

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

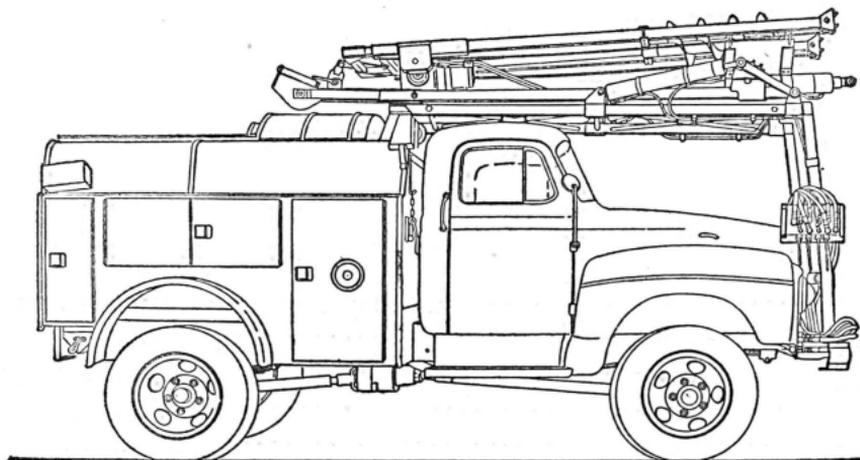
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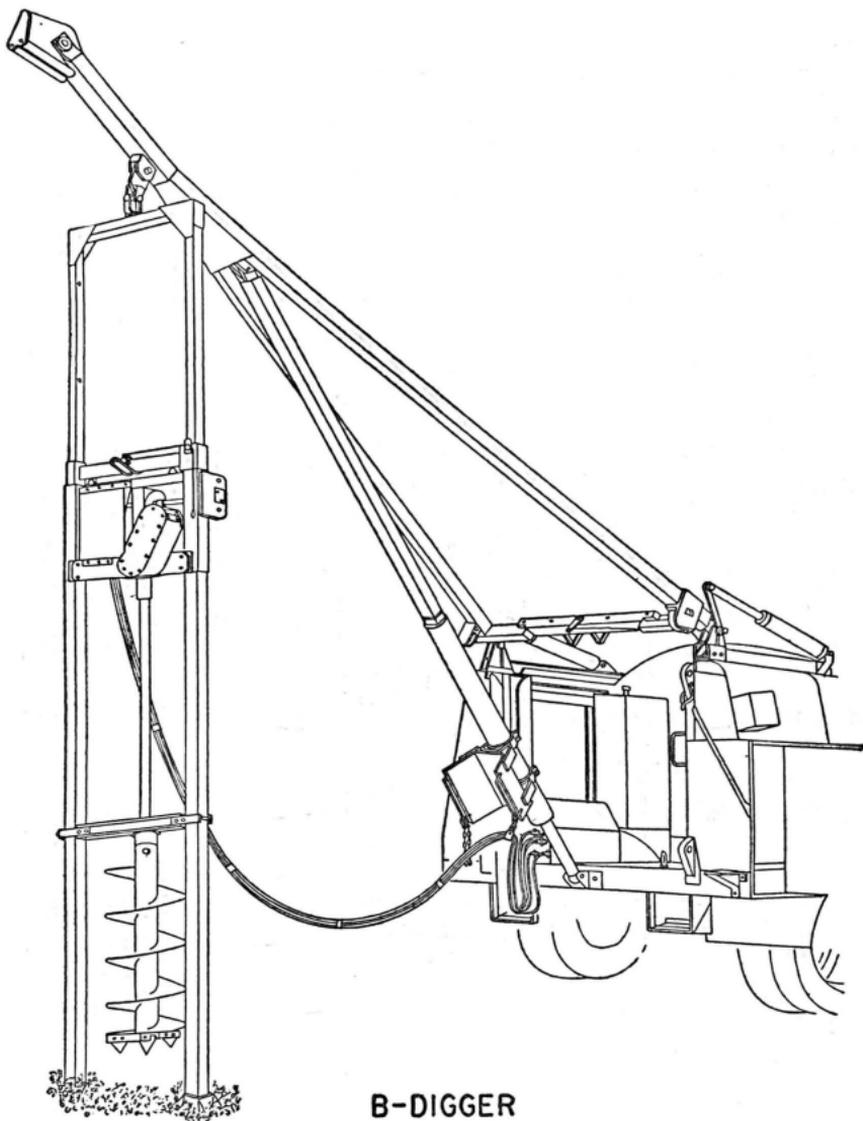
B HYDRAULIC DIGGER

