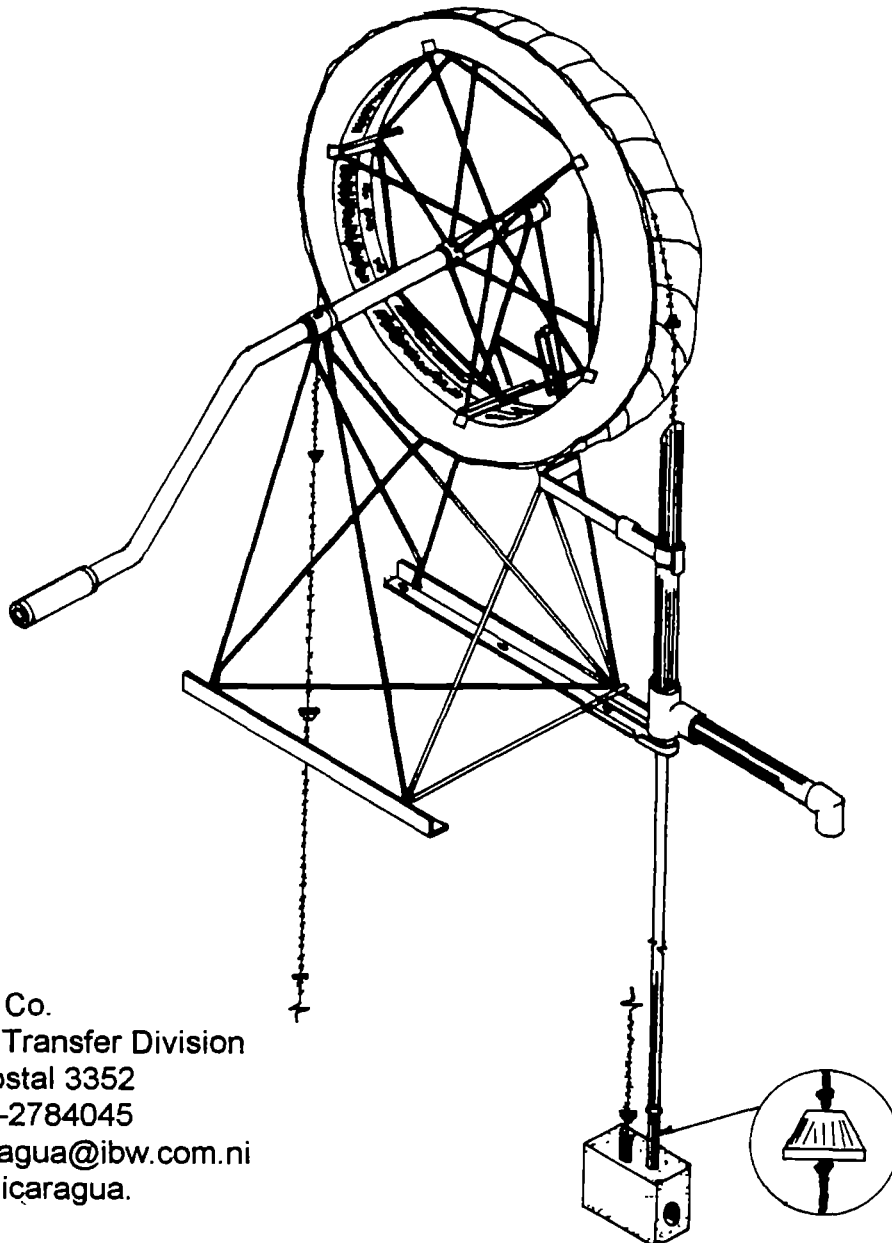


FAMILY WELL ROPE PUMP

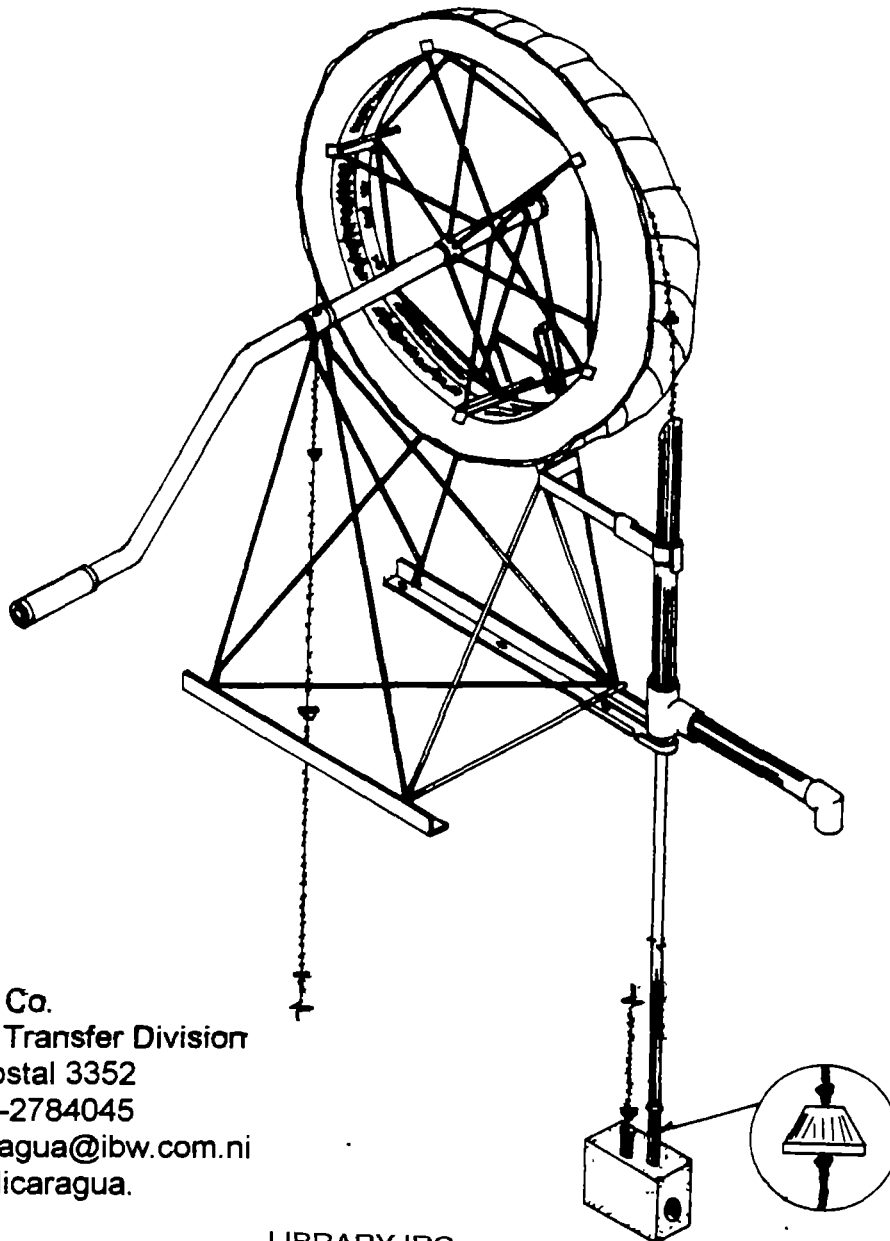
MANUAL OF TECHNICAL DRAWINGS



Rope Pump Co.
Technology Transfer Division
Apartado Postal 3352
Fax: 00-505-2784045
E-mail: sdc-agua@ibw.com.ni
Managua, Nicaragua.

FAMILY WELL ROPE PUMP

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Rope Pump Co.
Technology Transfer Division
Apartado Postal 3352
Fax: 00-505-2784045
E-mail: sdc-agua@ibw.com.ni
Managua, Nicaragua.

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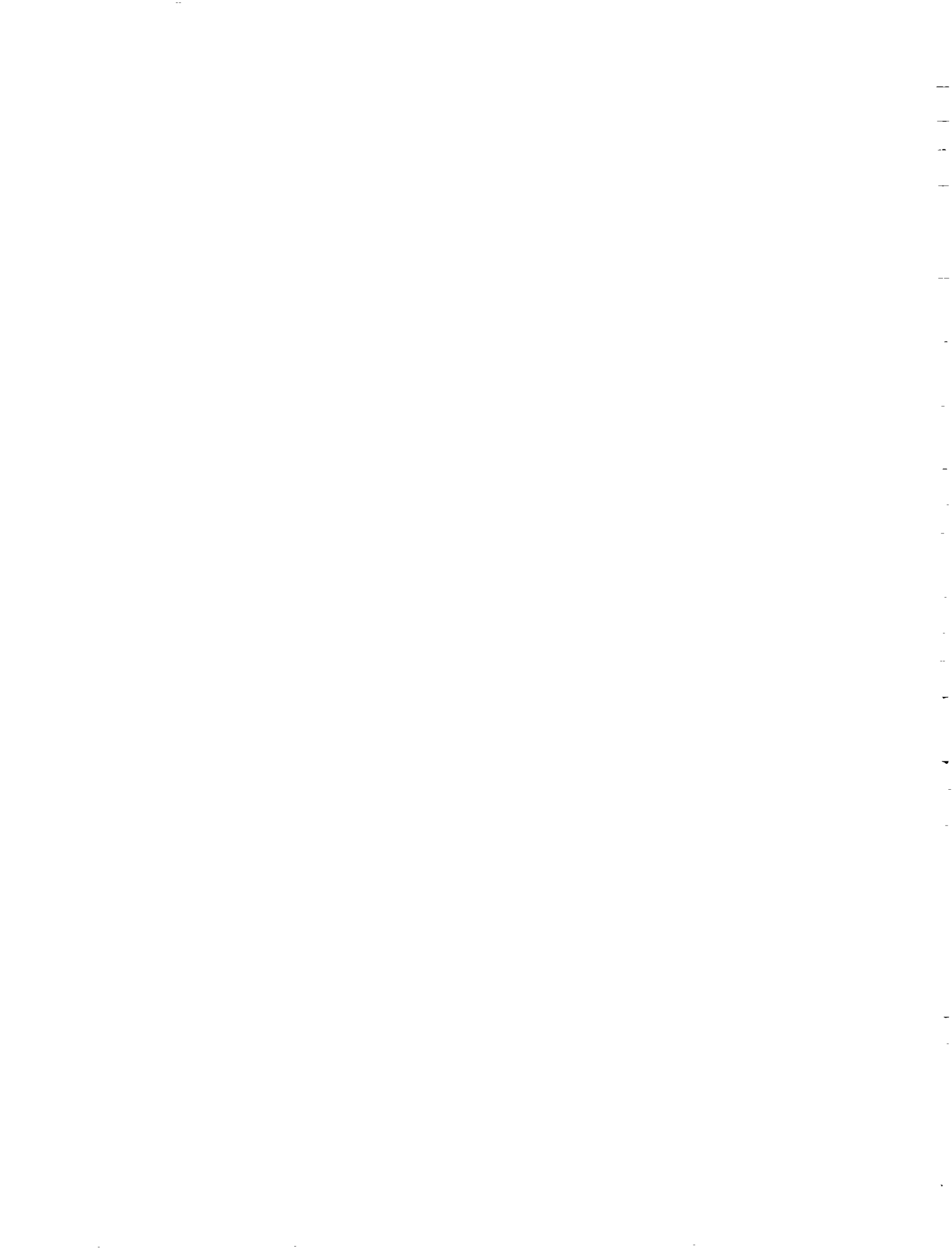


MANUAL OF TECHNICAL DRAWINGS

FAMILY WELL ROPE PUMP

CONTENTS

- I- PRESENTATION
- II.- EQUIPMENT CHARACTERISTICS
- III.- PUMPING CAPACITY
- A- PISTONS AND ROPE
- B1- GUIDE BOX INTERNAL PIECE
- B2- GUIDE BOX
- C- WHEEL STRUCTURE
 - C.a CRANK PRODUCTION
 - C.b LEG ASSEMBLY
 - C.c LEG REINFORCEMENT
 - C.d ANGLE IRONS
 - C.e PULLEY WHEEL HUB
 - C.f BRAKE SYSTEM
 - C.g UPPER AND LOWER SUPPORTS
- D- INSTALLATION ACCESSORIES



I.- PRESENTATION

This manual of technical drawings is part of the rope pump technology transference programme. It has as its goal to show in a clear and detailed manner the essentials of each component of this useful hand pump.

In addition to the current manual, the programme prepared manuals of the extra-strong rope pump and the community well rope pump. Their respective front page is shown in the back of this manual.

Each component is presented here with its corresponding measures, a list of all the necessary production materials, and complementary technical information.

In March 1996, the Governments of Nicaragua and Switzerland - through COSUDE - signed a new three-year bilateral cooperation agreement by which the INAA-COSUDE programme activities are to continue for the 1996-1998 period. Within the framework of this agreement, the transference of rope pump technology seeks to promote rope pump production at the regional and international levels. The Technology Transfer Division of the Rope Pump Company will be in charge of carrying out the aforementioned production activities. The Division is provided technical consultancy services through the Dutch Ecumenic Development Cooperation Organization known as "Servicio Ultramar" ("Overseas Services") or DOG (for "Dienst Over de Grenzen").

This is an easy-to-understand document and is aimed at future producers, cooperation organizations working in the field of water and sanitation, and other persons interested in the rope pump technology.

Together with the rope pump production photomanual and the document "Experiences and Tolerances", this manual provides all the information necessary to carry out technology transference activities at the international level.

This Manual has been prepared by the Technology Transfer Division of the Rope Pump Company. It can be freely reproduced.

Los Cedros, Province of Managua, Nicaragua. 4 August 1997.

II.- EQUIPMENT CHARACTERISTICS

- Appropriate technology equipment effective at a depth of 50 meters.
- Produced with accessible materials.
- Maintenance and repair do not require expertise and complex tools.
- Easy to handle.
- Easy to install.
- Its relatively low cost makes it accessible to the rural population.
- Preserves the quality of the water and the population's health.



III.- PUMPING CAPACITY.

PUMPING CAPACITY

| Depth (meters) | Adults (Liters/min) | Children (Liters/min) | Time needed for an adult to fill a barrel (min) |
|-------------------|------------------------|--------------------------|---|
| 5 | 70 | 39 | 3 |
| 10 | 41 | 19 | 5 |
| 15 | 27 | 13 | 8 |
| 20 | 20 | 10 | 10 |
| 25 | 16 | 8 | 13 |
| 30 | 14 | 6.5 | 15 |
| 35 | 12 | 5.5 | 18 |
| 40 | 10 | 4.8 | 20 |

A- PISTONS AND ROPE

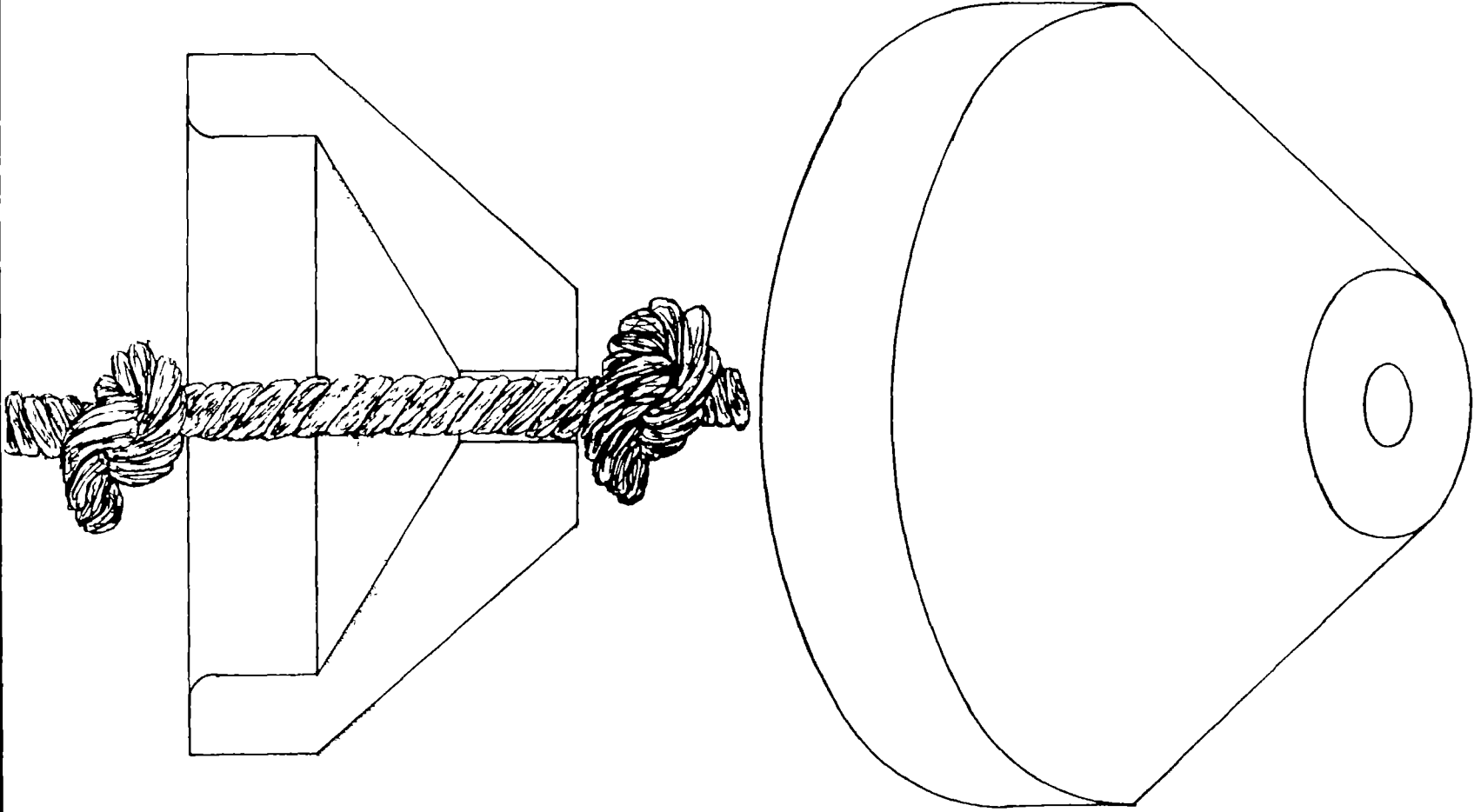
- Piston diameter is determined by the type of pipe to be used and the well's depth. Pistons should be made of injected polypropylene or polyethylene. Neither rubber nor wood are recommended.
- Five different piston sizes are used.
- The rope's length, diameter and amount of pistons are determined by the well's depth.

