



JOB GUIDE



FOR

INTERNATIONAL REFERENCE CENTRE

FOR HAND PUMPS

MAINTENANCE OF THE CONSALLEN DEEPWELL HAND PUMP

PREPARED UNDER A JOINT-VENTURE PROJECT OF
THE WORLD HEALTH ORGANIZATION (WHO) AND
THE NORWEGIAN AGENCY FOR INTERNATIONAL DEVELOPMENT (NORAD)

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PREFACE

JOB GUIDE PROJECT

A NORAD Senior Officer once said that enough water and sanitation "monuments" have been built around the world, it was about time people were given more guidance in how to operate and maintain these facilities. This comment stimulated a joint-venture project of the World Health Organization and the Norwegian Agency for International Development (NORAD). The project concentrates on the installation, operation or maintenance of unsophisticated water supply and sanitation equipment in the village setting. Job guides developed under this project are intended to be used by workers, craftsmen and/or technicians. Job guides are certainly not a cure-all, but we believe they can contribute substantially to better operation and maintenance.

JOB GUIDE AND THE INTENDED USERS

This job guide, "Maintenance of the CONSALLEN deepwell Handpump" has been prepared during a field mission to the Western Province, Zambia. It is a supplement to already existing manuals supplied by the pump manufacturer.

The official policy of the Department of Water Affairs (DWA), Western Province regarding operation and maintenance of handpumps is to develop a shared responsibility between DWA, the Rural Health Centres and the Village Water Committee (VWC).

This job guide is intended to be used by the VWC and the Rural Health Centres as an "aide-memoire" at the job site, as well as a teaching aid by an instructor in training related to the operation and maintenance of the "CONSALLEN" handpumps in order to achieve this policy. Operation and Maintenance outside the scope of this manual, are usually responsibilities of DWA.

ACKNOWLEDGEMENT

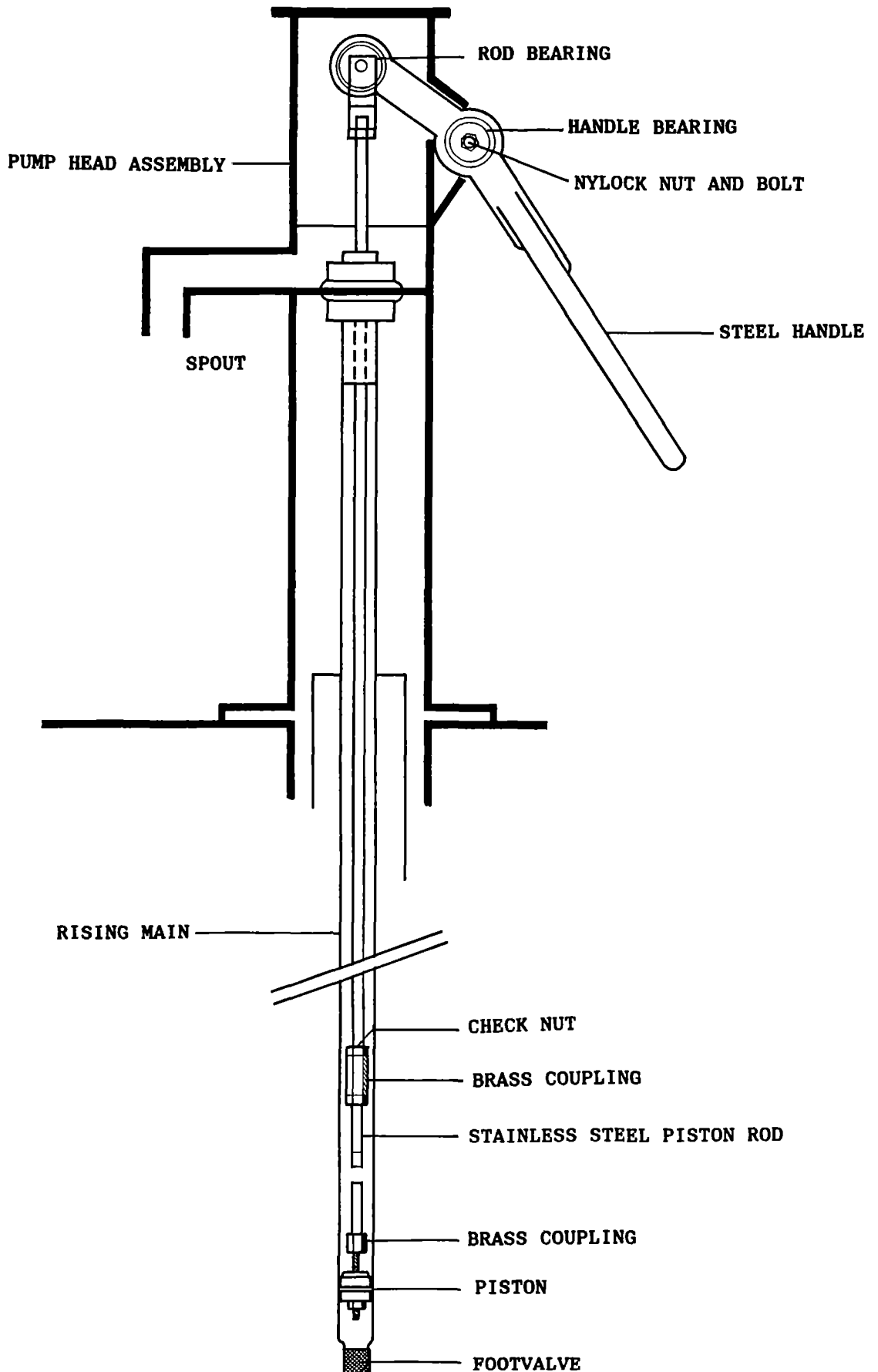
The willing cooperation from all the staff working with DWA/NORAD on the WASHE Programme (Water and Sanitation, Health Education) in Western Province of Zambia, and the keen interest and professional technical assistance received from the staff working in the graphic and printing section of ILO (International Labour Organization) Vocational Training Centre, Turin (Italy), is gratefully acknowledged.