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1. GENERAL

1.01 This practice covers the operation of the B hydraulic pole hole digger which is suspended from a hydraulic power operated derrick.





B-DIGGER

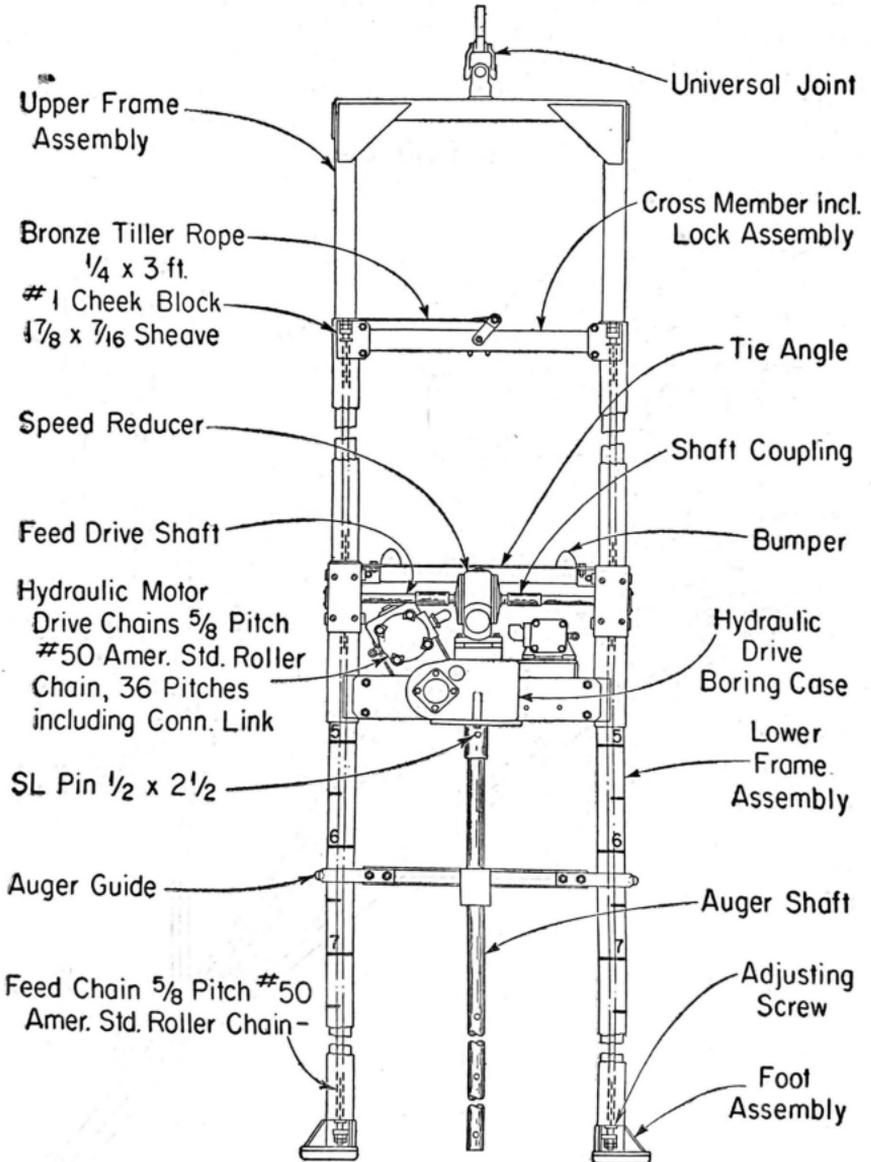
1.02 The digger is attached to the derrick in place of the prop by means of the prop attachment bracket and the prop clevis bolt. The digger may be equipped with a 12, 16 or 20-inch auger that will dig holes approximately 13, 17 and 21 inches in diameter respectively. Holes up to 7' in depth can be dug with the normal arrangement. Extra depth holes to 8-1/2 feet can be dug as indicated in Part 10.