Length and diameter variations for both the pistons and the rope

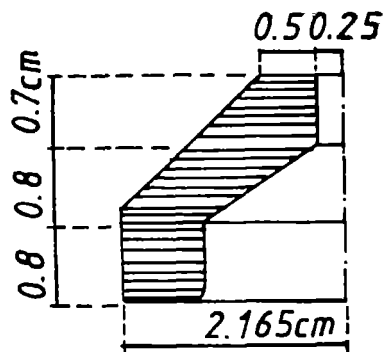
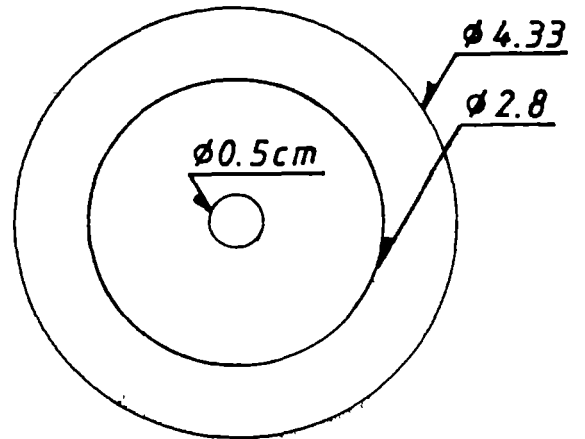
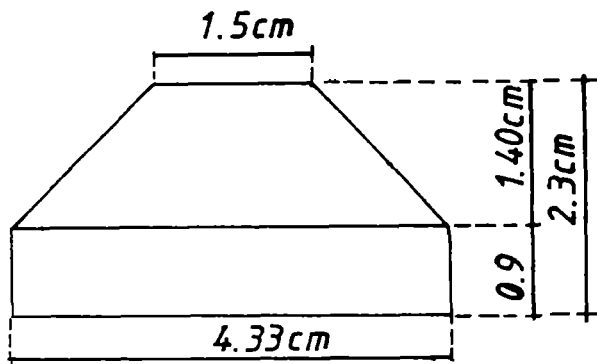
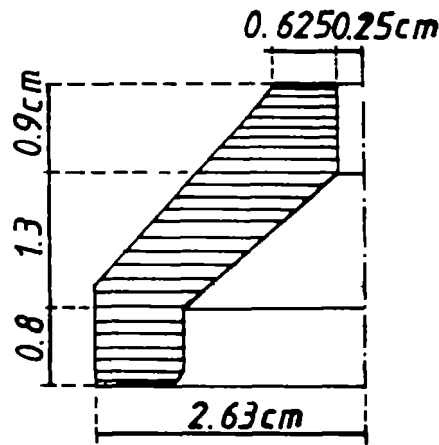
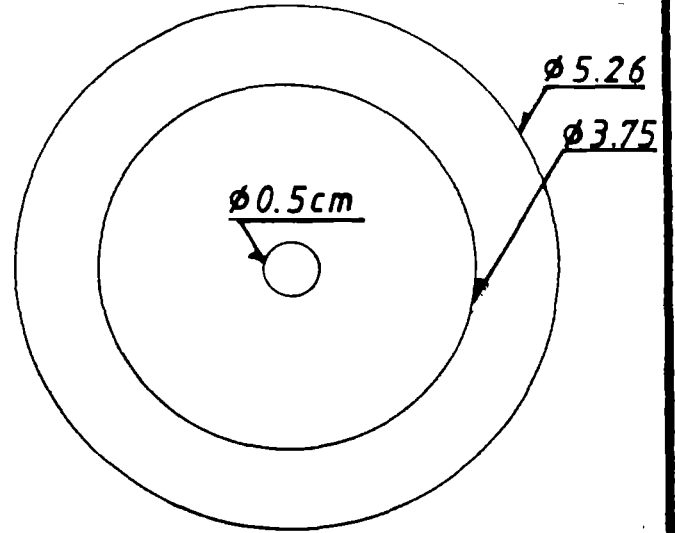
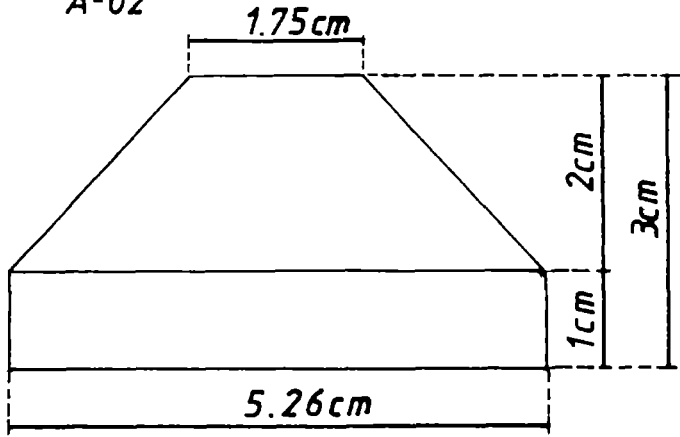
| | | Depth (meters) | | | |
|-------------------------|--------|----------------|---------|---------|---------|
| Component part | Unit | 0 - 11 | 11 - 19 | 19 - 29 | 29 - 40 |
| Piston nominal diameter | Inches | 1 | 3/4 | 1/2 | 1/2 |
| Rope length | Meters | 27 | 43 | 63 | 85 |
| Rope diameter | Inches | 1/8 | 1/8 | 1/8 | 1/4 |
| Amount of pistons | Unit | 26 | 42 | 62 | 84 |

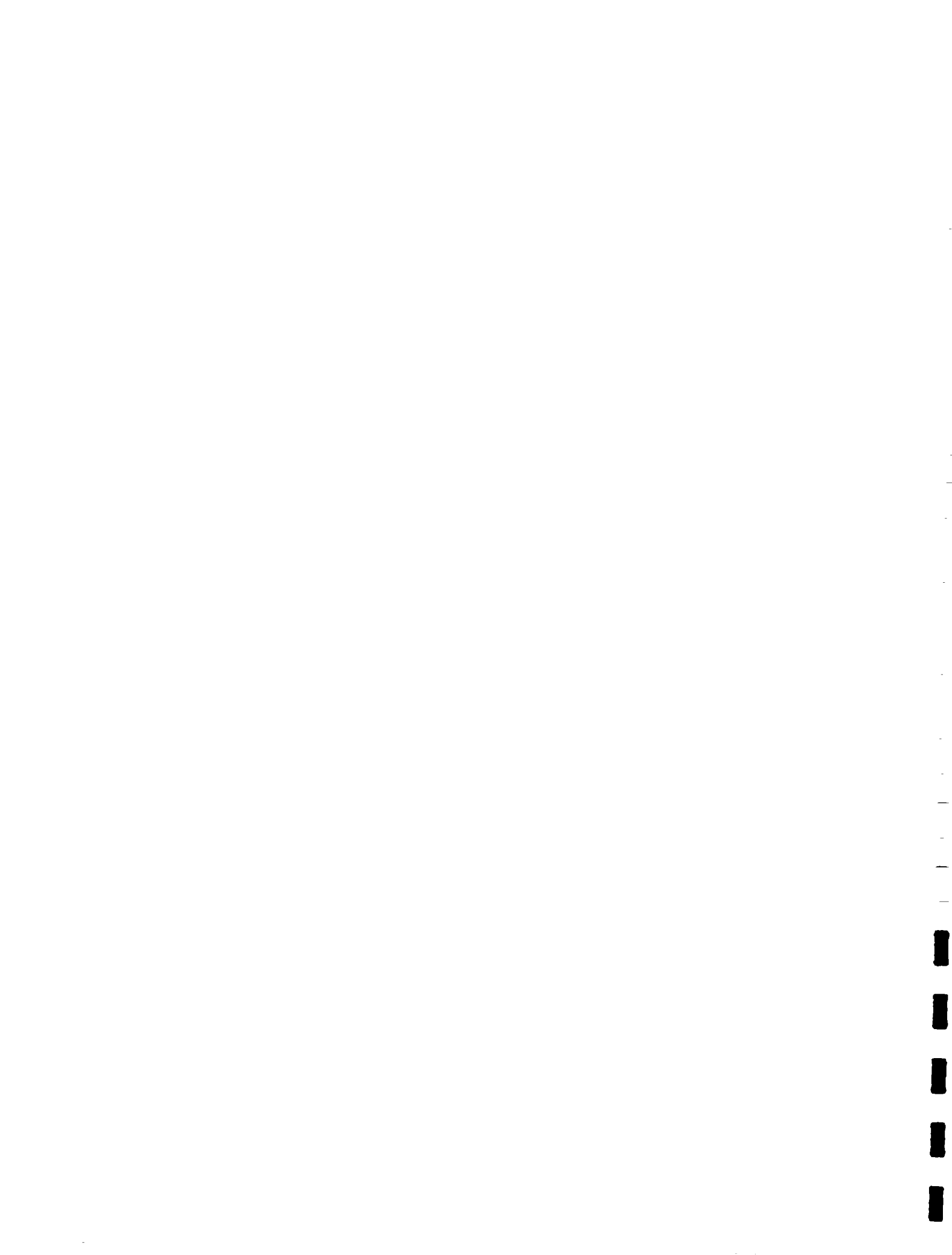
- Two-inch (0 - 3.5 meters) and 1 1/2" inch (3.5 - 5 meters) pistons are used in wells which are not too deep or when motor pumps are used.
- Deep wells (37 - 50 meters) use 1/2" inch pistons with Rim # 16, a double crank system, and wooden bearings. These pumps are installed as on drilled wells in order to increase the contact between the pulley wheel and the rope.

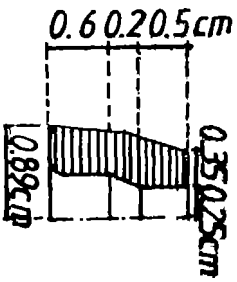
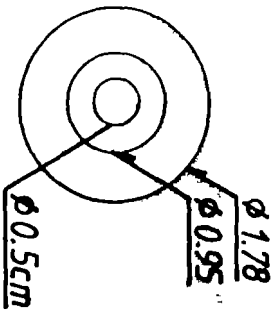
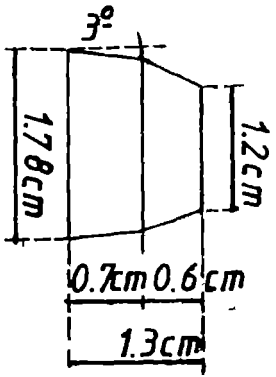
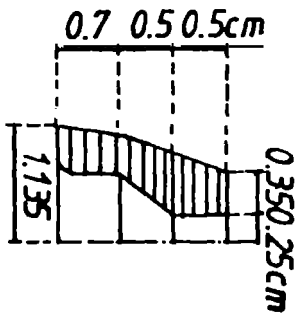
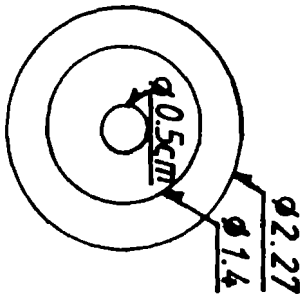
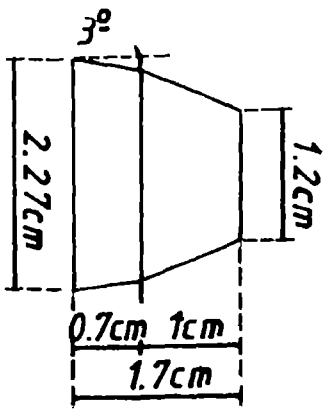
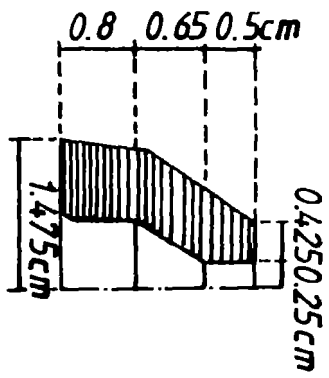
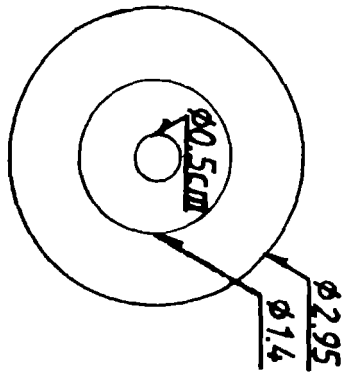
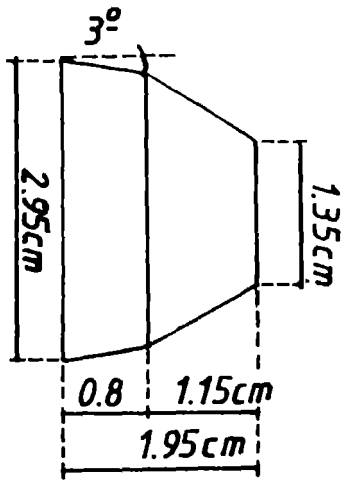




A-02









B.1. GUIDE BOX INTERNAL PIECE

- The guide box internal piece is made up of five components:
- The entrance pipe, pumping pipe and protector are made of PVC pipe. Diameter is determined by well depth.
- The ceramic piece and the base part do not vary regardless of well depth.

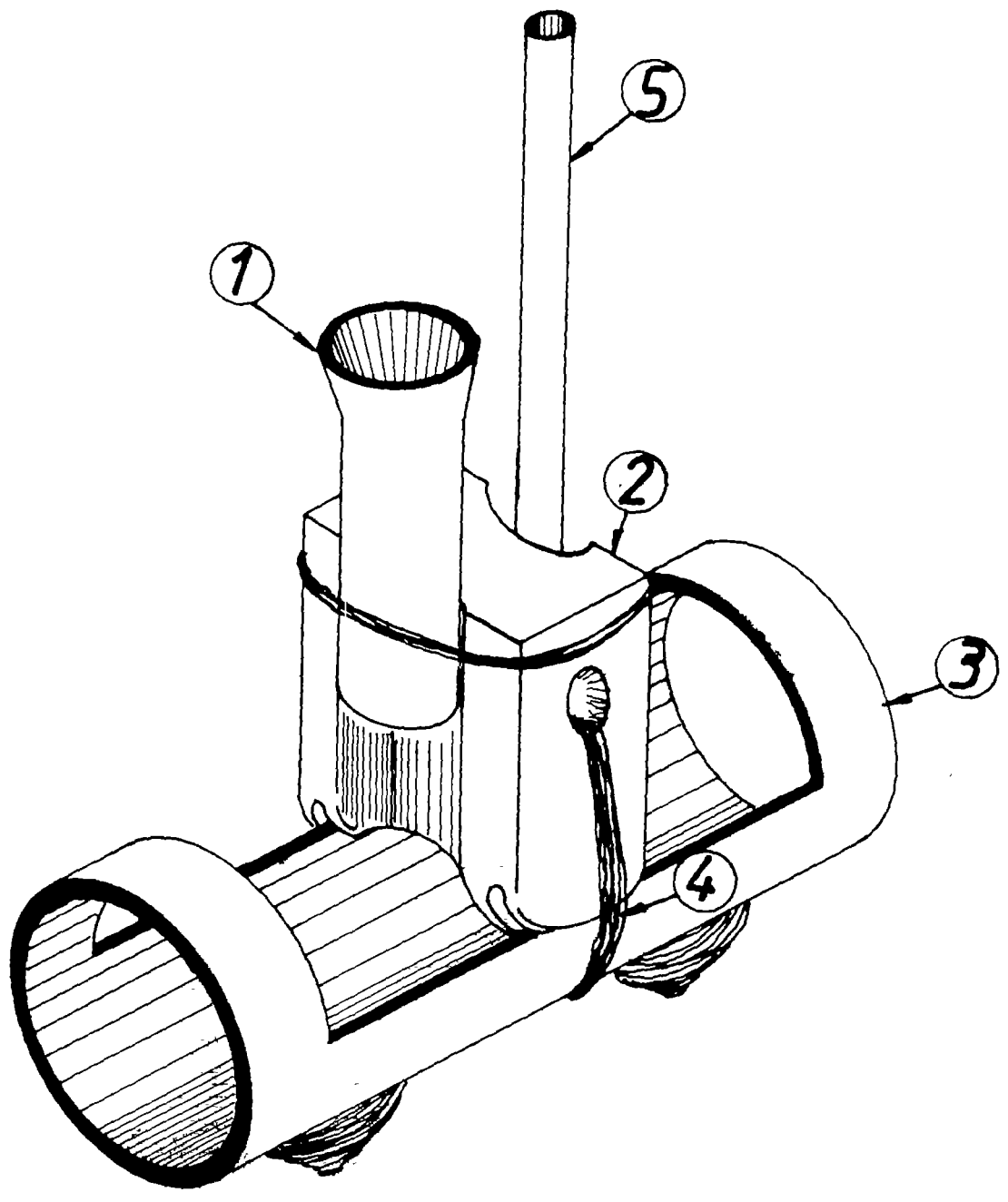
Measurement variations for the guide box internal piece

| Drawing No. | Component | Unit | Depth (meters) | | |
|-------------|---------------------------------|--------|----------------|---------|---------|
| | | | 0 - 11 | 11 - 19 | 19 - 50 |
| 2 | Ceramic pieces | - | - | - | - |
| 3 | Base diameter | Inches | 2 | 2 | 2 |
| 1 | Entrance pipe diameter | Inches | 1 ½ | 1 | 1 |
| 4 | Pumping pipe diameter | Inches | 1 | ¾ | ½ |
| - | Diam. of pumping pipe protector | Inches | 1 | ¾ | ½ |

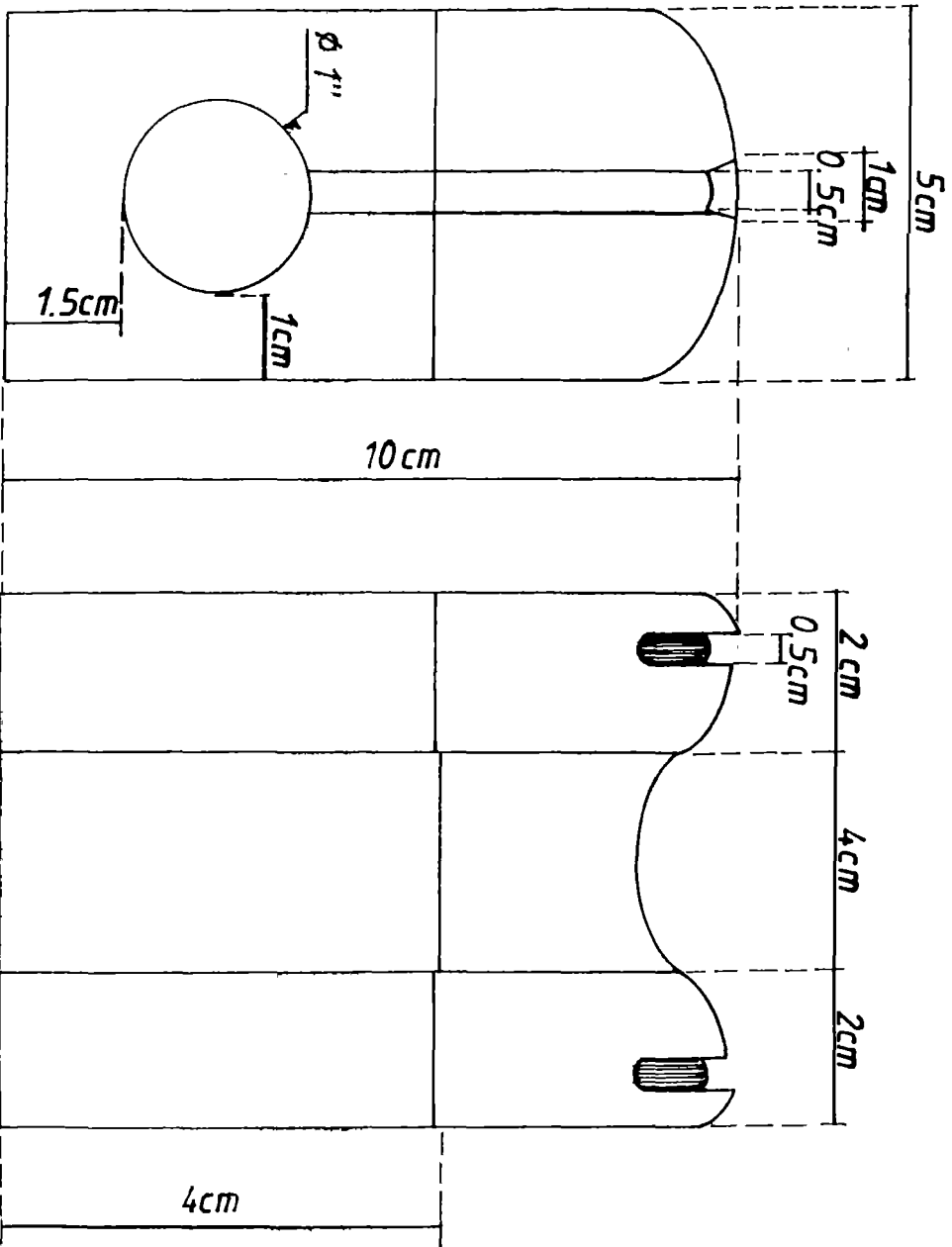
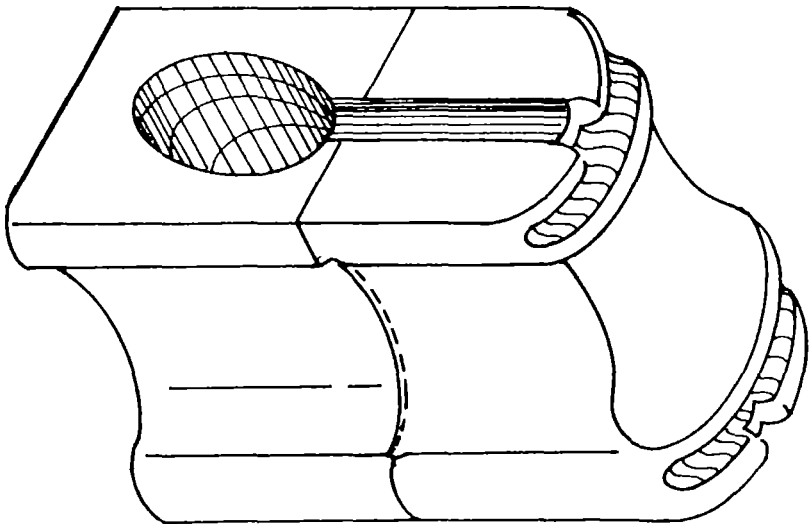
- PVC pipes may vary in diameter depending on the manufacturer. However, it is recommended that they correspond in diameter to the pistons' nominal diameter. This prevents water leaks and increases pumping efficiency.
- The ceramic piece may be replaced by an electric insulator or a bottle, provided that the rope does not wear away.