A highly appreciated contribution to this manual was provided by Mr Lou Sifuniso through all the drawings he has prepared in cooperation with the writer. Mr Lou Sifuniso is working as an artist for the WASHE Programme.

S. Agnar Gundersen
Associate Professional Officer
World Health Organization

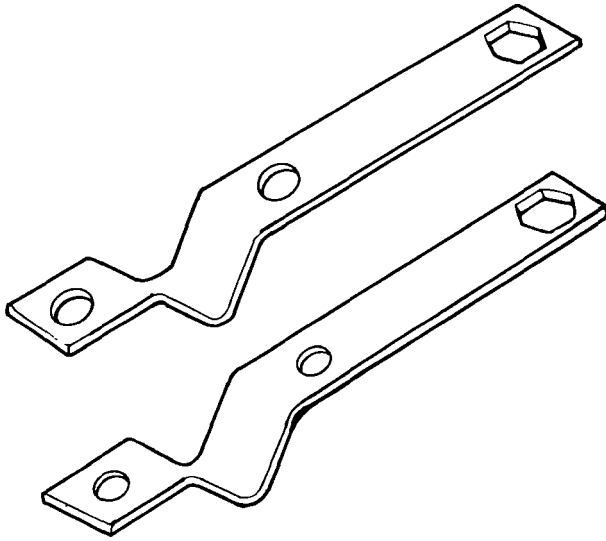
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SECTION VIEW OF THE PUMP



TOOLS SUPPLIED WITH THE PUMP

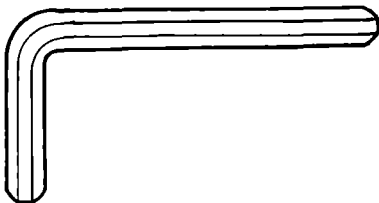
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TRAP WRENCHES



OPEN END SPANNERS



ALLAN KEY

IN ADDITION TO THESE TOOLS, A PIPE SPANNER AND A PIECE OF ROPE
ARE REQUIRED TO CARRY OUT THE MAINTENANCE WORK DESCRIBED IN THIS JOB
GUIDE.

MAINTENANCE SCHEDULE

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DAILY :

CLEAN THE PUMP AND THE PUMP SLAB EVERY DAY

- WIPE OFF THE PUMP HEAD
- RINSE THE SLAB WITH WATER

MONTHLY :

CHECK FOR ANY LOOSE NUTS ON THE PUMP HEAD. ARMS AND BASE PLATE. TIGHTEN OR IF NECESSARY REPORT ANY PROBLEMS TO THE NEAREST RURAL HEALTH CENTRE.