1.03 Since the digger is a unit suspended from the derrick
NO ONE SHOULD BE UNDER THE DIGGER AT ANY TIME.

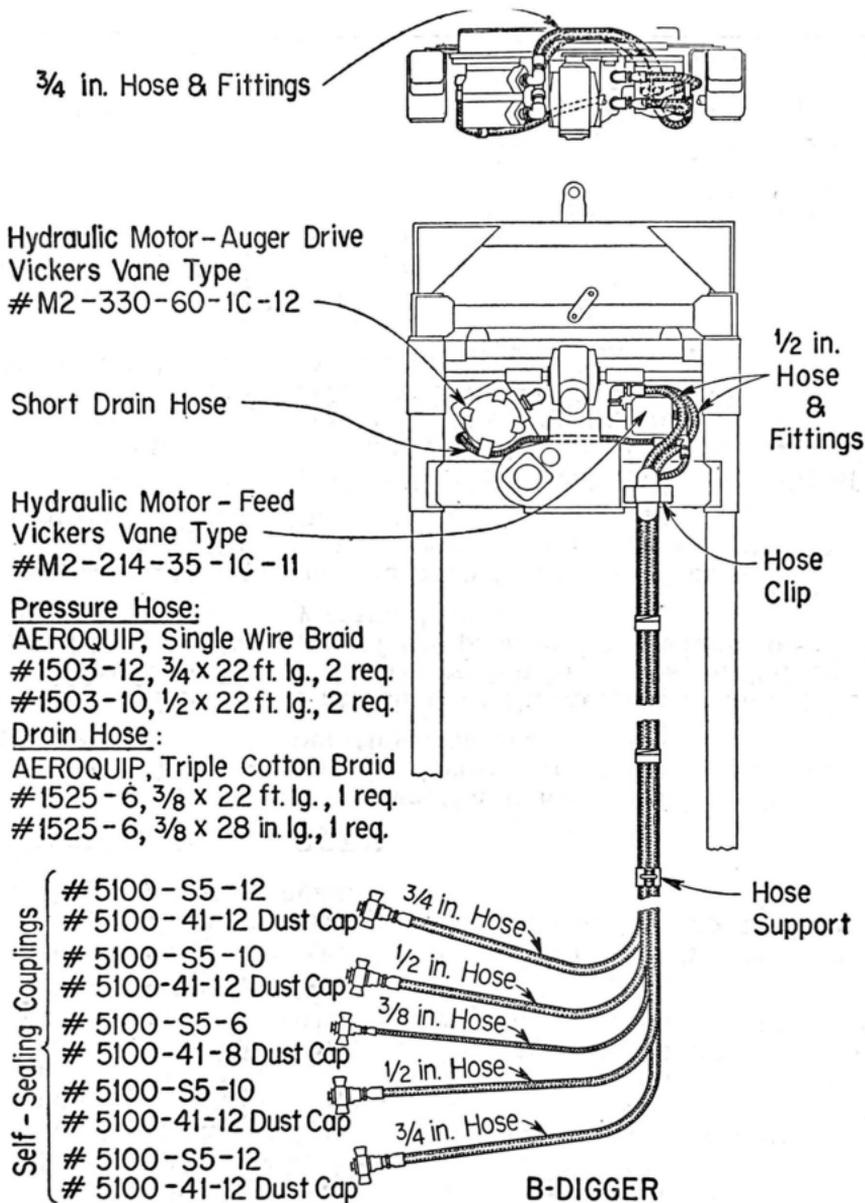
1.04 As with any digging equipment sharp cutting edges are extremely important for efficient operation. Therefore, blades and points should be changed as required to dig properly and prevent excessive auger wear.