B₁-01

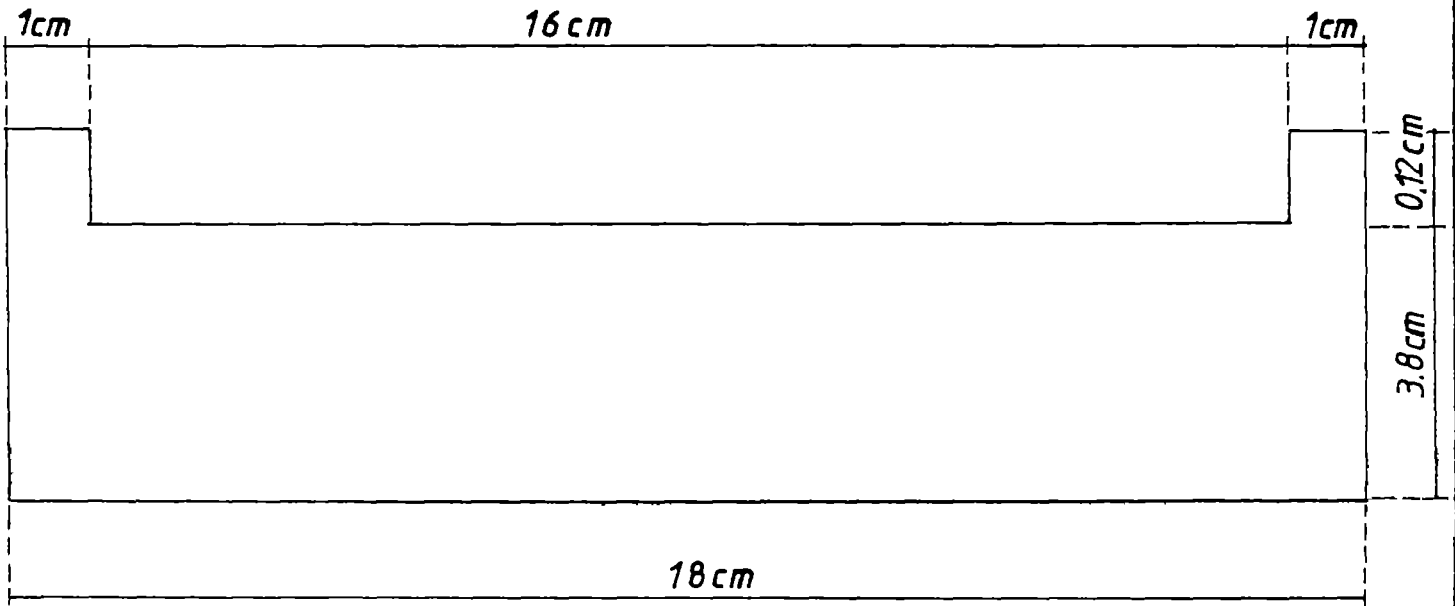
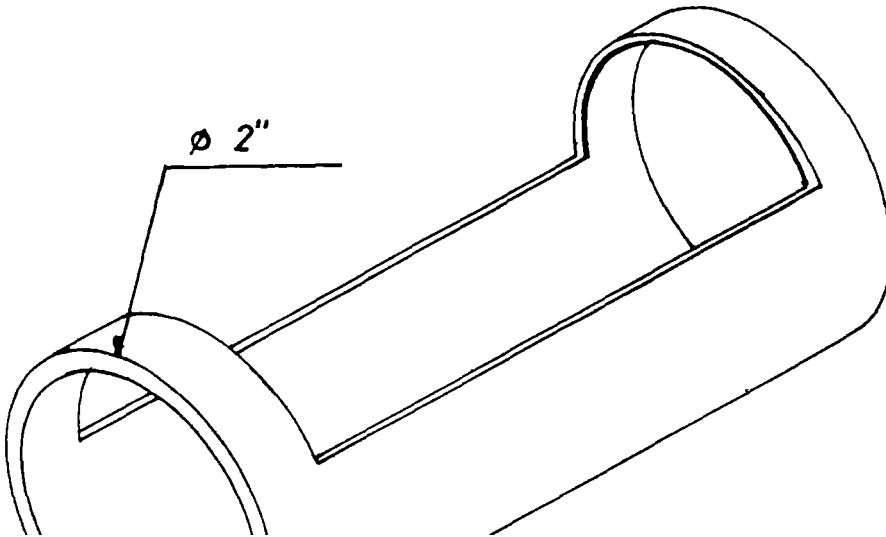






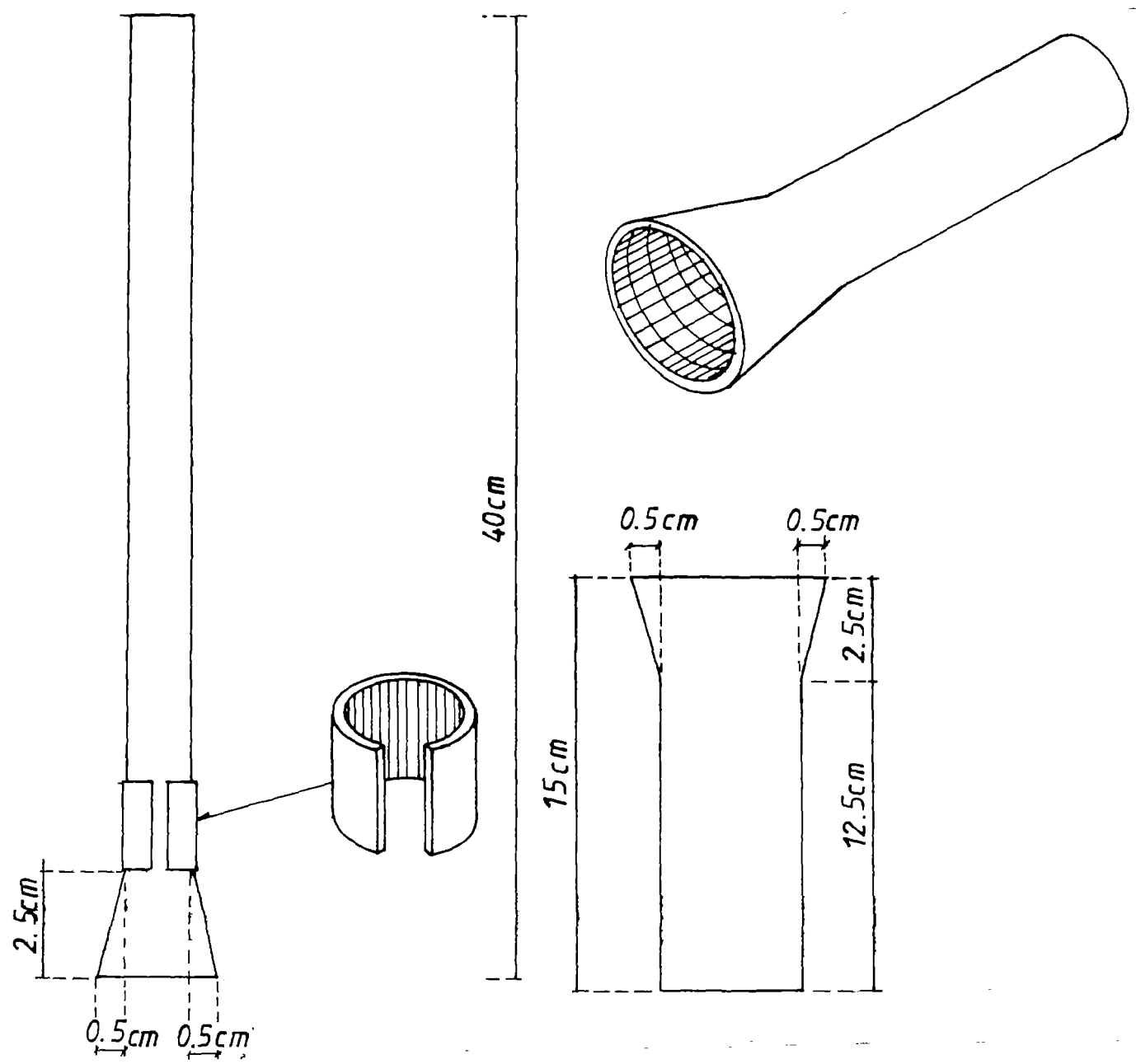


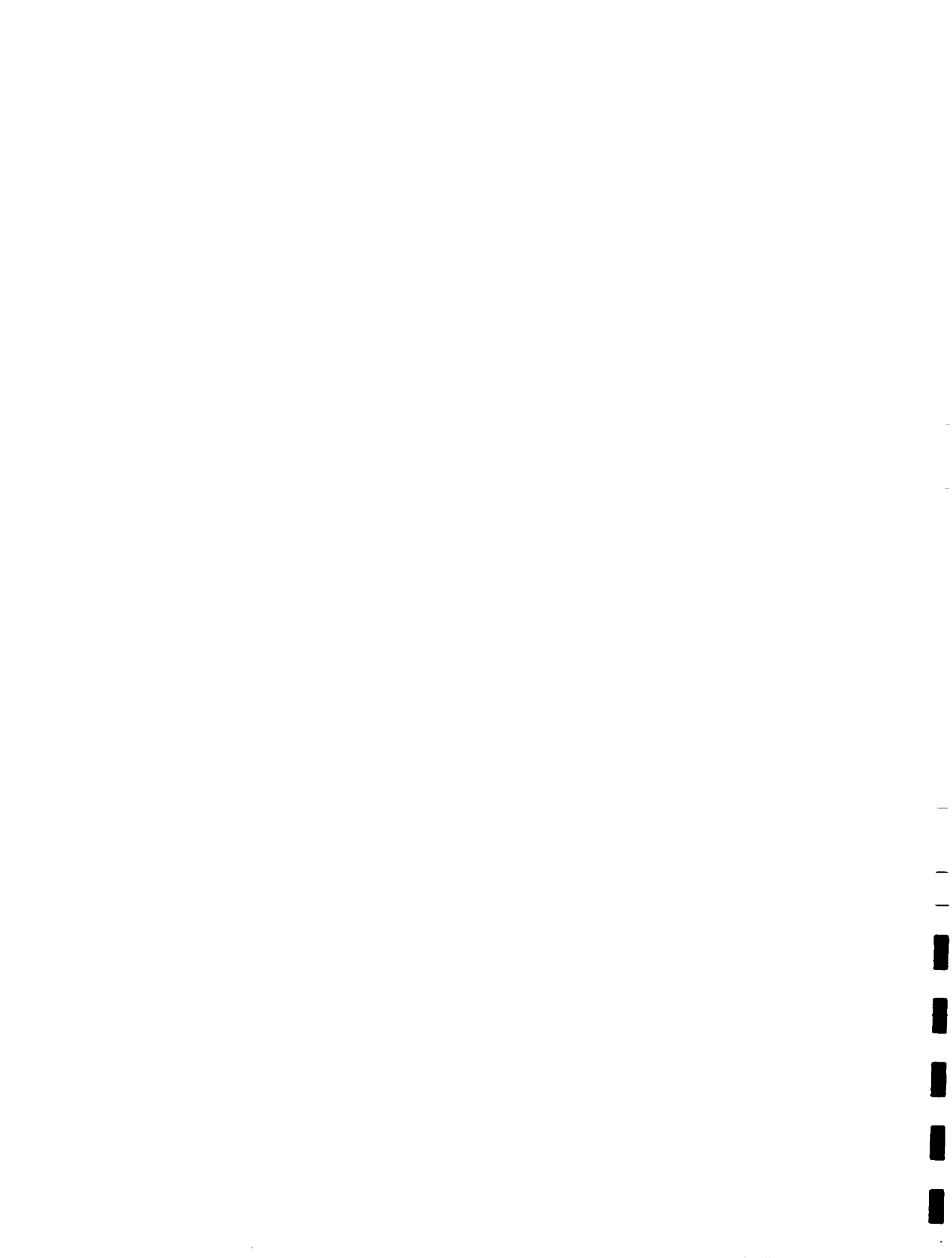
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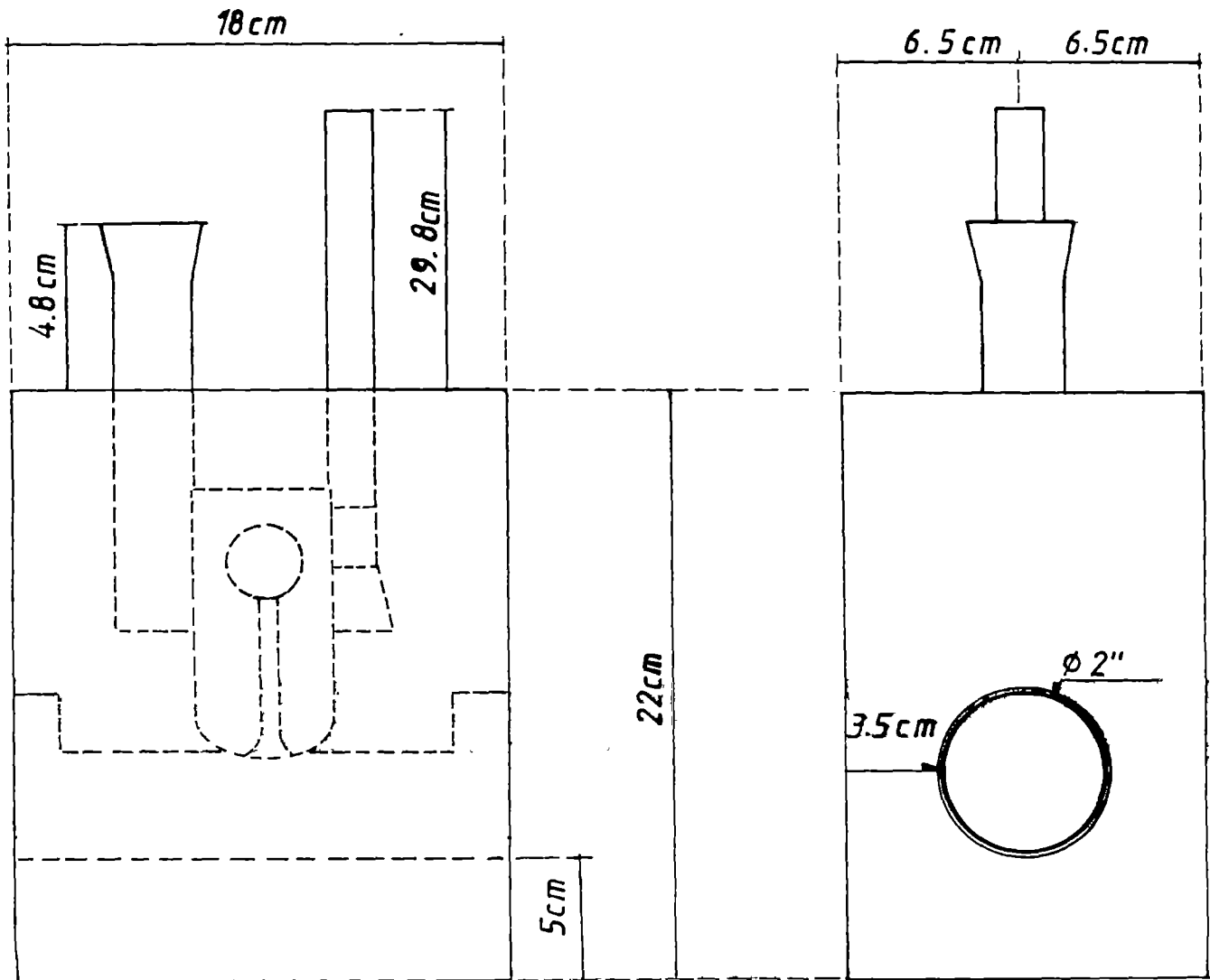
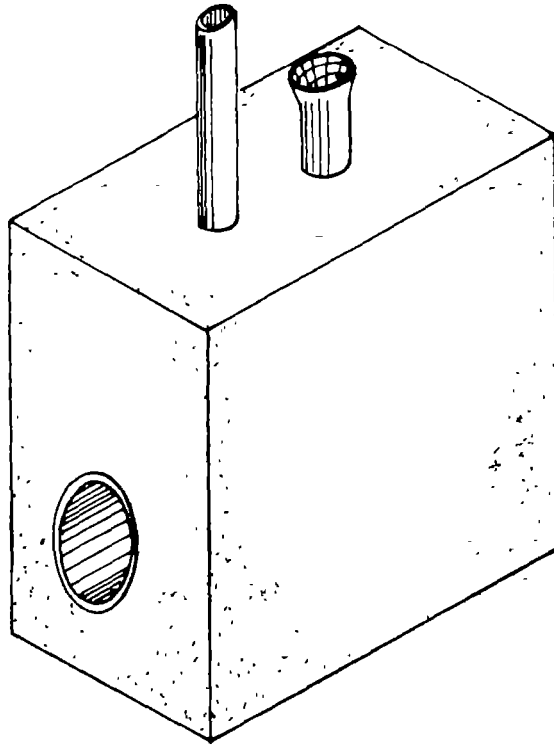
B₇-04