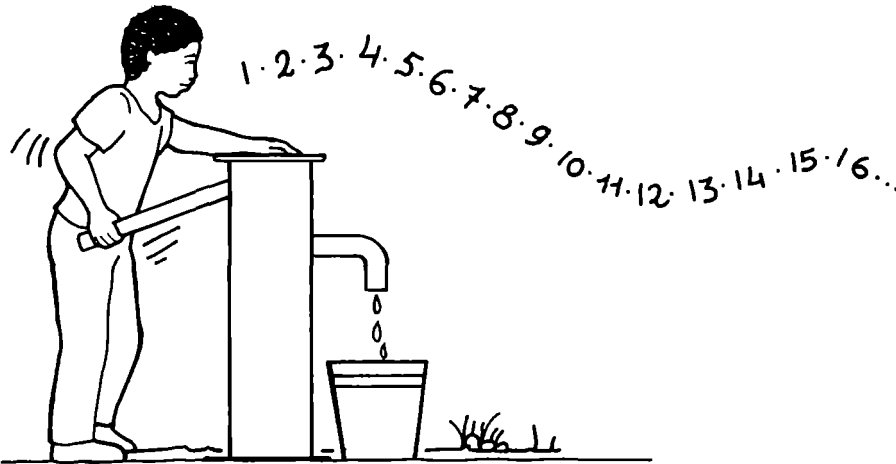
YEARLY :

PULL OUT THE PUMP-ROD. TAKE OFF THE PISTON VALVE AND CLEAN ALL THE PARTS

FOLLOW THE DISASSEMBLY GUIDE

PROBLEM :

60 OR MORE STROKES ARE NEEDED TO
FILL A BUCKET OF WATER



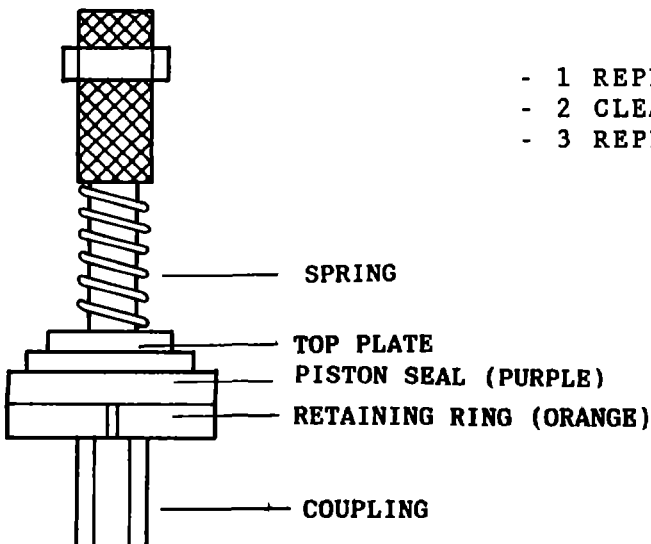
POSSIBLE CAUSE :

PISTON ASSEMBLY OPERATING IMPROPERLY

- 1 SEALS WORN OUT
- 2 SAND BETWEEN VALVE SEALS
- 3 VALVE SPRING BROKEN

REMEDY :

DISASSEMBLE THE PUMP (USE THE
DISSASSEMBLY GUIDE ON PAGE 9)



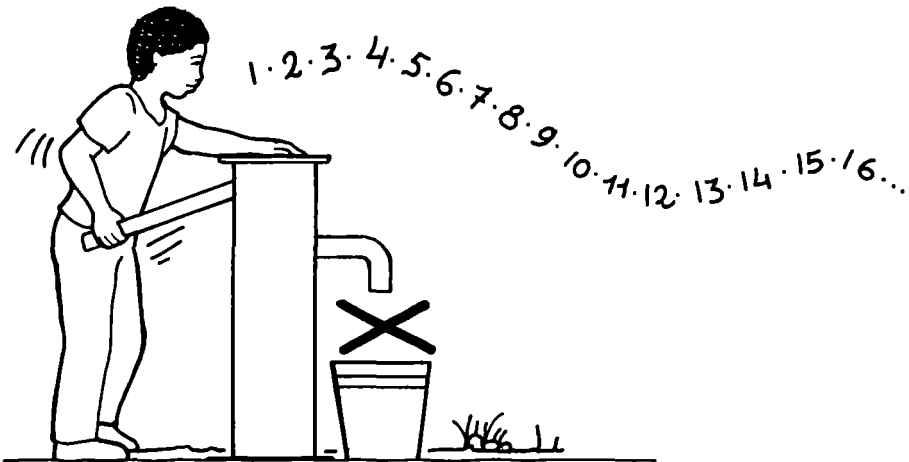
- 1 REPLACE THE SEALS
- 2 CLEAN THE PISTON VALVE SEATS
- 3 REPLACE THE SPRING

TROUBLE SHOOTING GUIDE

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PROBLEM :