2. NAME OF PARTS

2.01 The following figures show the names of the main parts of the digger:



B-DIGGER



3. DESCRIPTION

3.01 This is a derrick suspended digger consisting of a boring case which is mounted in a frame.

3.02 The control levers for the digger form a part of the hydraulic derrick bank valve assembly. The right lever which controls rotation of the auger is painted red and the left

lever which controls the feed of the auger into the ground is painted yellow.

3.03 The frame is made of two parts, a lower section which carries the boring case and an upper section which telescopes into the lower section to give the over-all frame length required for a particular hole location.

3.04 The boring head consists of a gear case containing a worm and wheel driven by a hydraulic motor to rotate the auger, and a small worm and wheel inclosed in another case driven by a second hydraulic motor to raise and lower the boring head on the lower section of the frame. This raising and lowering mechanism provides the feed for the auger by rotating sprockets engaged with roller chains attached to each side of the lower frame assembly.

3.05 The depth of the hole is indicated by the scale painted on the lower frame and is read at the top of the slides carrying the boring head.

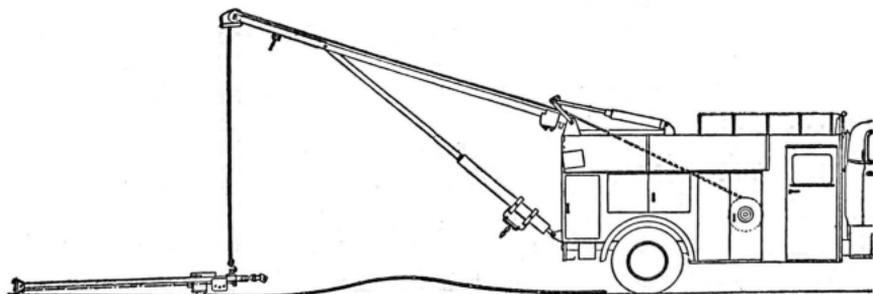
4. ATTACHING DIGGER

4.01 To attach the digger the truck should be located on level ground and the derrick erected in the manner covered by the derrick operating practices.

4.02 If the prop is attached to the derrick it should be removed. To do this the winch line hook should be connected to the lower end of the prop and the winch line tied to the top of the prop by a small line.

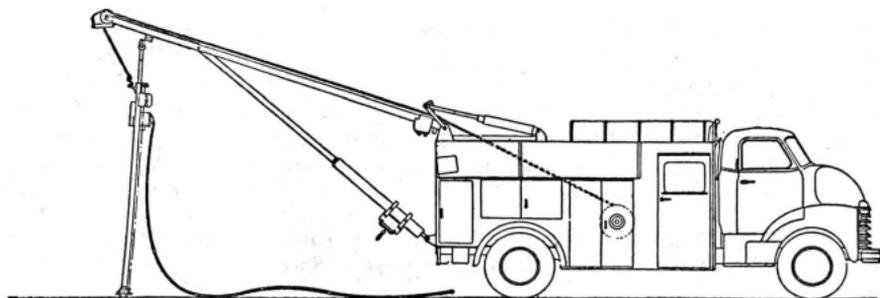
4.03 The pin holding the prop to the main leg at the lower end should then be removed and the end of the prop permitted to rest on the ground.

4.04 A light pull on the winch line will lift the weight of the prop and a workman should remove the top bolt which holds the prop to the derrick. This may be done from a ladder placed against the derrick. The prop should then be lowered to the ground by means of the winch line.



4.05 Lay the digger on the ground under the derrick with the hose connections on the bottom side and the lower end of the frame pointed away from the truck. The winch line should be attached to the digger by connecting to the lifting loop at the top of the lower frame assembly.

4.06 Raise the digger slowly with the winch line and when it is suspended in a vertical position lower it until the frame ends rest on the ground.



4.07 Slack off the winch line a very small amount pushing the attachment bar of the digger into the prop attachment bracket and replace the prop clevis bolt.