B.2. THE GUIDE

B₂-01

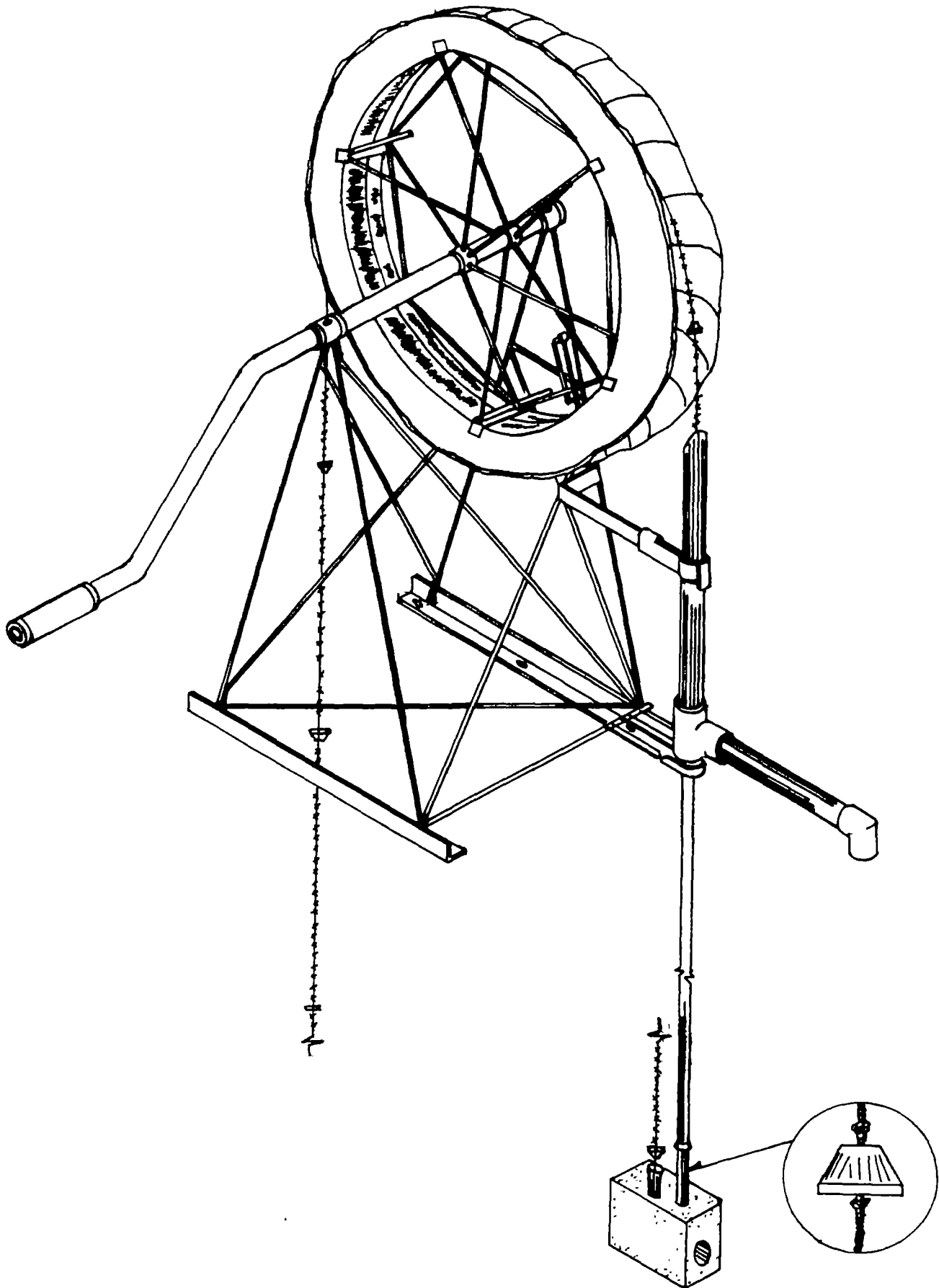




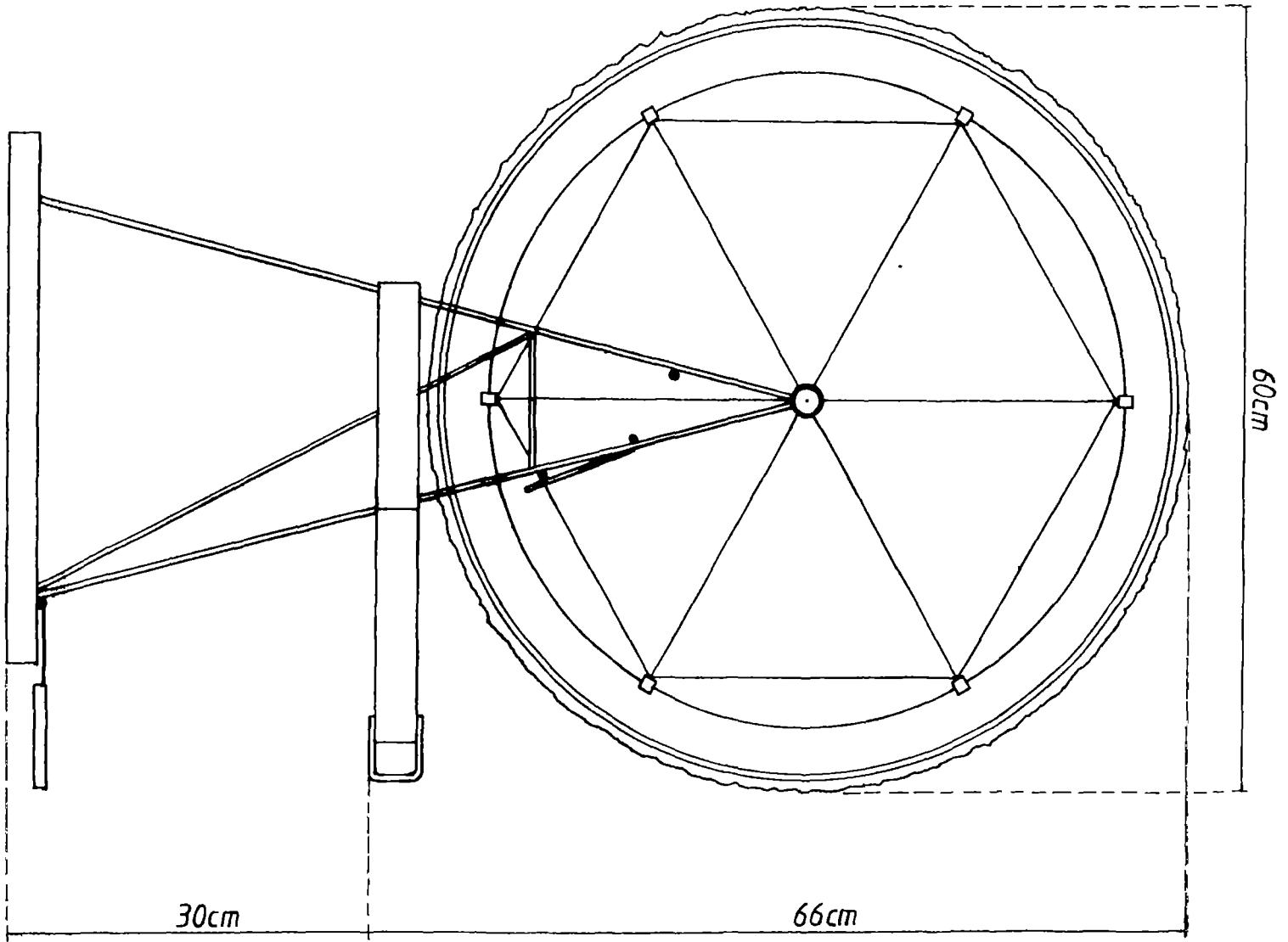
C. FAMILY WELL ROPE PUMP STRUCTURE

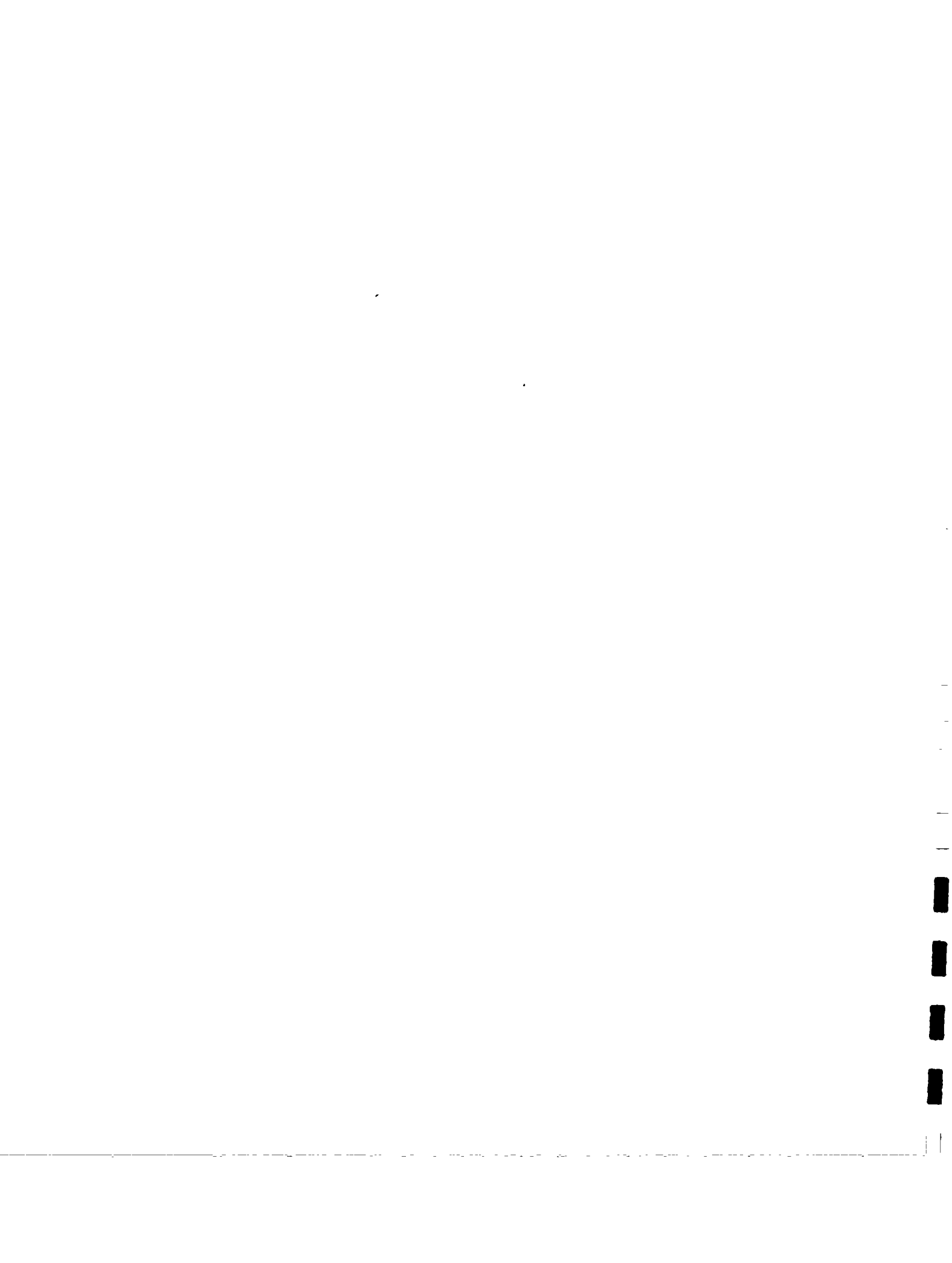
- For family wells
- For family gardens
- It has a normal structure

