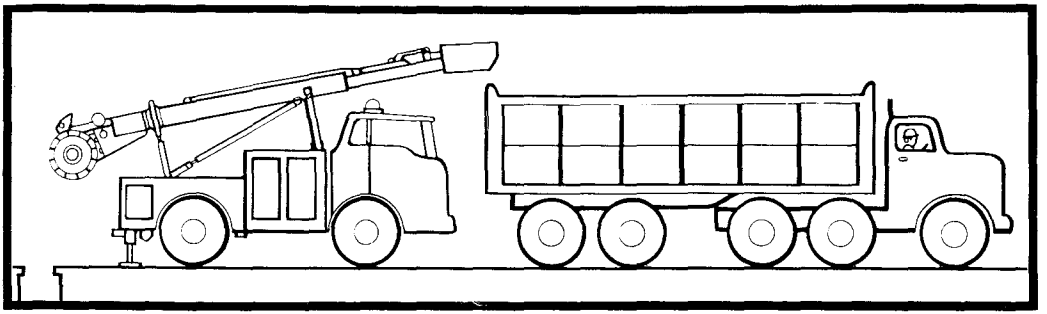

Fig. 6—Dump Truck in Position for Loading

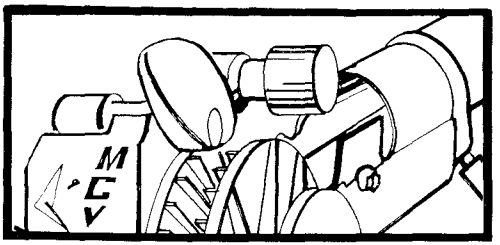

Fig. 7—Cam and Nip Roller in Open Position

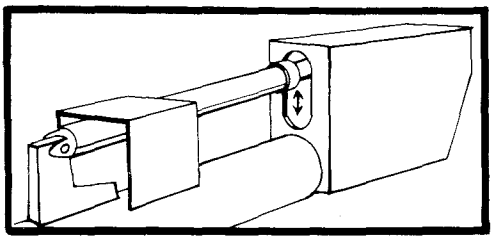

Fig. 8—Cutter Cylinder in High Position

STARTING THE PULL

4.11 To start the pull, the capstan section of the power head is used with a 1-1/4 inch braided pulling line (see Table A) and a chain or steel sling. Lower one end of the braided line into the manhole. Thread the end through the sheave and attach the line to the cable with the chain or sling (Fig. 9). With the other end of the line, wrap five or six turns around the capstan in a clockwise direction. Start nearest to the pulling wheel and lay the wraps side by side (Fig. 10).

TABLE A

BRAIDED CAPSTAN LINE

MANUFACTURERS' DESIGNATION*	DIA	CIRC	APPROX AVG BREAKING STRENGTH
Silverlon Dubl Braid #5512†	1-1/4 in.	3-3/4 in.	44,000
Samson Stable Braid‡	1-1/4 in.	3-3/4 in.	43,600

*Braided polyester fiber line recommended for use with MCV is available from the manufacturers listed in the table. Any equivalent product may be substituted at the discretion of the user.

†Tubbs Cordage Co., Orange, Calif.

‡Samson Cordage Works, Boston, Mass.