4.08 The winch line should then be detached from the digger and the workman should descend to the ground.

4.09 The dust caps should be removed and carefully stored for future use and the hoses from the digger should be connected to the proper connections on the truck. These are painted for easy identification and the marks should be carefully observed. These couplings are self sealing in both directions and may therefore be connected or disconnected without the loss of oil. The frame of the digger may then be adjusted as indicated in Part 5.

5. ADJUSTING FRAME LENGTH

5.01 There are five positions of adjustment in the telescope frame.

5.02 The fourth position is painted yellow to indicate that further extension of the frame should be done with caution.

5.03 The fifth and last position is painted red indicating that the frame should not be extended beyond this position. There is, however, about 20 inches of overlap beyond this point to provide the necessary stability when the frame is extended to this fifth position.

5.04 The frame can be adjusted to these various positions by tripping the lock assembly with a wire raising tool or similar hook to engage the loop of the small cable. The derrick should be raised or lowered a very small amount as required to relieve the load on the frame lock.

5.05 The lock should be held in the trip position and the derrick raised or lowered by means of the boom control.

5.06 As the frame approaches the desired length for the particular operation the pull on the small cable attached to the frame lock should be released and the derrick moved very slowly. The lock handle should be carefully observed for a quick motion crosswise which will indicate that the lock has properly engaged. This should be checked by applying a down pressure with the derrick and then raising the digger to be sure that the lock is fully engaged.

6. CARRYING POSITION

6.01 The proper length of frame for the carrying position will depend on the length of the associated derrick. The proper length of the frame for carrying the digger is the position which results in the lower end of the digger frame being about even with the lower end of the center ram. The boring case should be carried at the top of its travel but not high enough to compress the rubber bumpers.

6.02 If the move is short over reasonably smooth ground and the derrick is to remain erected the digger may be permitted to swing from its attachment to the derrick.

6.03 The digger may also be carried back against the center leg of the derrick by attaching the auger to the carrying saddle with the chain.

6.04 To place in this position the derrick should be run up to near the vertical but not far enough for the derrick lift locks to engage, at which time the digger will be near the carrying saddle. Since the digger moves down on the derrick center leg as the derrick is lowered **THE ATTACHMENT CHAIN SHOULD ALWAYS BE PLACED ABOVE A FLIGHT ON THE AUGER.**

6.05 When moving with the derrick erected and the digger attached to the center leg the hose should be attached to the carrying saddle so that it will not drag on the ground.

6.06 The other position is on top of the truck and derrick when traveling. This position is, of course, reached in the same manner as described in the preceding paragraphs except that the derrick is operated to a carrying position on top

of the truck after the digger has been attached to the carrying saddle with the chain. The frame and auger should be cleaned of excess dirt before it is moved back over the truck.

6.07 The hoses connecting the digger to the truck should be layed along the derrick side leg and stored in the carrying position.

7. DIGGING POSITION

7.01 To move the digger to the digging position the derrick should be erected in the usual manner to the point where the center ram is connected to the bracket on the truck.

7.02 The chain attaching the digger to the carrying saddle should be removed. The derrick should then be lowered toward a working position permitting the digger to hang vertically down from the derrick.

7.03 The frame should be adjusted to the desired length for the particular location as outlined in Part 5.

7.04 When the digger is located over the hole location the derrick should be lowered slowly until the frame ends contact the ground and some down pressure is applied by the derrick. The amount of the pressure desired will depend on the amount of pressure required to dig at that particular location.

7.05 This down pressure should always exceed the amount expected to be required for the digger and if, during the digging operation, it is found that the ends of the digger frame are being raised off the ground by the auger pressure additional down pressure should be exerted by the derrick.

7.06 The digger frame may also be placed at an angle from the vertical to dig anchor holes. For this operation considerably less pressure should be applied and the digging operation performed more carefully since particularly for side angles only one side of the digger frame will rest on the ground.

8. NORMAL DIGGING PROCEDURE

8.01 The digger is operated by two hydraulic control valve levers. The right red lever controls the motor which rotates the auger. Forward rotation is obtained by pushing on the red lever and reverse rotation by pulling on this lever. The left yellow lever controls the raising and lowering or feed mechanism, driving it down with a downward push on the lever and raising it with a pull on the lever.