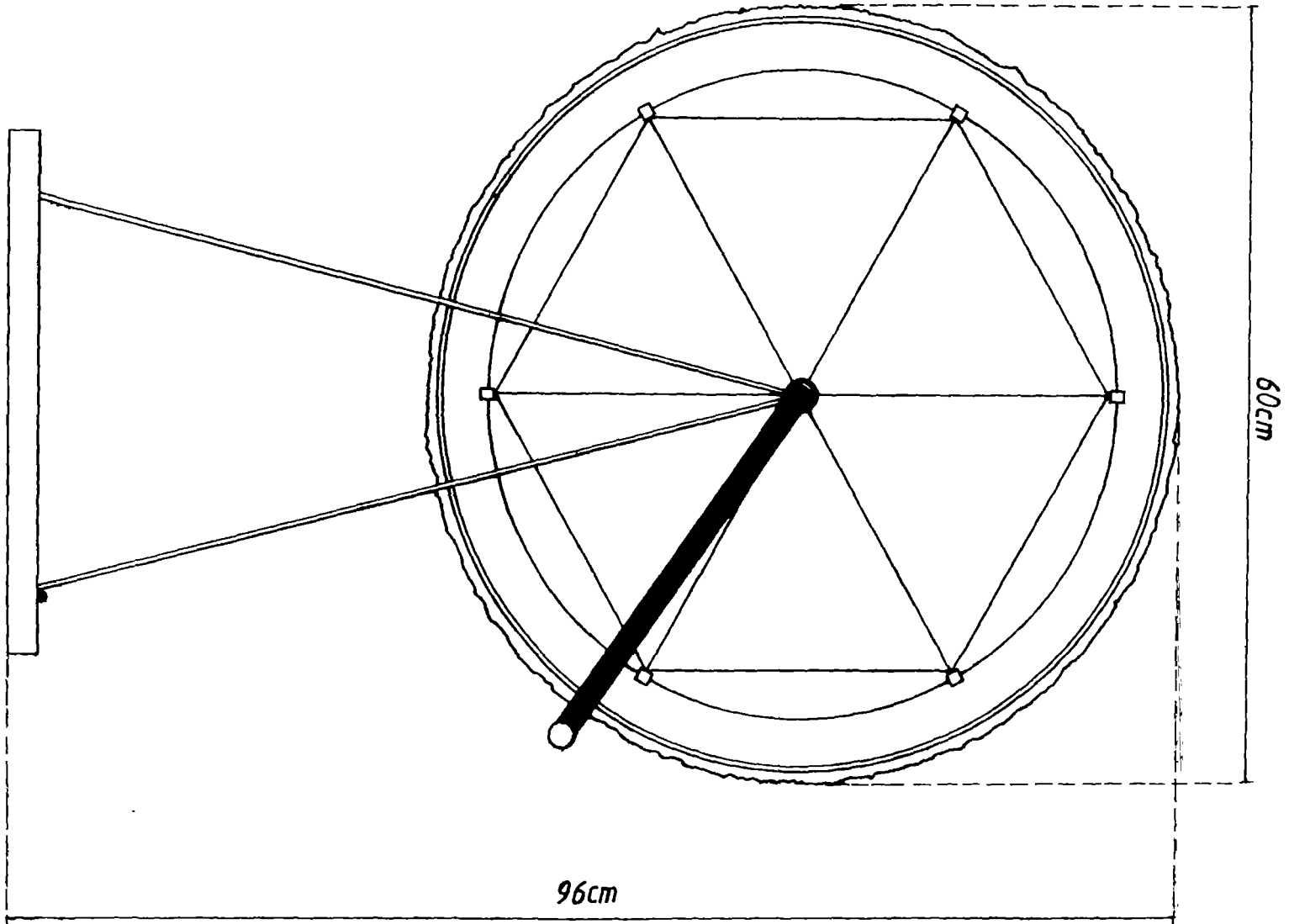


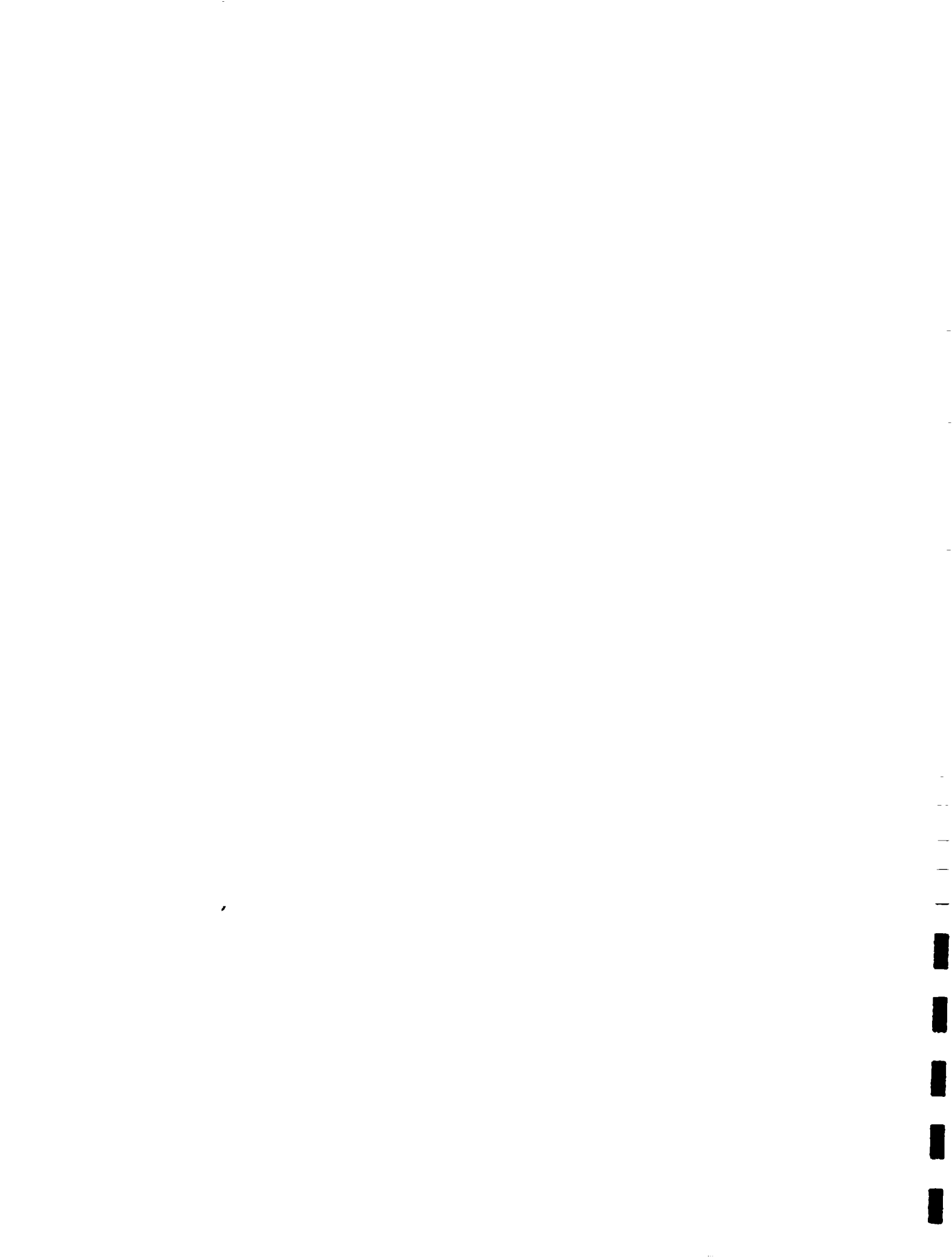


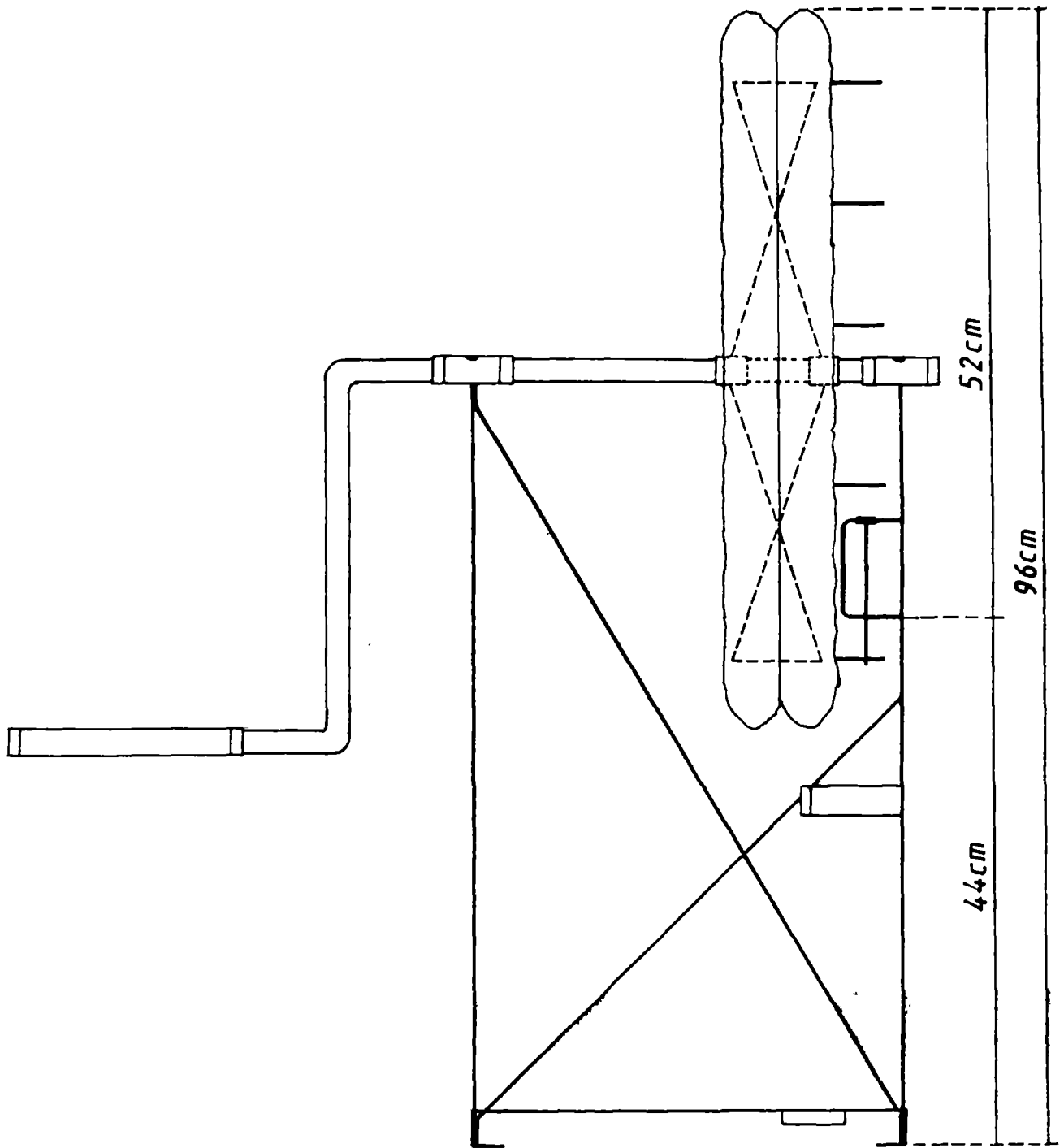




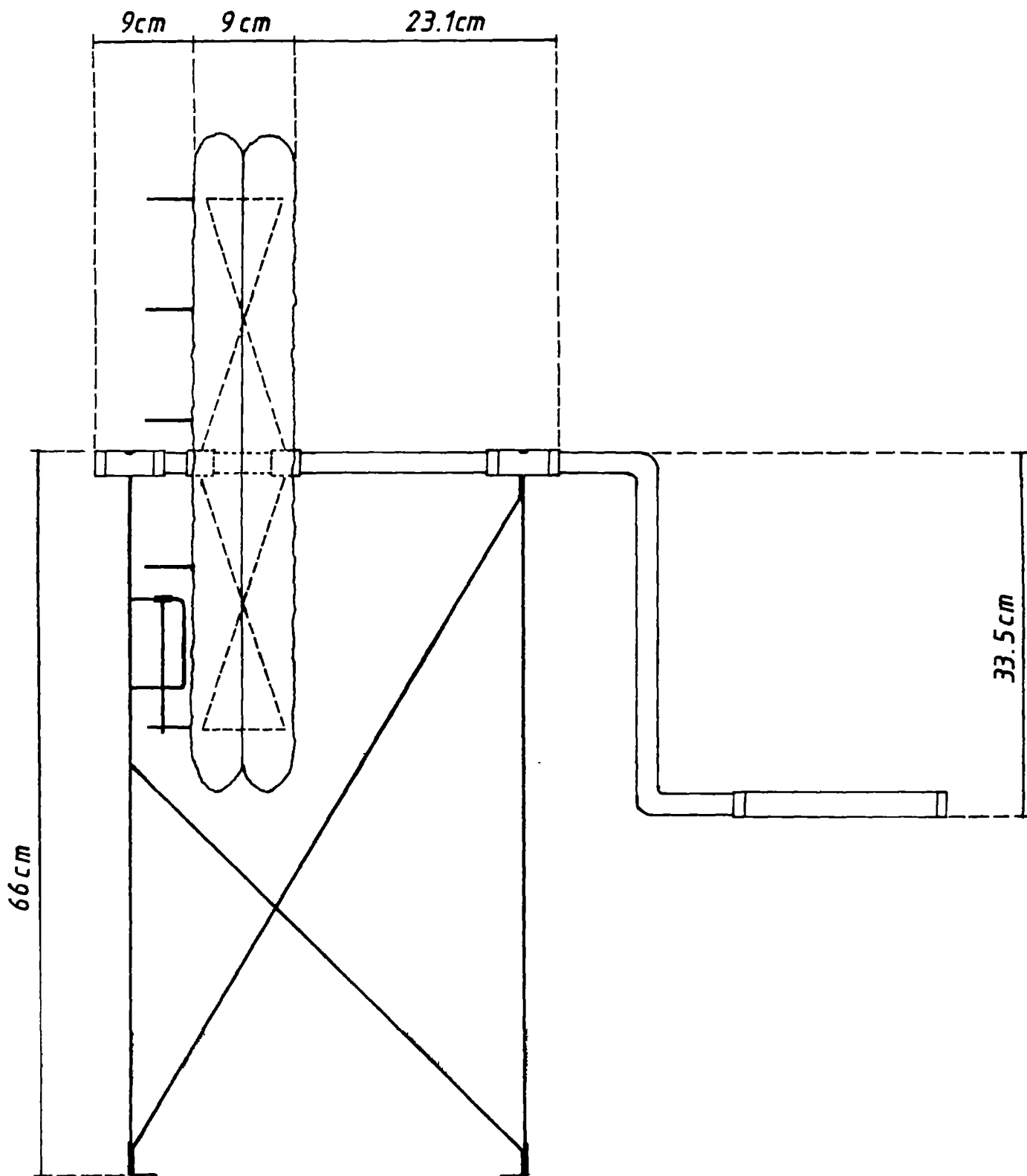














C.a. THE CRANK

MATERIALS FOR CRANK PRODUCTION

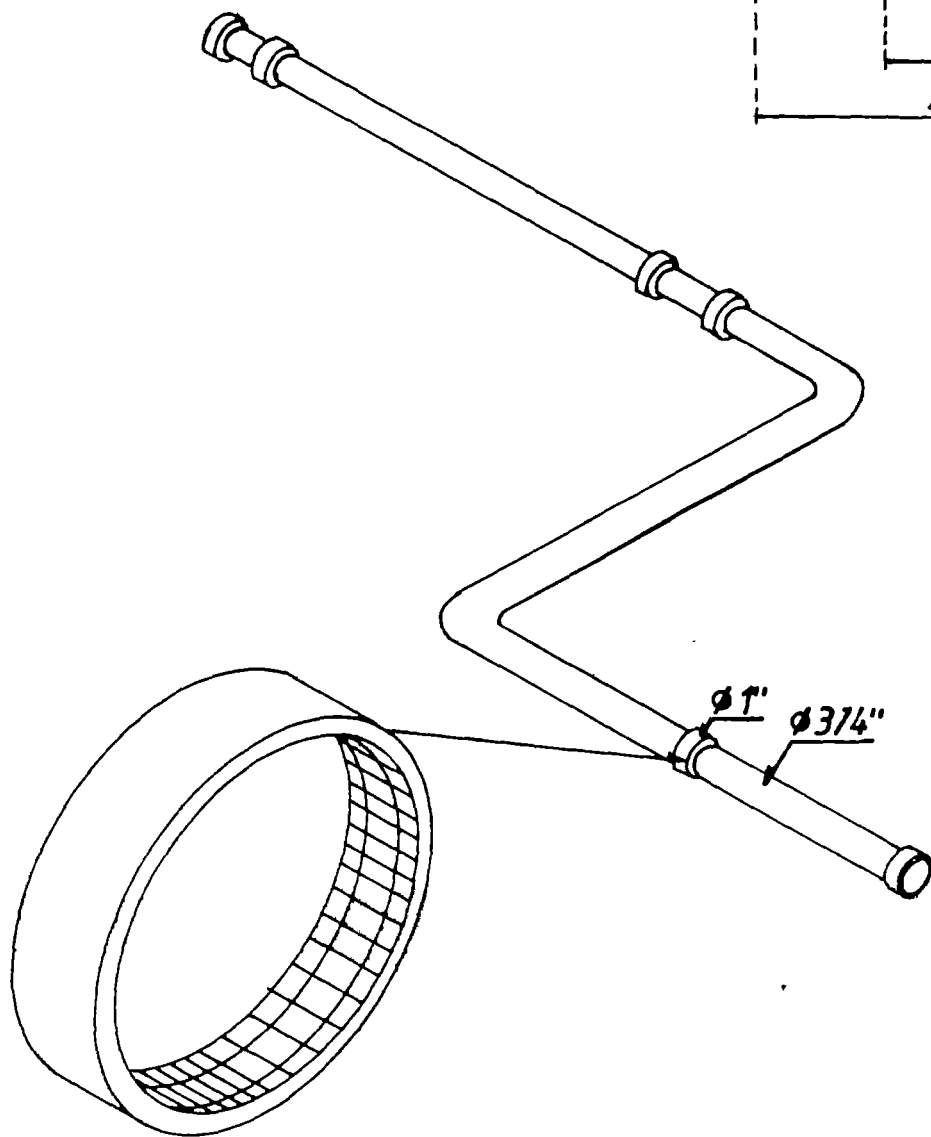
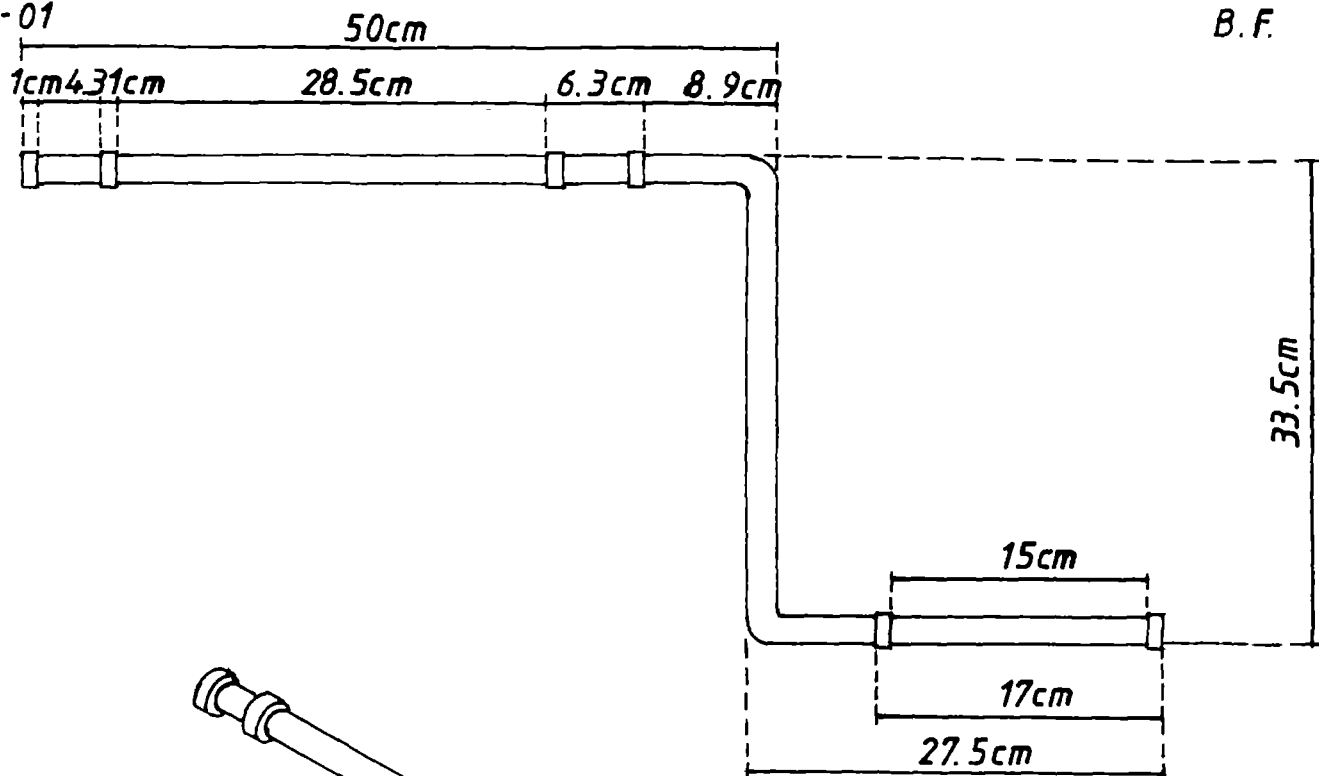
| Amount | Materials | Measures | Section |
|--------|------------------|----------------|---------|
| 1 | Black pipe | 3/4" x 100 cm. | Shaft |
| 1 | Galvanized pipe | 1" x 15 cm | Roller |
| 2 | Galvanized pipes | 1" x 1 cm | Spacers |

- 0 - 37 meter deep pumps used one crank.
- Pumps for 37 - 50 meter deep wells are special; they use wooden bearings and a double crank system.

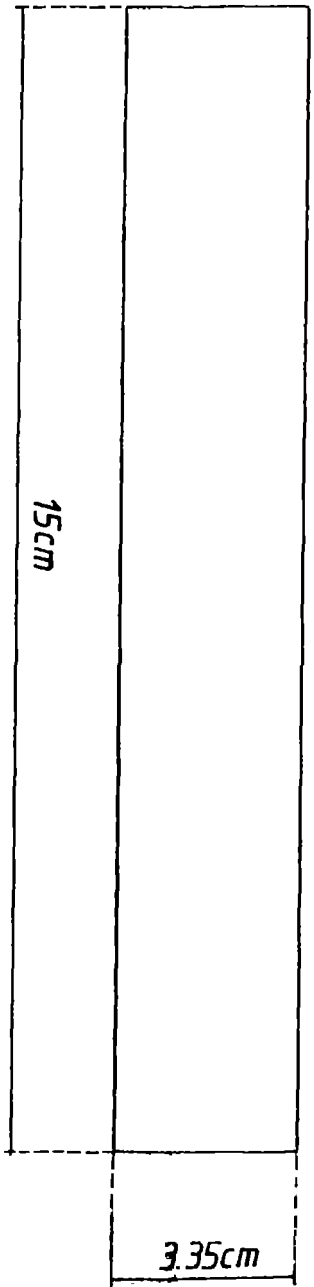
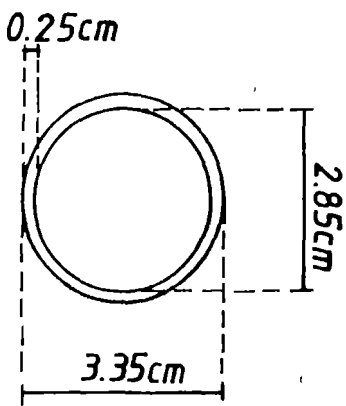
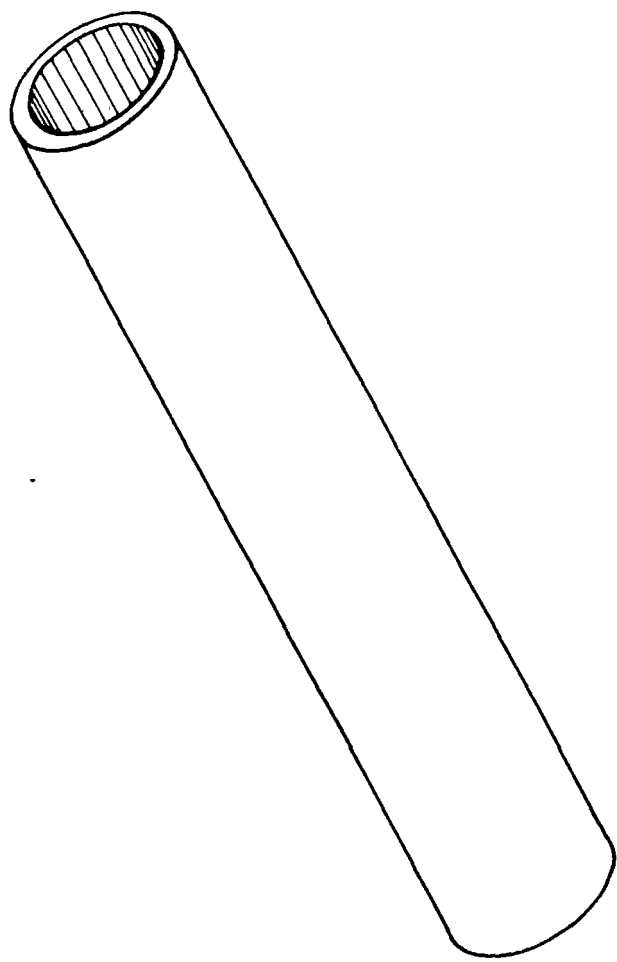


C-a-01

B.F.