MORE THAN 10 STROKES ARE NEEDED
BEFORE THE WATER STARTS FLOWING



POSSIBLE CAUSE :

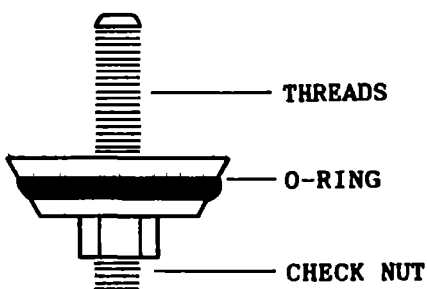
FOOTVALVE NOT WORKING

- 1 O-RING WORN OUT
- 2 SAND BETWEEN THE VALVE SEATS
- 3 VALVE SPRING BROKEN

REMEDIES :

DISASSEMBLE THE PUMP (USE THE
DISASSEMBLY GUIDE ON PAGE 9)

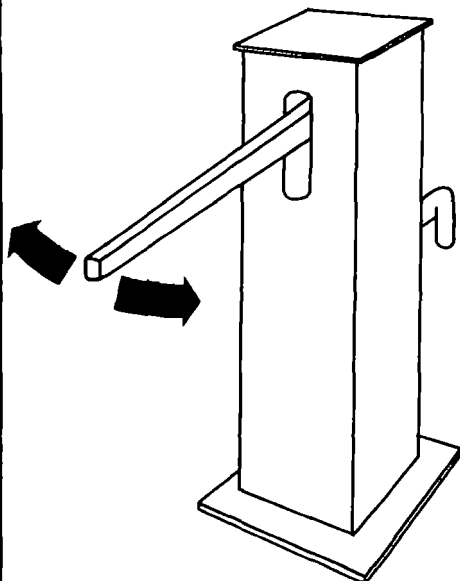
- EITHER - 1 REPLACE THE O-RING (PART NO.)
- AND/OR - 2 CLEAN THE VALVE SEATS
- AND/OR - 3 REPLACE THE SPRING (PART NO.)



TROUBLE SHOOTING GUIDE

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PROBLEM :



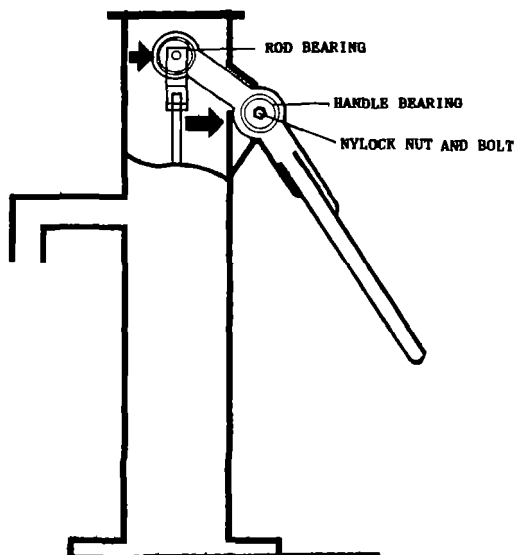
LOOSE HANDLE - WHICH MOVES SIDWAYS
AS WELL AS UP AND DOWN

NOTE: THIS SHOULD BE REPAIRED AS
SOON AS POSSIBLE OR OTHER PARTS
OF THE PUMP WILL BE DAMAGED

POSSIBLE CAUSE :

- 1 NYLOCK NUTS AND BOLTS ARE LOOSE
- 2 FULCRUM BEARINGS WORN OUT

REMEDY :



- 1 TIGHTEN THE NYLOCK NUTS AND
BOLTS (INDICATED BY THE
ARROWS)
- 2 ASK FOR ASSISTANCE FROM DWA
AS SOON AS POSSIBLE

TROUBLE SHOOTING GUIDE

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IF ANY ADDITIONAL PROBLEMS APPEAR OUTSIDE THE SCOPE OF THIS TROUBLE SHOOTING GUIDE, CONTACT THE REPRESENTATIVE OF THE DWA IN YOUR DISTRICT OR THE DEPARTMENT OF WATER AFFAIRS (DWA) IN MONGU DIRECTLY