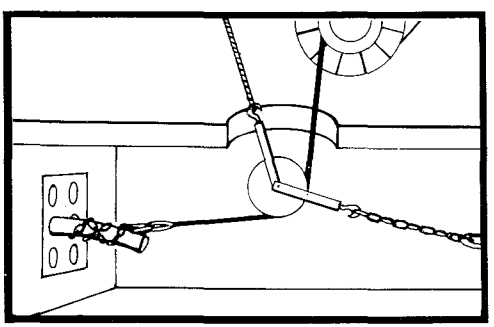

Fig. 9—Pulling Line Attached to Cable End

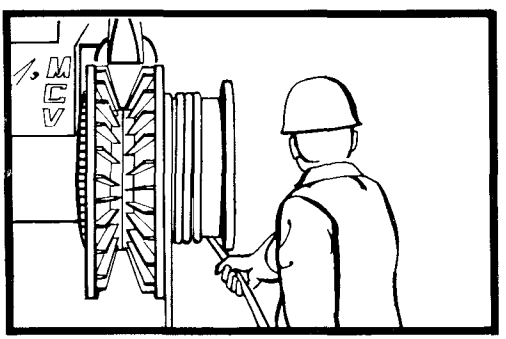

Fig. 10—Pulling Line Wrapped on Capstan

4.12 While a craft person holds tension on the free end of the line, the operator moves the POWER HEAD VALVE control lever to the "forward" position to take up slack and apply a strain. At this point, stop the pull and check for proper alignment. Make any necessary adjustments and then continue to pull by gradually applying hydraulic pressure while maintaining tension on the free end of the pulling line (Fig. 11). Pull the butt end of the cable clear of the manhole and onto the capstan for about one-half of a turn (Fig. 12). Stop the pull.

LOADING THE MACHINE

4.13 Reverse direction of rotation of the power head so the cable can be pulled off of the capstan (Fig. 13A). Disconnect the line and chain from the cable and remove the line from the capstan. With the cam open, insert the cable end into the teeth of the pulling wheel (Fig. 13B). If the cable sheath has been stripped from the core, cut the core back to where the sheath is intact (the machine will not pull on the cable core). Rotate the pulling wheel until the cable is under the cam (Fig. 13C). Rotate the cam clockwise to apply sufficient pressure to force the cable into the wheel teeth (Fig. 13D). Increase engine speed to full rpm. Rotate the pulling wheel ***slowly*** in the forward direction. As the end of the cable passes under the nip roller, lower the roller onto the cable (Fig. 13E) with sufficient pressure to allow the auxiliary toothed wheel under the cable to grip the bottom of the cable (Fig. 13F).

4.14 As cable tension increases, be sure that the cable is feeding from the manhole without difficulty. Correct the angle and position of the pulling head to accurately align with the taut cable. Check clearances and alignment in manhole. Be sure cable is exiting the duct without breaking or stripping off the cable sheath. Be sure cam pressure is sufficient for proper "bite" on the cable, not too deep, but deep enough to avoid slippage of the cable or stripping of the sheath. The wheel teeth should make prominent impressions in the cable sheath but should not break through the sheath. Observe the cable as it passes from the wheel. The nip roller must be turning but not bouncing due to excessive pressure.