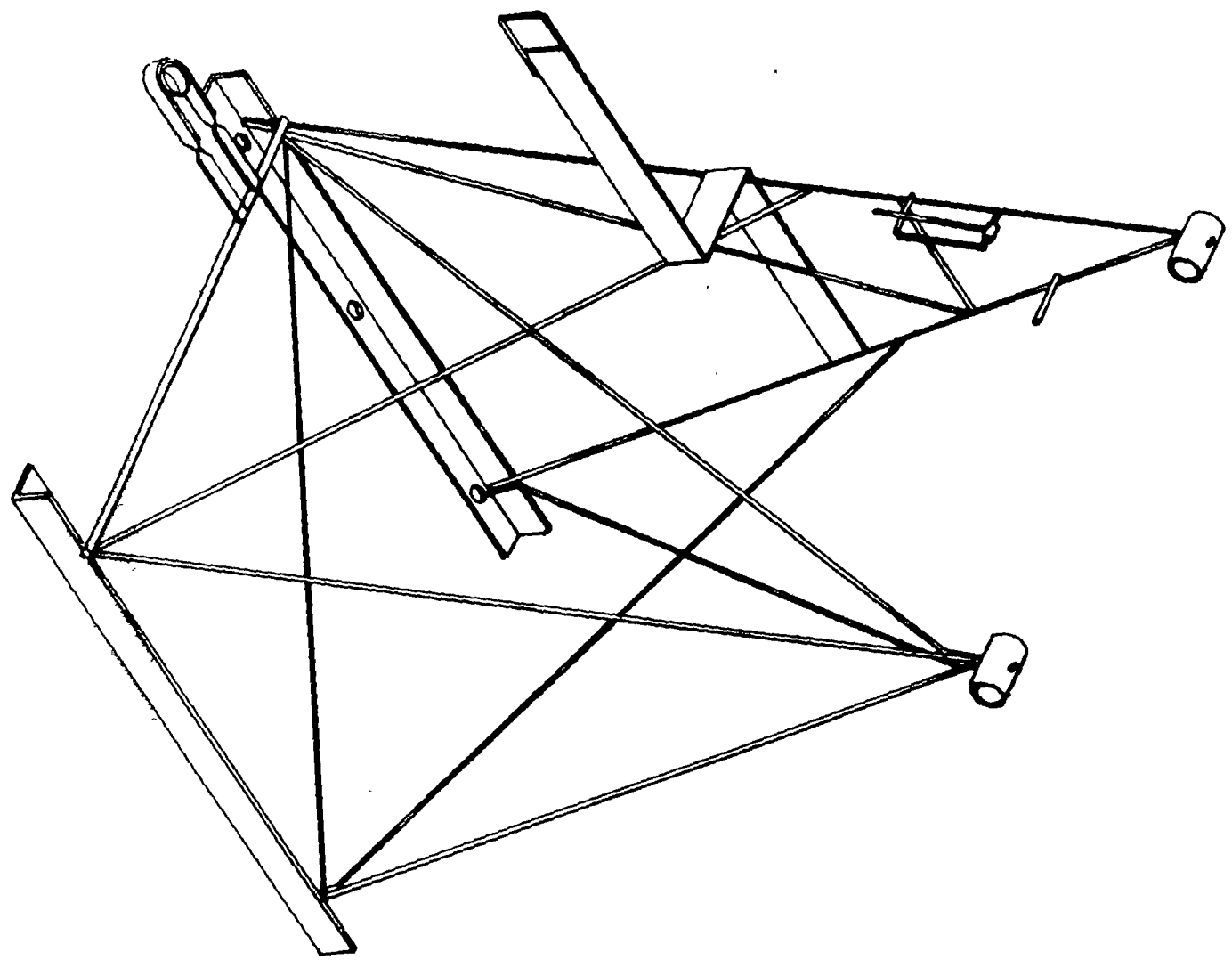


C.b. LEG ASSEMBLY

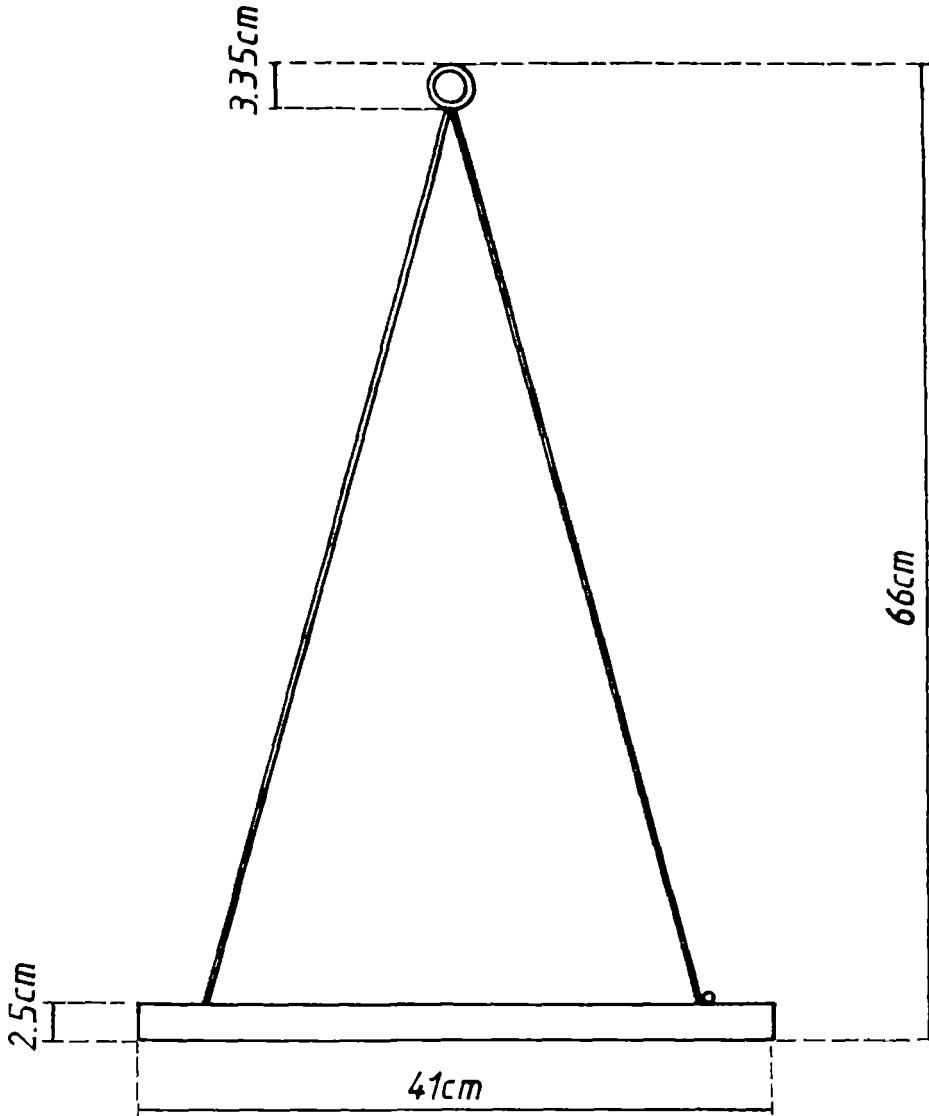
LIST OF MATERIALS

| Amount | Materials | Measures | Section |
|--------|-----------------|--------------|----------------------|
| 4 | Corrugated rods | 3/8 x 66 cm | Legs |
| 1 | Corrugated rod | 3/8" x 10 cm | Horizontal cross bar |
| 2 | Pipes | 1" x 4.3cm | Bushing |
| 4 | Pipes | 1" x 1 cm | Spacers |

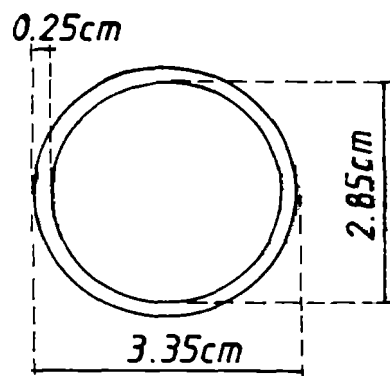
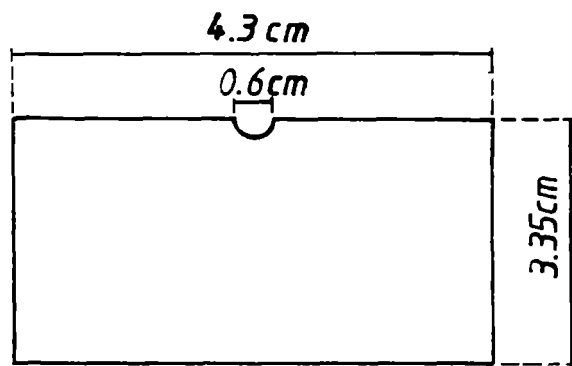
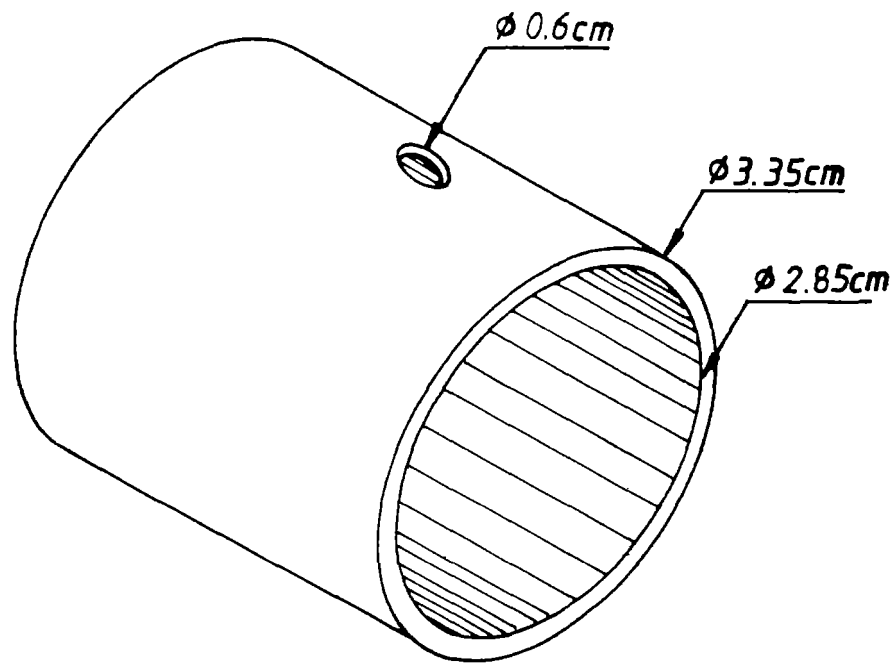
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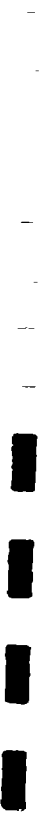


B.F.





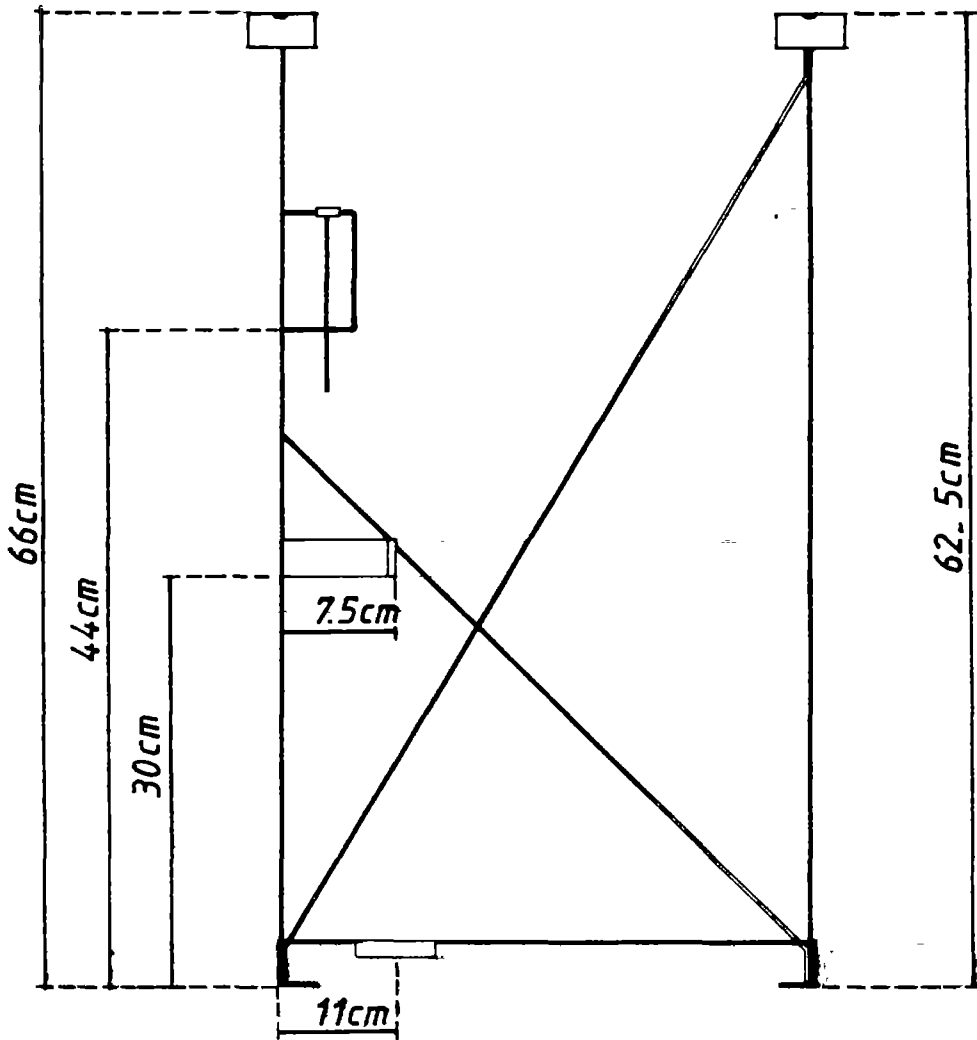




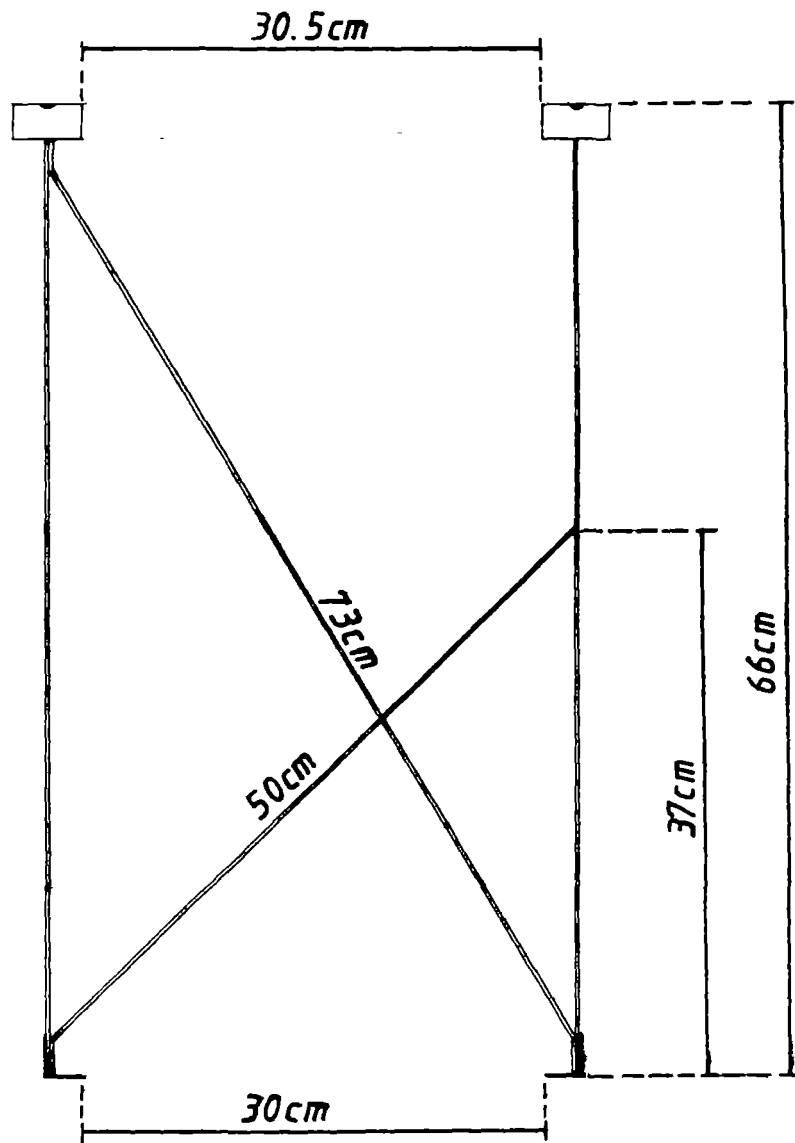
C.c. LEG REINFORCEMENT

LIST OF MATERIALS

| Amount | Materials | Measures | Section |
|--------|------------|--------------|-----------|
| 1 | Smooth rod | 1/4" x 73 cm | Cross bar |
| 1 | Smooth rod | 3/8" x 73 cm | Cross bar |
| 2 | Smooth rod | 1/4" x 50 cm | Cross bar |









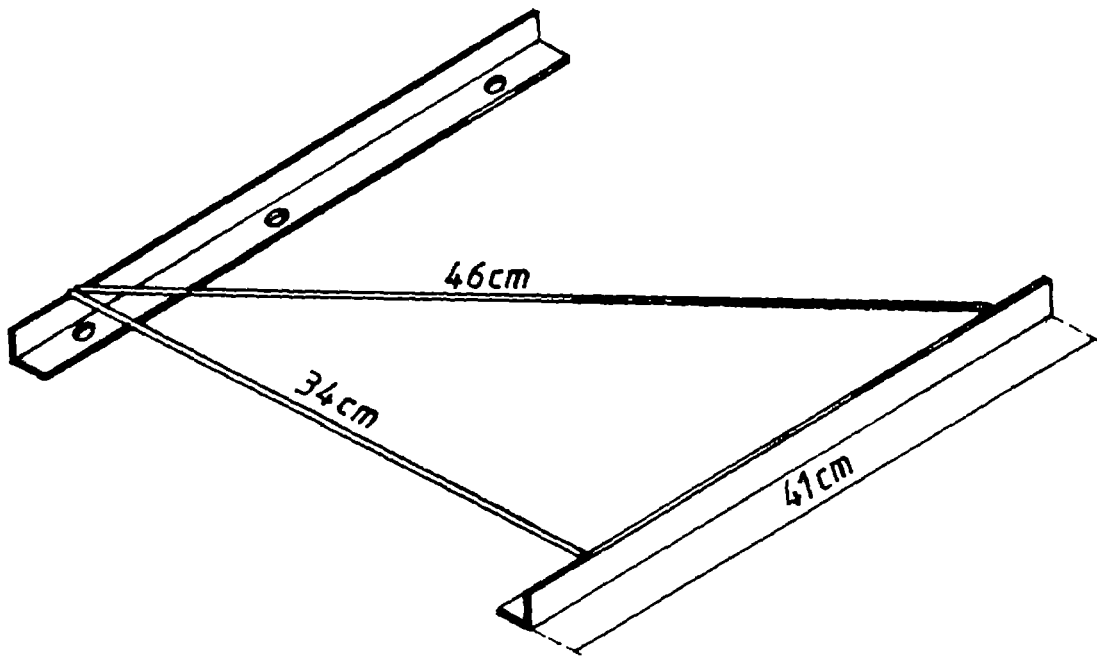
C.d. ANGULARES BASE.

LISTA DE MATERIALES.