8.02 Drive the boring case down with the left yellow lever until the point of the auger is pressed into the ground.

8.03 Start the rotation of the auger very slowly with the right red lever feeding the auger into the ground as it starts to rotate.

8.04 It is important to watch carefully for surface obstructions which will cause the auger to move off the desired location.

8.05 After the auger has started to rotate and has dug in a small amount it may be given full rotation speed.

8.06 The feed into the ground should be at a speed which develops most of the power capacity of the rotating motor.

8.07 When the auger is loaded to a few inches above the flight it should be raised out of the hole.

8.08 Rotation should be stopped as soon as the auger starts to move up.

8.09 Raise the auger to the top of its travel and release the left lever. **DO NOT BUMP THE BORING CASE AGAINST THE TOP END OF THE FRAME** since this impact will develop excessive stress in the chains and feed mechanism.

8.10 Spin off the dirt with a quick application of the right lever. If additional clearance below the auger is desired the digger may be raised by the derrick before the last load is spun off.

8.11 Lower the auger into the hole, starting the rotation just before the auger reaches the bottom of the hole.

8.12 Marks of depth on the frame, if observed before the auger is raised, will be of assistance in determining when the auger is within a few inches of the bottom.

8.13 Repeat for each load of the auger.

8.14 If too large a load is picked up by the auger it will be necessary to keep it rotating while it is raised or to reverse the rotation and remove a portion of the load.

8.15 No damage to the rotating mechanism or the raising and lowering mechanism will be experienced due to obstructions or normal overloads since the pressure release mechanism in the valves will unload the hydraulic circuit at the predetermined pressure.

9. PLACING A POLE

9.01 There are two basic positions for the digger while placing the pole.

9.02 Where space under the derrick is not required to maneuver the butt of the pole the digger may be permitted to hang from the derrick as outlined in Paragraph 6.02.

9.03 Where full space underneath the derrick is required to maneuver the butt of the pole the digger should be placed in the position outlined in Paragraphs 6.03 and 6.04.

10 EXTRA DEPTH HOLES

10.01 The normal depth of the holes, about 7 feet, is obtained by the auger with the flight assembled to the auger shaft in its shortest position. Additional depth to a total of 8-1/2 feet may be secured by assembling the auger shaft in the extended position.

10.02 There are two methods of digging which may be used for these extra depth holes.

10.03 Dig the 7 foot depth with the normal procedure and then extend the auger. Load the auger and raise it to the top of its travel. Raise the derrick bringing the blades of the auger above ground line. Spin off the spoil and lower the auger back into the hole by first lowering the derrick and then running the feed mechanism down.

10.04 Another method may be used particularly when the first few feet of the hole are easy digging. Extend the auger for the required depth. Lower the derrick until the auger point rests on the ground and follow the normal digging procedure for the first one or two auger loads. Dig carefully while the digger frame is suspended above the ground. For the next load lower the derrick so that the digger frame rests firmly on the ground while digging.

10.05 A low position of the derrick is desirable for digging these extra depth holes since the digger will be raised more nearly vertical by the derrick operation.

11. WET GROUND

11.01 When digging in wet ground it is desirable to keep the auger rotating until it is almost out of the hole. This will avoid creating a vacuum in the hole and the resulting heavy pull on the auger.

11.02 In wet ground there is also a tendency in some soils for the auger to screw into the ground instead of digging, therefore, the feed must be slower than the auger's normal advance in order to insure that the earth is fully distributed and cut loose.

11.03 Some wet soils are extremely sticky and are very difficult to spin off the auger. A liberal coating of wax on the auger will in many cases facilitate this cleaning of the auger.

12. SANDY SOIL

12.01 Digging in sandy soil requires that the auger be stopped before it is raised so that the load will not be spilled back into the hole.

12.02 The auger should also be lowered to the bottom of the hole before any rotation is started so that there will not be a tendency for the auger to bump the sides of the hole and cause cave-ins.