SUCH PROBLEMS COULD BE :

- SAND IS CONTINUOUS DISTURBING THE PERFORMANCE OF THE PUMP
- NO WATER FLOW AFTER ASSEMBLY OF THE PUMP

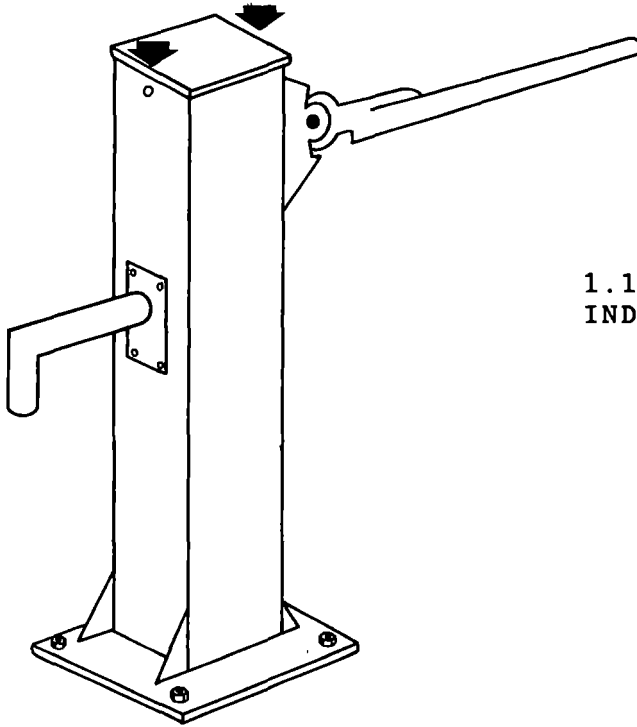
NOTE: 100 TO 150 STOKES SHOULD BE PUMPED BEFORE IT IS CERTAIN THERE IS "NO WATER FLOW"