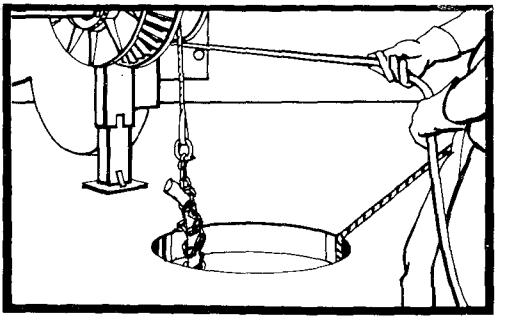

Fig. 11—Holding Tension on Pulling Line

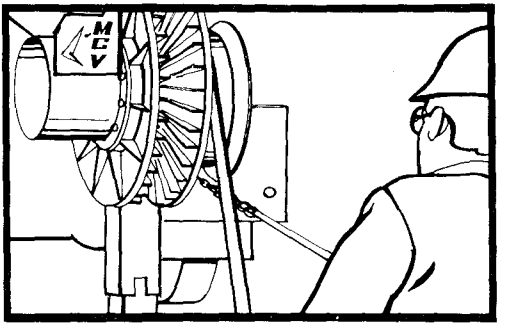

Fig. 12—Wrapping Cable Onto Capstan

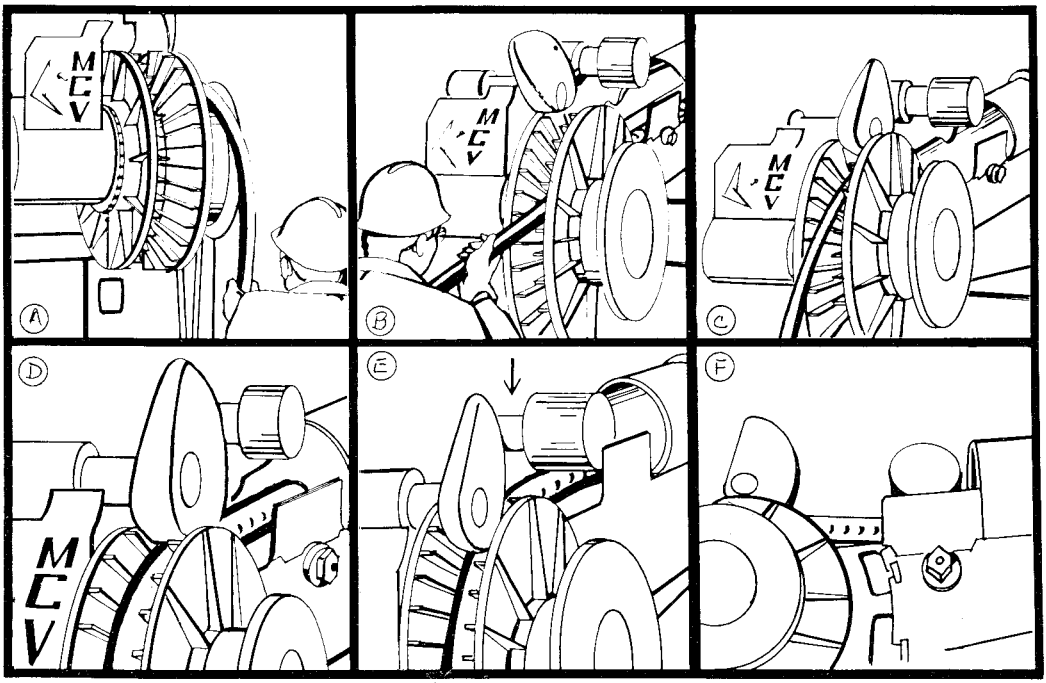

Fig. 13—Loading the Machine

COMPLETING THE PULL

4.15 Advance the cable end up the boom. When the cable end appears out of the discharge end, push the SHEAR ON button (Fig. 14). The speed of the pulling head now must be synchronized with the speed of the shear by "metering" the POWER HEAD valve. The necessary power head speed adjustments are determined by observing the POWER HEAD pressure gauge and the CABLE SHEAR pressure gauge. With the right balance, the power head pressure will be nearly constant and the cable shear pressure will peak at 900 psi or less. Too fast will cause the power head pressure to increase, the shear pressure to decrease, and the shear will probably miss cuts. Too slow will cause the power head pressure to pulsate lower and the shear pressure to peak much higher than 900 psi because the shear will be dragging the cable faster than the pulling wheel is delivering it.