12.03 The digger should be operated as smoothly and carefully as possible to prevent cave-ins.

12.04 In wet sandy soils where the hole may cave in very quickly after it is completed, a pole may be suspended by the derrick while the hole is being dug. The derrick should then be raised until the pole is over the hole location and the pole lowered quickly into the hole.

12.05 In soils where there is a considerable amount of sand or small stones, excessive caving-in of the hole may be prevented by depositing the spoil a few feet from the hole location. This can be done by raising the loaded auger to the top of its travel, raising the derrick until the digger hangs a few feet toward the truck from the hole location and spinning the soil off at this location. In some cases to avoid dust, it may be desirable to feed the auger down at the remote location before spinning off the spoil.

13. ROCKY SOIL

13.01 Rocky soil requires considerable care in the digging operation although the hydraulic release mechanism will protect the equipment.

13.02 The rotation at the beginning of the hole should be very slow in case surface obstructions should be encountered. See Paragraph 8.04.

13.03 In general rocks 1/2 the size of the auger, that is 8 inches for a 16-inch auger, may be removed with the auger.

13.04 When a rock is struck by the auger and the rotating motor stalls it may be possible to remove it by one of two procedures. The auger may be raised, the rotation started and the auger fed down slowly onto the rock letting the auger bump the rock on each revolution. Another procedure is to ro-

tate the auger in forward and reverse about one eighth of a revolution for a few times with a continued down pressure on the feed mechanism and then holding forward rotation on the auger as it is raised. This may hook the blade under the rock and pull it loose.

13.05 If the rock cannot be loosened or becomes loosened and is too large to be raised by the auger, it may be desirable to raise the digger out of the hole and then raise the derrick to swing the digger out of the way while the rock is removed with a bar and spoon. If too many rocks are encountered, it may be necessary to abandon the hole or, if possible, move to a slightly different location. With this digger the move need be only a part of the hole diameter since the frame will guide the auger while cutting only on one side of the hole.

14. FROZEN GROUND

14.01 Digging in frozen ground requires extremely heavy down pressure and slow rotation so that the auger blades will be cutting at all times.

14.02 If the auger spins on the frozen earth it forms a glaze which is more difficult to cut than the original frost.

14.03 If the frost is reasonably firm, the use of special frost blades available for the auger will be of considerable assistance.

14.04 While for any digging operations, sharp blades and points are important, they are absolutely necessary when digging in frost conditions.

14.05 A critical point is reached at the lower level of the frost since with the heavy pressure on the auger it may break through and screw itself into softer soil below the frost line.

14.06 If the auger breaks through the frost at one part of the hole only, it may be necessary to reverse the rotation and raise the auger, then cut out the remainder of the frost with a very slow feed or in some cases with an actual reverse feed or an up pull against the auger.

15. USE AS A PROP

15.01 The digger frame may be used as a ground prop in a manner similar to that for a regular derrick prop.

15.02 Whenever the digger is used as a prop the derrick should be pushed down firmly onto the digger so that the ends of the frame will rest securely on the ground. If the ground is uneven blocks should be used under the digger frame members so that they rest evenly.

15.03 Where a double line pull to a pole is required the eye of the line should be attached to the clevis at the top of the digger.

16 INSPECTION AND LUBRICATION

16.01 The digger should be given a visual inspection at the beginning of each day for apparent defects or loose parts and a general inspection and lubrication check at some predetermined period such as each month or each 100 holes.

16.02 The oil level in each of the gear cases should be checked by removing the level plug and if additional lubricant is required it should be added. The lubricant level in the gear cases should not be above the level plugs since this will result in excessive leakage. The lubricant used in these cases is an extreme pressure lubricant of the same type and grade used in the winch drive housing. The feed sprocket bearings at the location of the vertical chains are equipped with grease fittings which should be lubricated by means of a grease gun with standard chassis lubricant.

16.03 The exposed chains should be reasonably tight, but should not be lubricated. The side chains should be tightened from the bottom only since the upper adjustment is made to equalize the chains and prevent the boring case from being tipped at an angle on the lower frame.

16.04 The lubrication of the machine should be in accordance with the following lubrication chart.