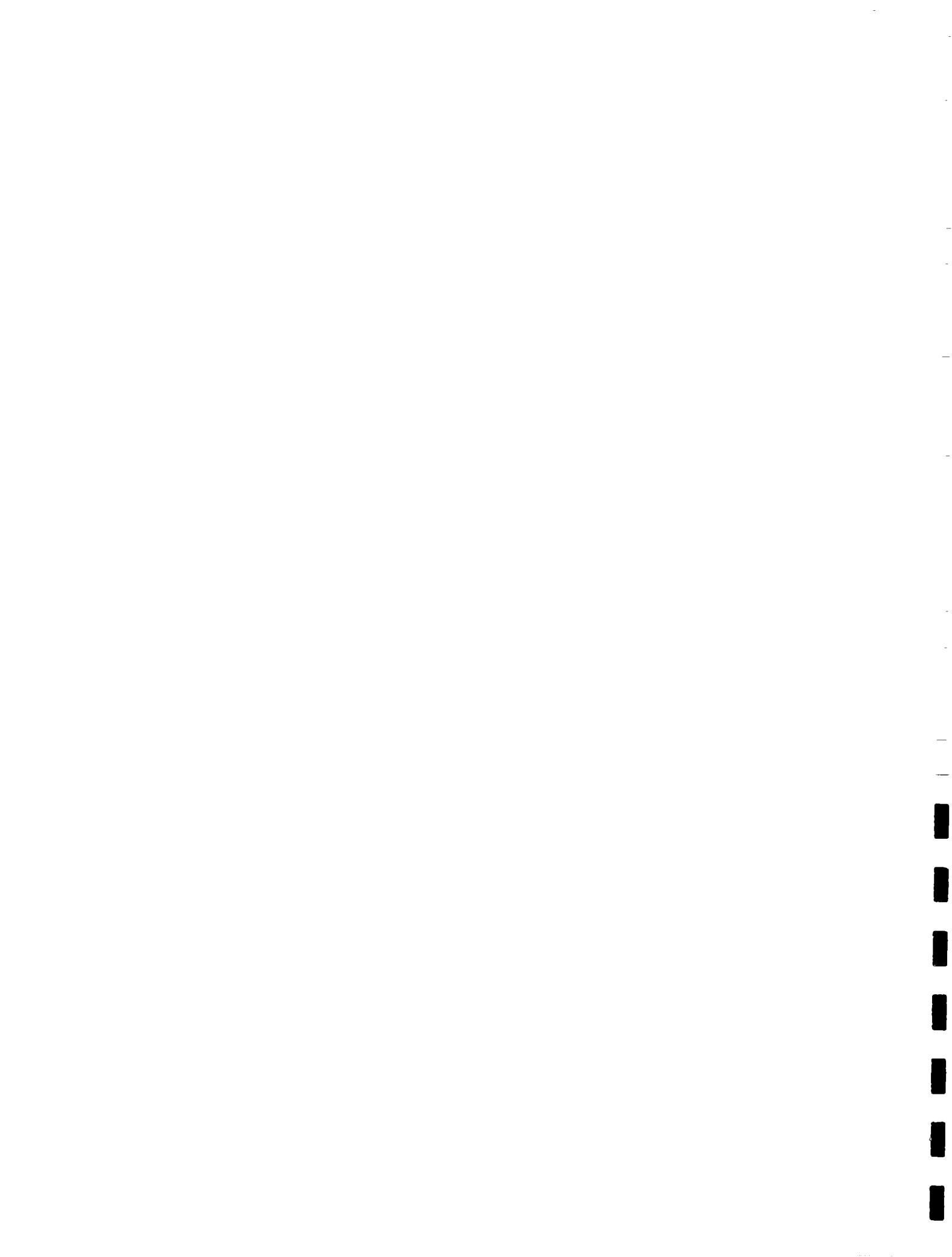
| Cantidad | Material | Medida | Sección |
|----------|-------------------|-----------------|--------------|
| 2 | Angulares | 1/8 x 1 x 41 cm | Angular Base |
| 1 | Varilla Corrugada | 1/4" x 46 cm | Refuerzo |
| 1 | Varilla Corrugada | 3/8" x 34 cm. | Refuerzo |

C-d-01

B.F.



1

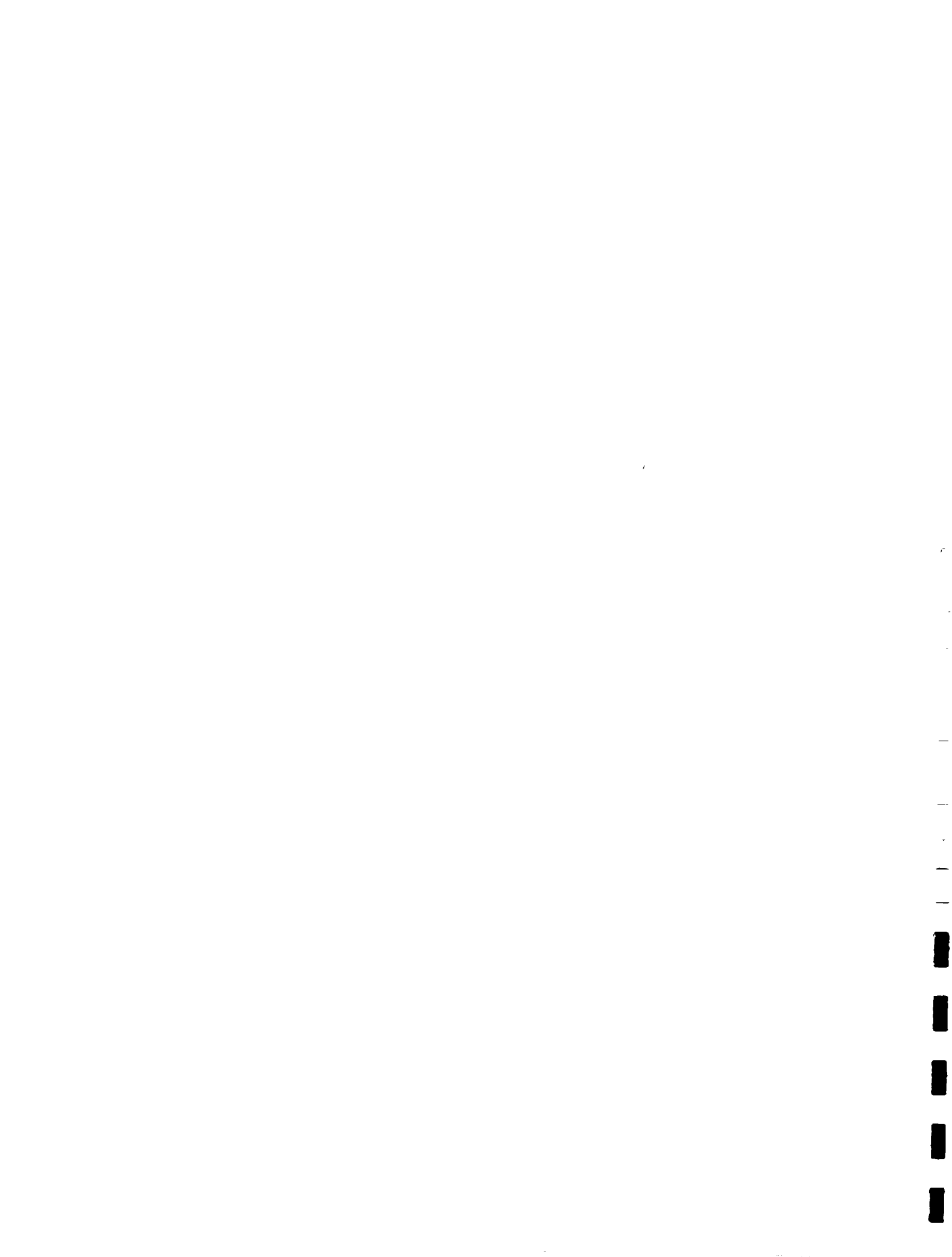


C.e. THE PULLEY WHEEL HUB

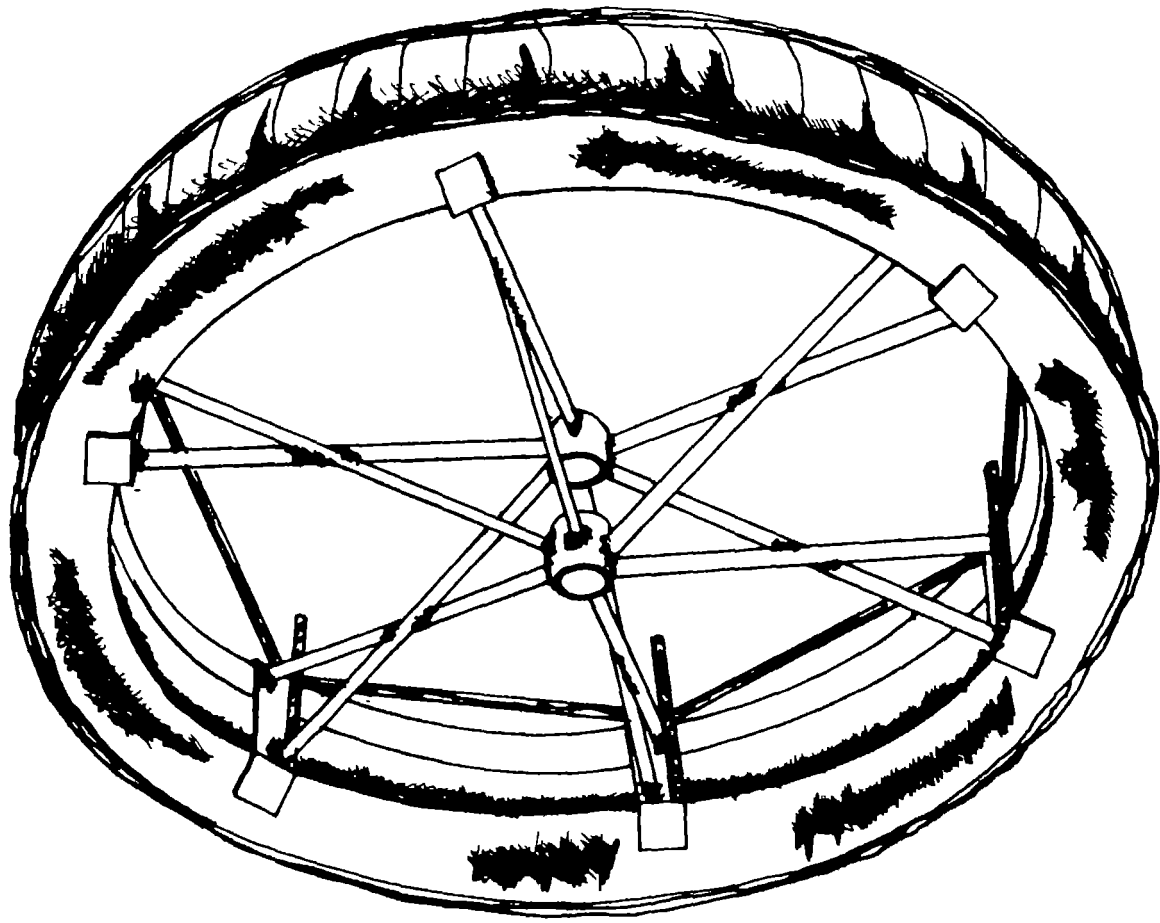
LIST OF MATERIALS

| Amount | Materials | Measures | Section |
|--------|---------------|------------------|--------------------|
| 12 | Smooth rods | 1/4" x 25 cm | Spokes |
| 6 | Smooth rods | 1/4" x 25 cm | Reinforcement bars |
| 6 | Steel strips | 1/8" x 1"x 10 cm | Staples |
| 2 | Pipes | 1" x 2.5 cm | Bushings |
| 2 | Tire cuttings | Rim# 20" | Wheel |

- Tire cuttings rim # 16 are used for 29 to 50 meter deep wells with wooden bearings and a double crank system which should be installed as on drilled wells.

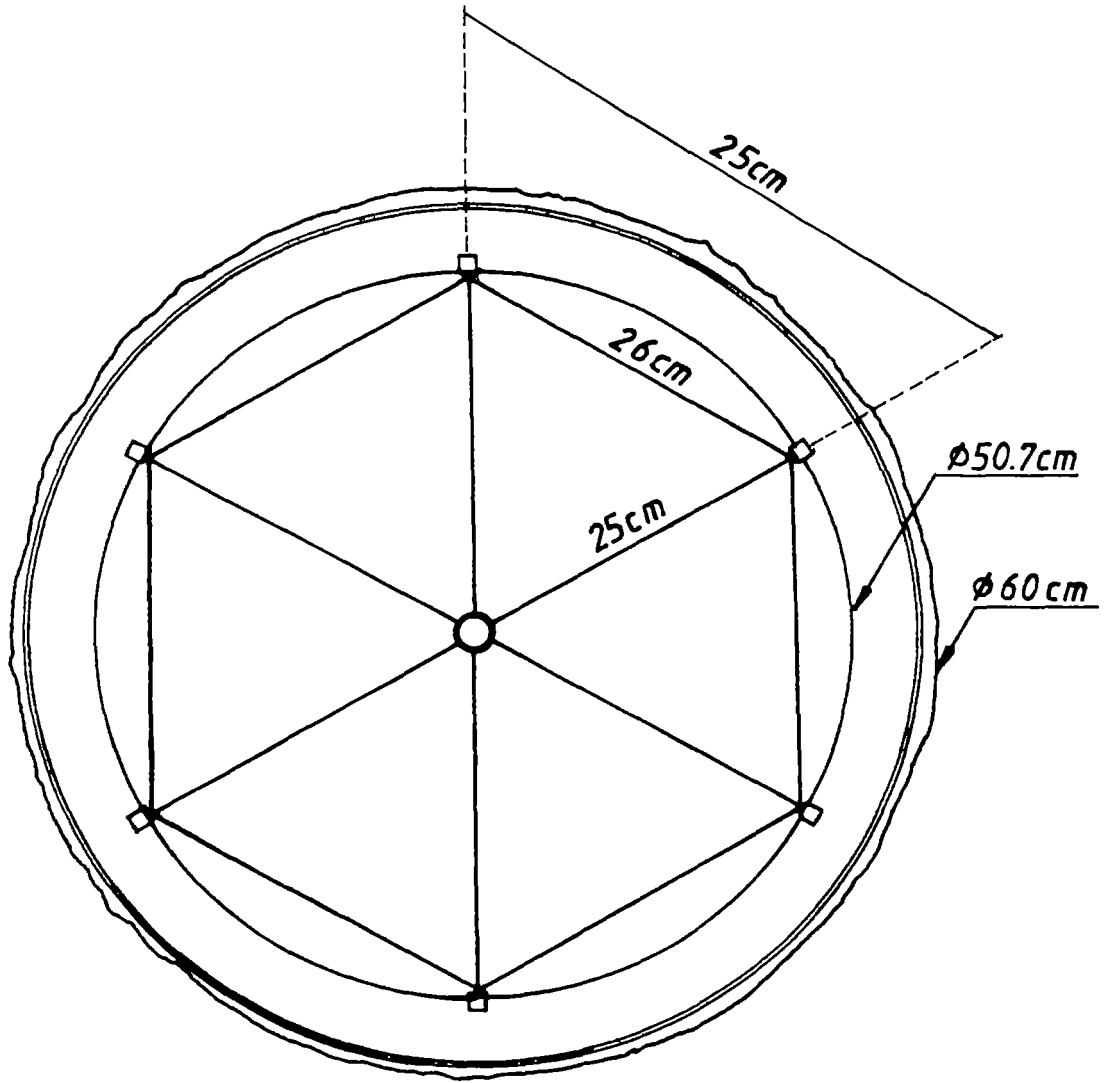


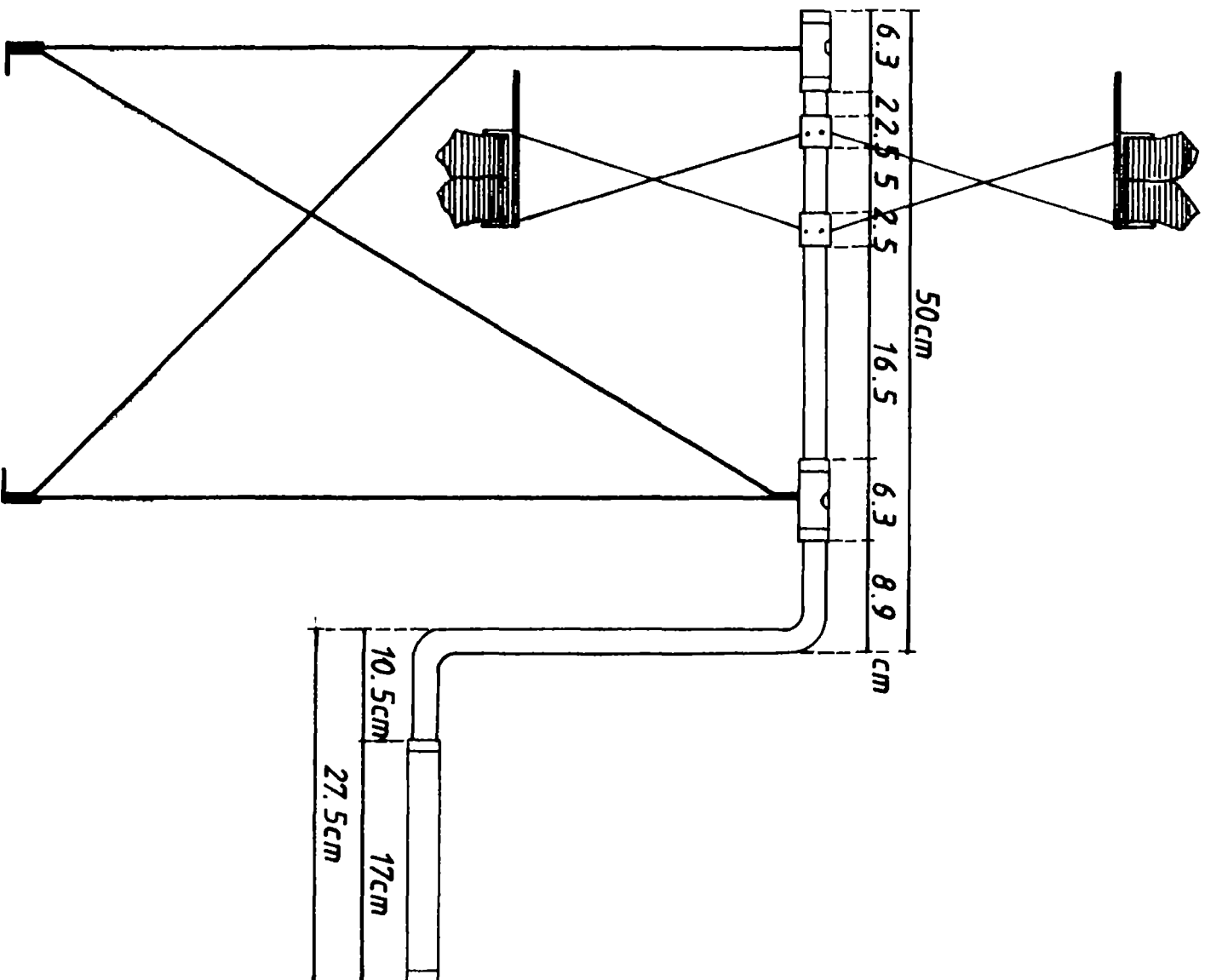
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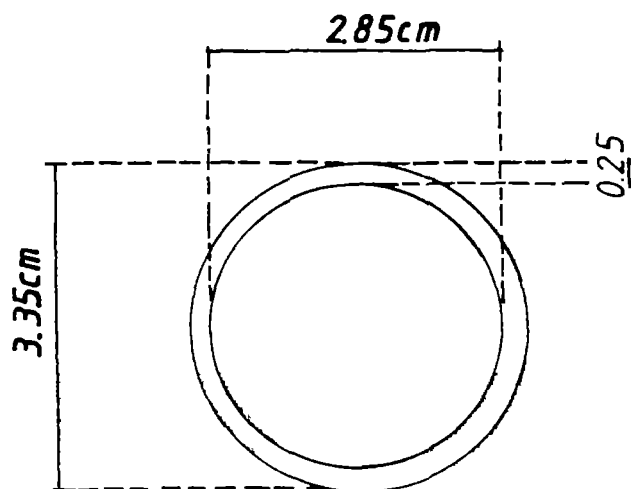
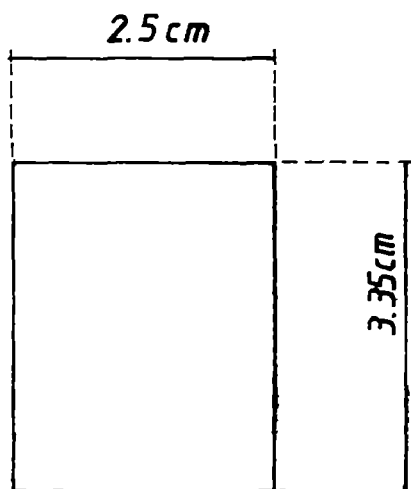
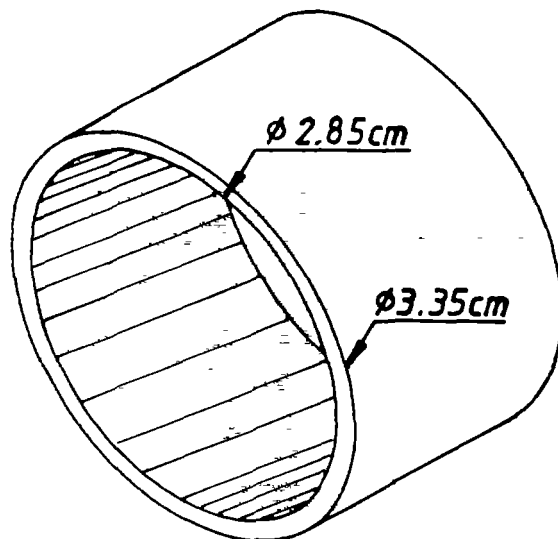