- HANDLE BEARINGS ARE WORN OUT
- THE PUMP FOUNDATION IS LOOSE
- ANY OTHER DAMAGE TO THE PUMP

MAINTENANCE OF THE PUMP: DISASSEMBLY

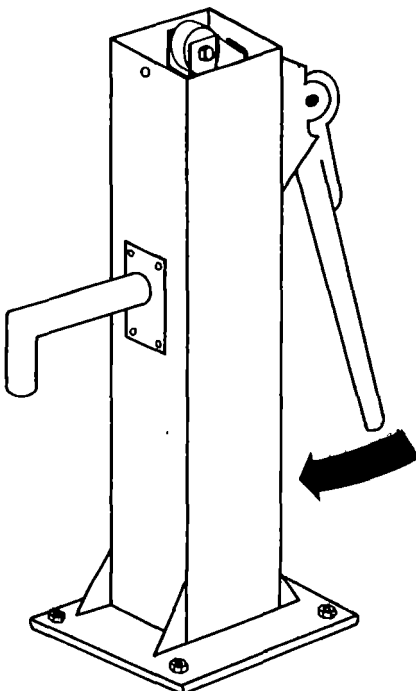
9

1. REMOVE THE TOP LID



1.1. UNSCREW THE TWO ALLAN SCREWS INDICATED BY THE ARROW

2. PLACE THE HANDLE IN THE LOWEST POSSIBLE POSITION

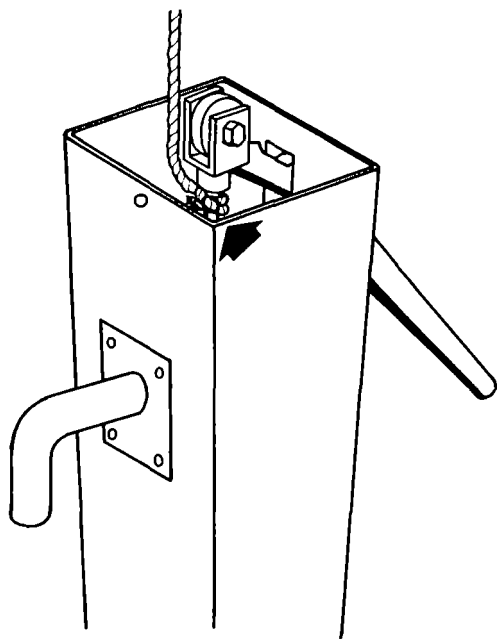


MAINTENANCE OF THE PUMP: DISASSEMBLY

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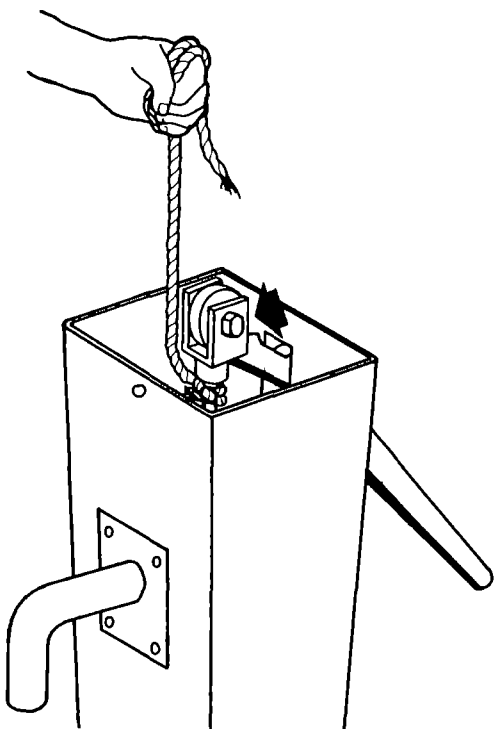
3. ATTACH A ROPE TO THE PUMP

3.1 TIE A ROPE AROUND THE ROD BELOW THE FORK-END (INDICATED BY THE ARROW)



4. REMOVE THE NYLOCK NUT AND BOLT INDICATED BY THE ARROWS

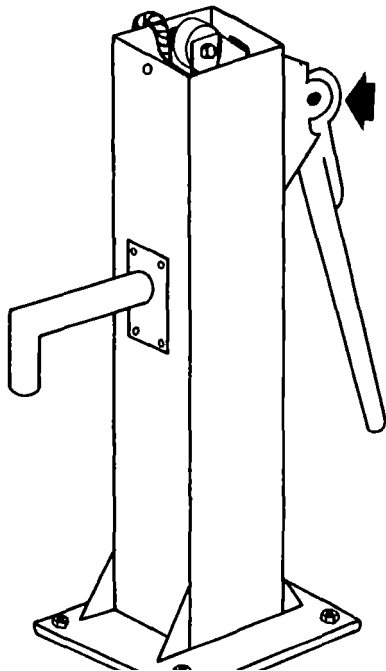
4.1 SUPPORT THE ROD WITH THE ROPE WHEN REMOVING THE BOLT FROM FORK-END



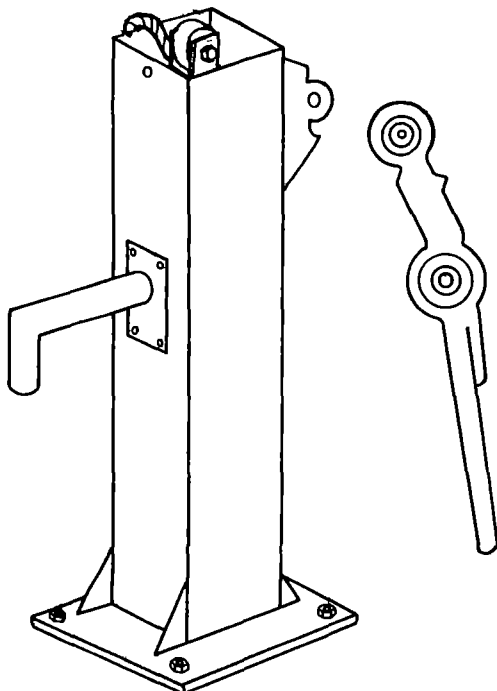
MAINTENANCE OF THE PUMP: DISASSEMBLY

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5. REMOVE THE NYLOCK NUT AND BOLT FROM THE HANDLE INDICATED BY THE ARROW