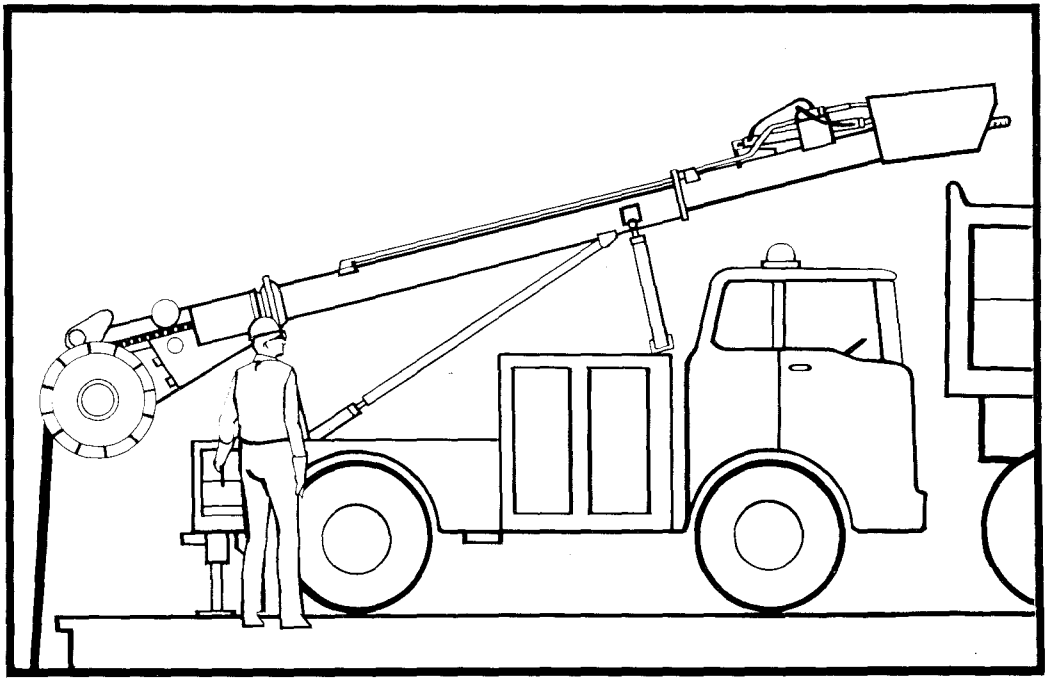

Fig. 14—Starting the Shear

4.16 As the cable is being pulled, continue to monitor the pressure gauges and frequently observe the pieces of cable as they are discharged (Fig. 15). Watch for skipped cuts, stripped sheath, severe curving of the cut lengths, etc. Also, frequently observe the cable feeding into the pulling wheel (Fig. 16). Watch for proper alignment, cam pressure, damaging of cable sheath, and nip roller down pressure. As the cable is pulled from the duct, power head pressure will reduce, so metering the POWER HEAD valve must be continuous until the end of the cable reaches the pulling head. As the cable is being cut, the operator should cautiously extend or retract the boom and move it laterally as required to evenly distribute the pieces as they drop into the dump truck or other receptacle.

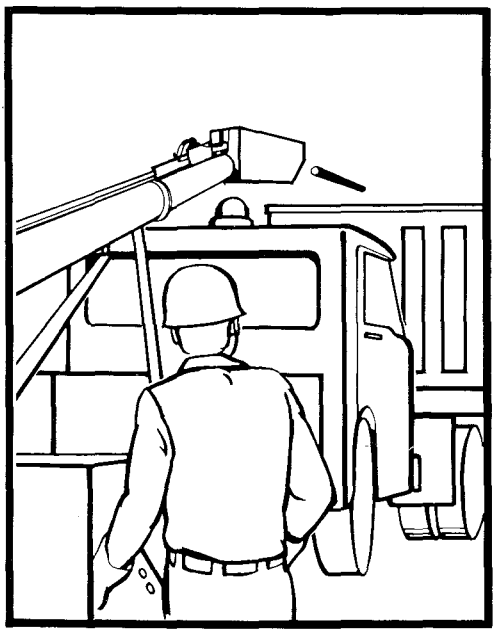

Fig. 15—Observing Cut Cable

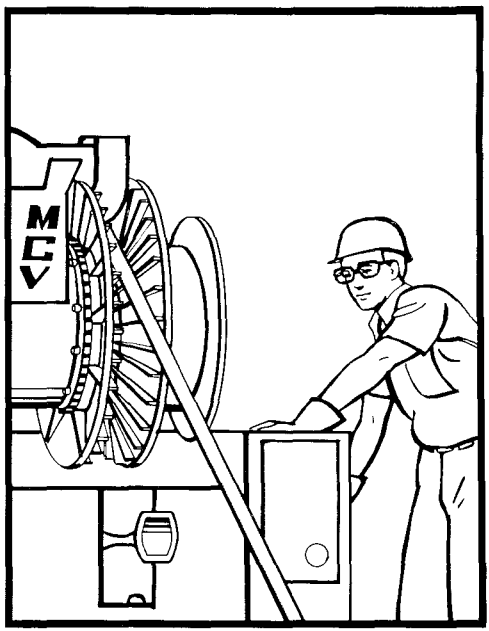

Fig. 16—Observing the Pulling Wheel

CLEARING THE MACHINE

4.17 Allow the end of the cable to pass through the nip roller. At this point, press the SHEAR OFF button and stop the pulling wheel. Raise the rear of the machine as high as possible without bringing the discharge end in contact with the dump truck. Press the SHEAR ON button and watch to see that the remaining length of cable is cut into short pieces as it is pulled from the boom (Fig. 17). After the last piece of cable exits, press the SHEAR OFF button when the cutter cylinder reaches its high position.