6. REMOVE THE HANDLE

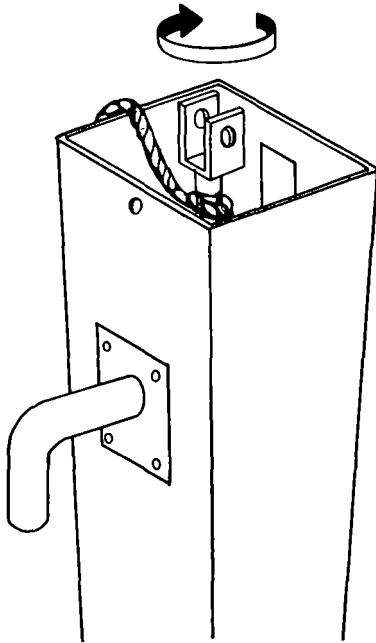


NOTE: IF THE HANDLE IS STUCK
USE A HAMMER AND TAP THE END
OF THE HANDLE CAREFULLY UNTIL
IT COMES LOOSE. MAKE SURE THE
BEARINGS DO NOT GET DAMAGED

MAINTENANCE OF THE PUMP: DISASSEMBLY

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7. ATTACH THE FOOTVALVE TO THE ROD



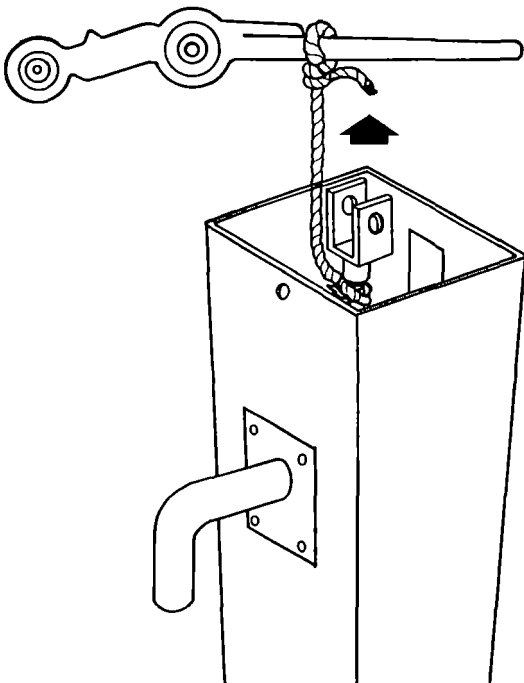
7.1 LOWER THE ROD CAREFULLY UNTIL IT RESTS ON THE FOOTVALVE

7.2 SCREW THE FOOTVALVE TO THE ROD BY TURNING THE ROD 6 TO 10 TIMES IN CLOCKWISE DIRECTION (INDICATED BY THE ARROW)

NOTE: WHEN IT IS MORE DIFFICULT TO TURN THE ROD, THE FOOTVALVE IS ATTACHED

NOTE: DON'T TURN IT THE WRONG WAY AND DON'T TIGHTEN IT TOO HARD

8. PULL THE FOOTVALVE LOOSE



8.1 TIE THE OTHER END OF THE ROPE AROUND THE HANDLE

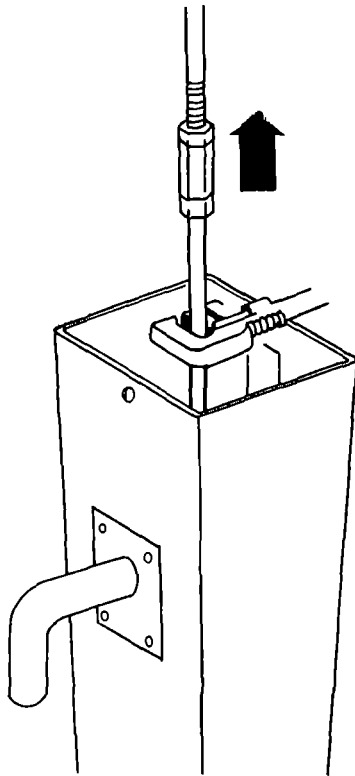
8.2 PULL IN DIRECTION OF ARROWS WITH A QUICK MOVEMENT

NOTE: IF RODS COME UP TOO EASILY THE FOOTVALVE IS NOT ATTACHED. TRY STEP 7 AGAIN. THE FIRST PULL SHOULD BE QUITE DIFFICULT AND THEN BECOME EASIER.

MAINTENANCE OF THE PUMP: DISASSEMBLY

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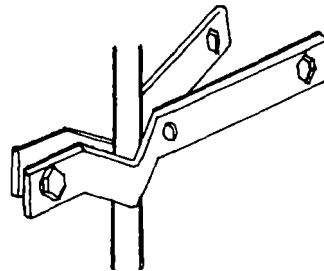
9. LIFT THE ROD



9.1 LIFT THE ROD CAREFULLY UNTIL THE FIRST ROD COUPLING APPEARS

9.2 SECURE THE ROD WITH A PIPE SPANNER BELOW THE ROD COUPLING

*IF NO PIPESPANNER IS AVAILABLE, USE THE TWO TRAP WRENCHES AS SHOWN IN THE FIGURE BELOW.



NOTE: MAKE SURE THE ROD IS FIRMLY SECURED. IF THE ROD DROPS DOWN THE WELL, IT MAY DAMAGE THE FOOTVALVE OR THE RISING MAIN PIPE

10. DISASSEMBLE THE RODS



10.1 FIX ONE OPEN END SPANNER TO THE BRASS COUPLING

10.2 LOOSE THE LOCKNUT ABOVE WITH A SECOND SPANNER BY TURNING IN ANTI-CLOCKWISE DIRECTION

10.3 FIX THE SECOND SPANNER TO THE PROVIDED TRACKS ABOVE (INDICATED BY THE ARROW)

10.4 UNSCREW THE ROD BY TURNING IN ANTI-CLOCKWISE DIRECTION

10.5 REPEAT STEPS 9 TO 10 UNTIL RODS ARE DISASSEMBLED. AND THE PISTON AND THE FOOTVALVE APPEAR.

NOTE: PLACE THE RODS FLAT IN A PROTECTED AREA IN ORDER TO PREVENT ANY DAMAGE. KEEP SAND OUT OF THREADS.

MAINTENANCE OF THE PUMP: DISASSEMBLY

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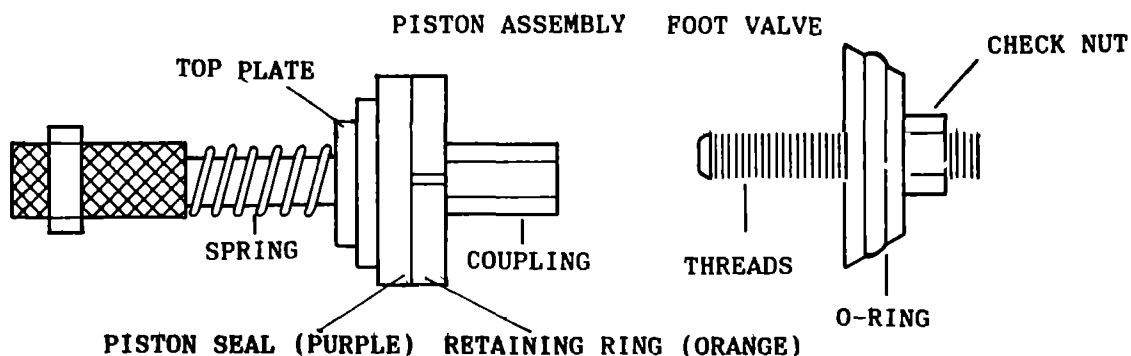
11. MAINTENANCE OF THE PISTON ASSEMBLY AND FOOTVALVE

11.1 UNSCREW THE FOOTVALVE FROM THE PISTON ASSEMBLY

11.2 WASH ALL THE PARTS IN CLEAN WATER

11.3 REPLACE WORN-OUT OR DAMAGED PARTS WITH NEW PARTS

11.4 ATTACH THE FOOTVALVE TO THE PISTON ASSEMBLY GENTLY



12. ASSEMBLY OF THE PUMP

12.1 ATTACH THE FOOTVALVE GENTLY TO THE PISTON ASSEMBLY.

NOTE: DO NOT TIGHTEN!!

12.2 REVERSE FROM STEP 10 TO STEP 8.

12.3 - LOWER THE ROD UNTIL IT RESTS ON THE FOOTVALVE

- LIFT ROD APPROXIMATELY 10 CM AND DROP IT.

NOTE: THE FOOTVALVE WILL BE LOCKED AGAINST THE WALL OF THE CYLINDER.

- UNSCREW THE PISTON ASSEMBLY FROM THE FOOTVALVE BY TURNING THE ROD IN A CLOCKWISE DIRECTION.

12.4 LIFT THE ROD (NOW WITHOUT THE FOOTVALVE ATTACHED) AND REVERSE FROM STEP 6 TO STEP 1.