4.18 When moving to the next location, take the following steps:

(1) Position the boom on the truck centerline

(2) Extend the rear cylinders

(3) Retract the front cylinders

(4) Raise the stabilizers

(5) Reduce engine speed to idle

(6) Disengage the PTO.

5. OPERATING PROCEDURES—AERIAL CABLE REMOVAL

5.01 Before moving the MCV to the work site, as much of the preparatory work as is feasible should be completed. The amount of preparatory work that can be done will depend upon the removal method used. See Section 627-380-240, Aerial Cable Removal. In any event, proper planning is necessary to limit the amount of time the machine is idle. There is no need to separate lashed cable and strand or cable in rings and strand. The shear will cut strand, wire, rings, and cable. However, all supension hardware, strain insulators, three-bolt clamps, etc, must be removed.

5.02 Position the MCV with consideration given to traffic obstruction and the location of the dump truck or other bulk handling vehicle. It is not necessary for the MCV to be exactly parallel to the pole line since the power head can be aligned with the pull. When the MCV is in position, follow procedures in paragraphs 4.03 through 4.05 and paragraphs 4.08 through 4.10.

5.03 To start the pull, attach one end of a suitable pulling line to the end of the cable and, with the other end, wrap 5 or 6 turns around the capstan in a clockwise direction. Start nearest to the pulling wheel and lay the wraps side by side. Proceed as covered in paragraph 4.12. To load the machine, complete the pull and clear the machine; follow the procedures covered in paragraphs 4.13 through 4.18.

6. MAINTENANCE

6.01 All lubrication and maintenance checks recommended by the manufacturer are essential to the safe, dependable operation of the MCV.

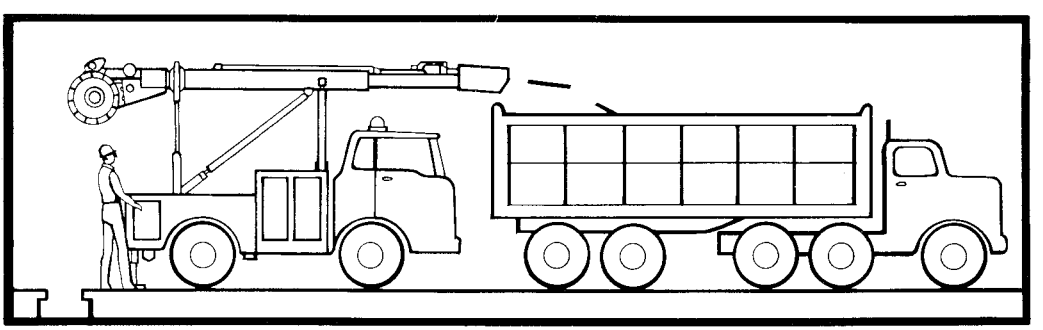

Fig. 17—Clearing the Machine

6.02 Each time the equipment is used, all visible hydraulic lines, hoses, cylinder heads, and packing should be observed for signs of oil leakage, wear, or damage.

6.03 Periodically inspect welds for signs of cracks or failure. After any unusual shock or stress, examine the equipment for misalignment of the boom, cylinders, etc, and for damaged welds.

6.04 Keep the pulling wheel, nip roller, boom, and shear free of debris and excessive mud and dirt.

6.05 It is the responsibility of the operator to be constantly alert to detect any unusual or excessive noises or changes in the operating characteristics of the equipment. In any case where trouble is suspected, report the trouble in accordance with established local procedures.