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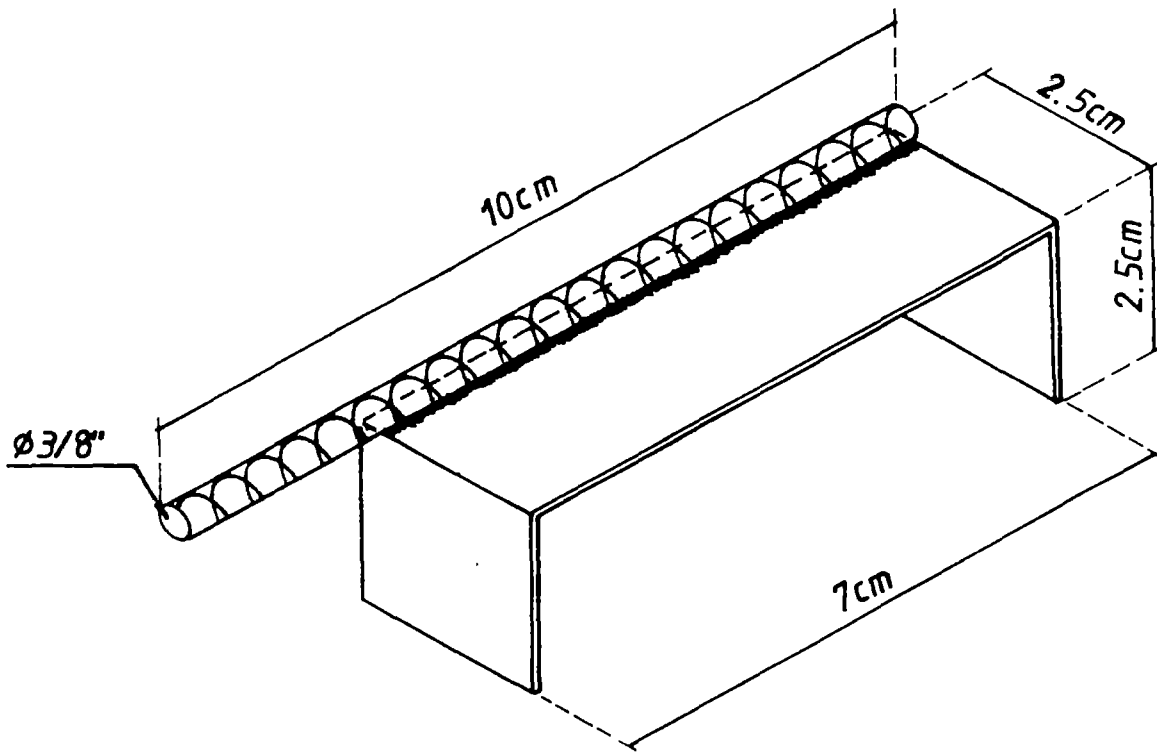






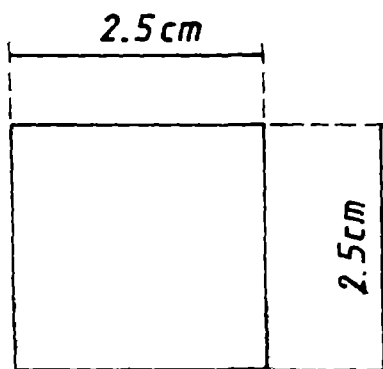
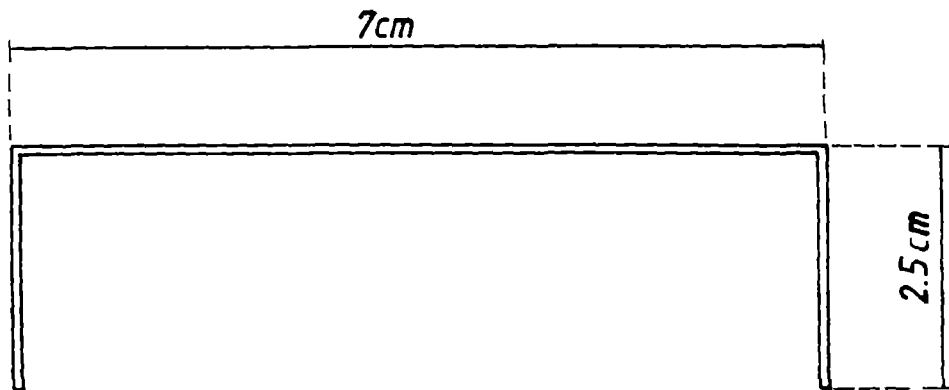
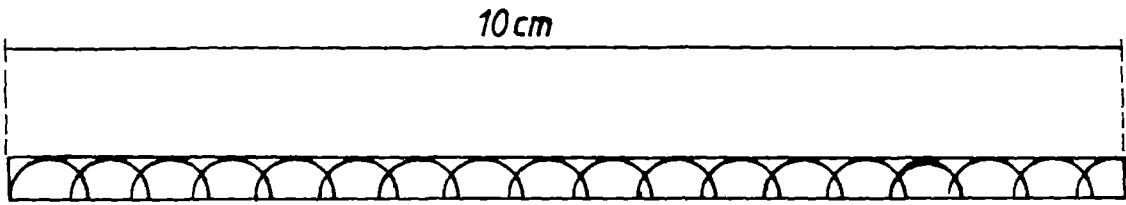
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B.F



C-e-06

B.F.

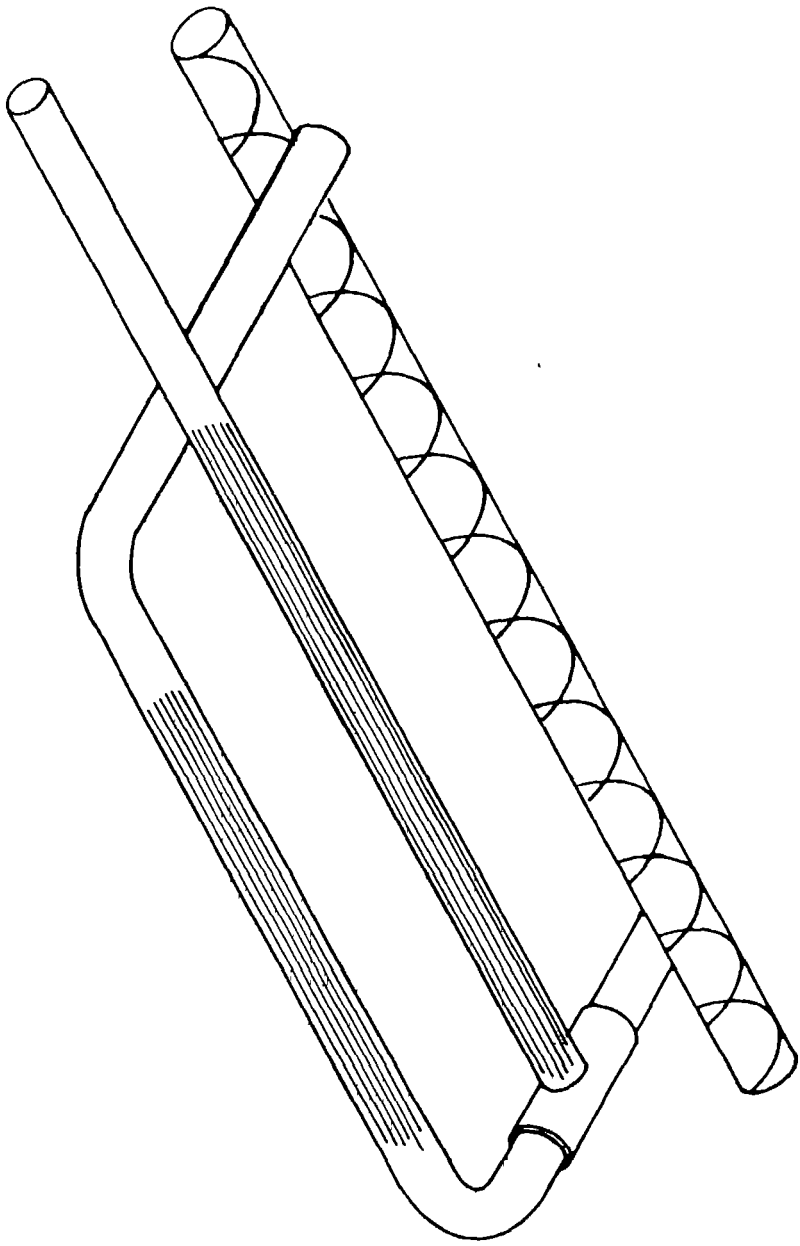


C.f. THE BRAKE SYSTEM

LIST OF MATERIALS

| Amount | Materials | Measures | Section |
|--------|-----------------|--------------|-------------------|
| 6 | Corrugated rods | 3/8" x 10 cm | For the stop pins |
| 1 | Corrugated rod | 3/8" x 15 cm | For brake |
| 1 | Corrugated rod | 3/8" x 10 cm | Lever |
| 1 | Pipe | 1/2" x 2 cm | Bushing |
| 1 | Smooth rod | 1/4" x 4 cm | Brake stop pin |

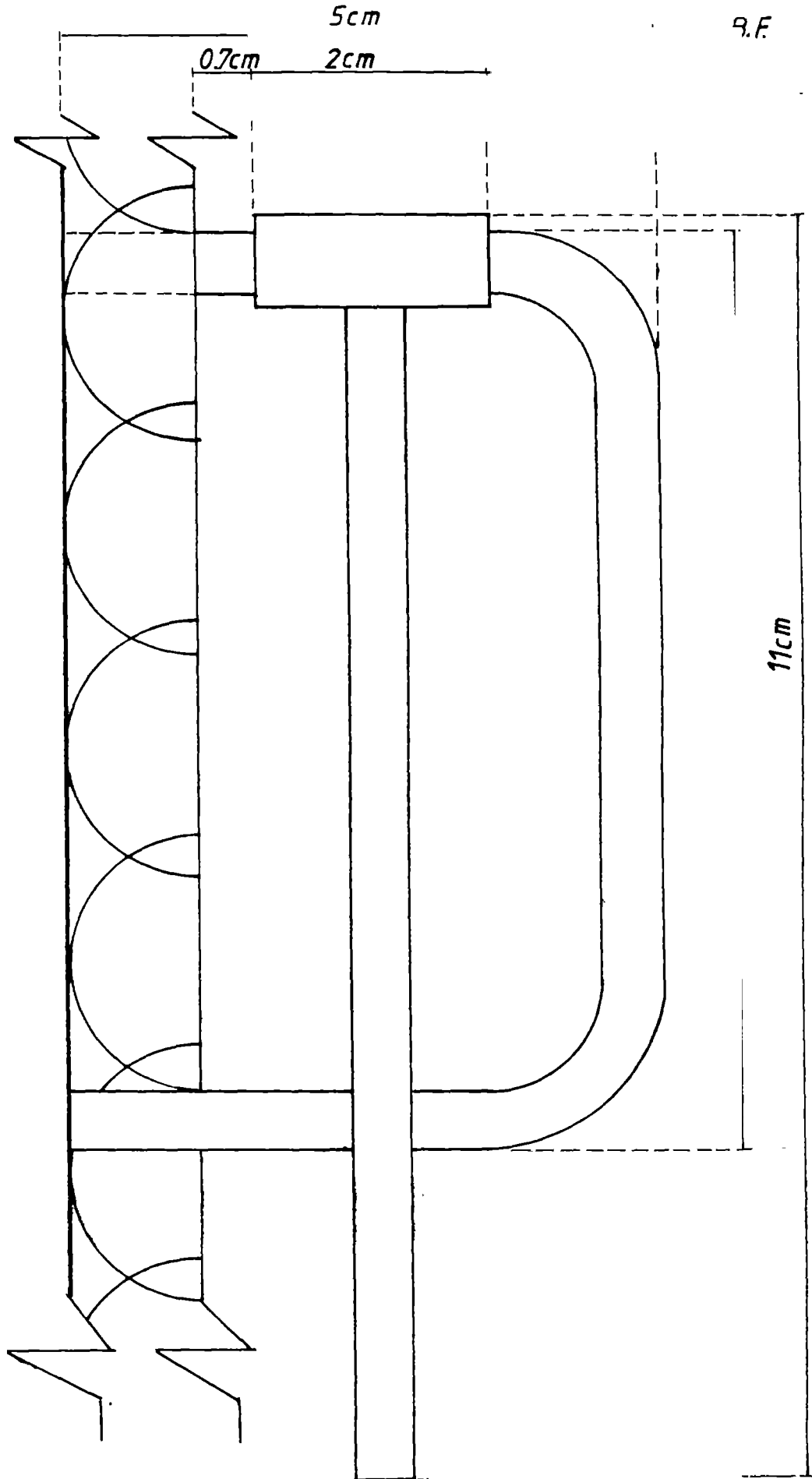
C-F-01



B.F.

C-f-02

9.F



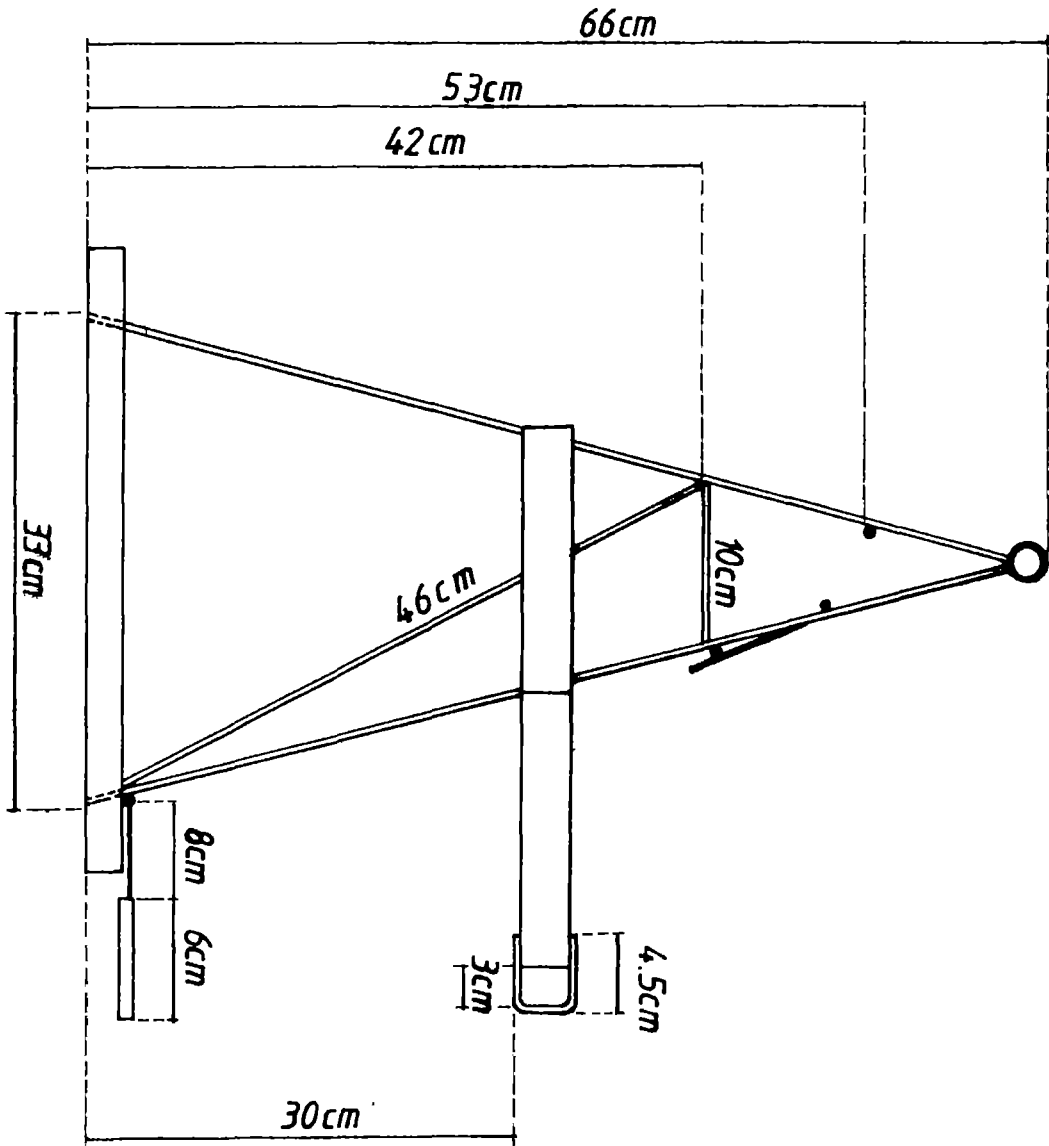


C.g. UPPER AND LOWER SUPPORTS

LIST OF MATERIALS

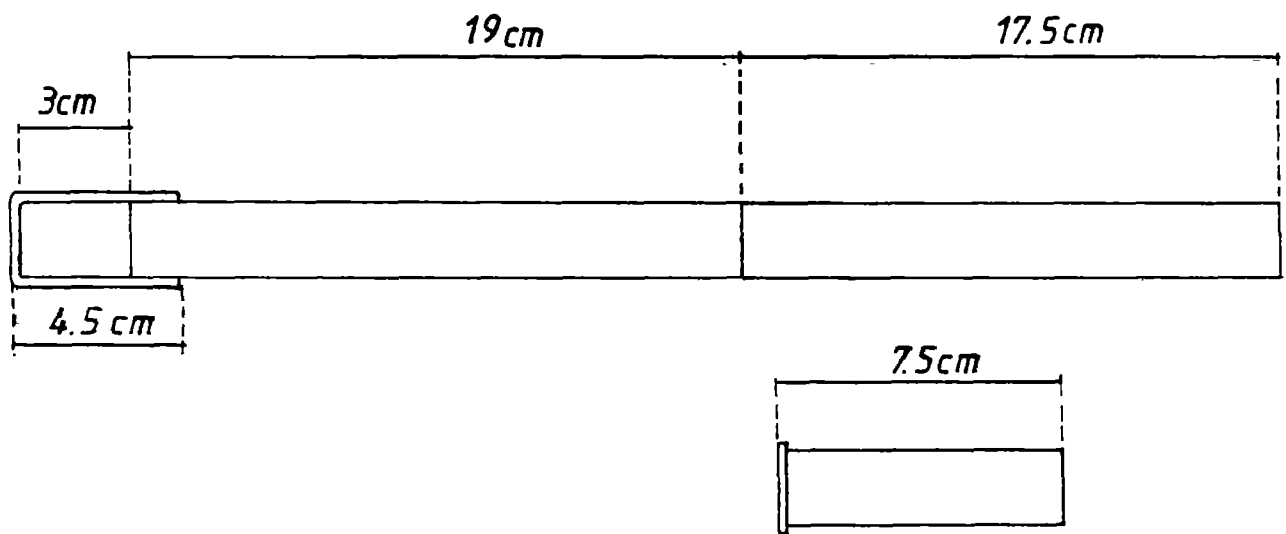
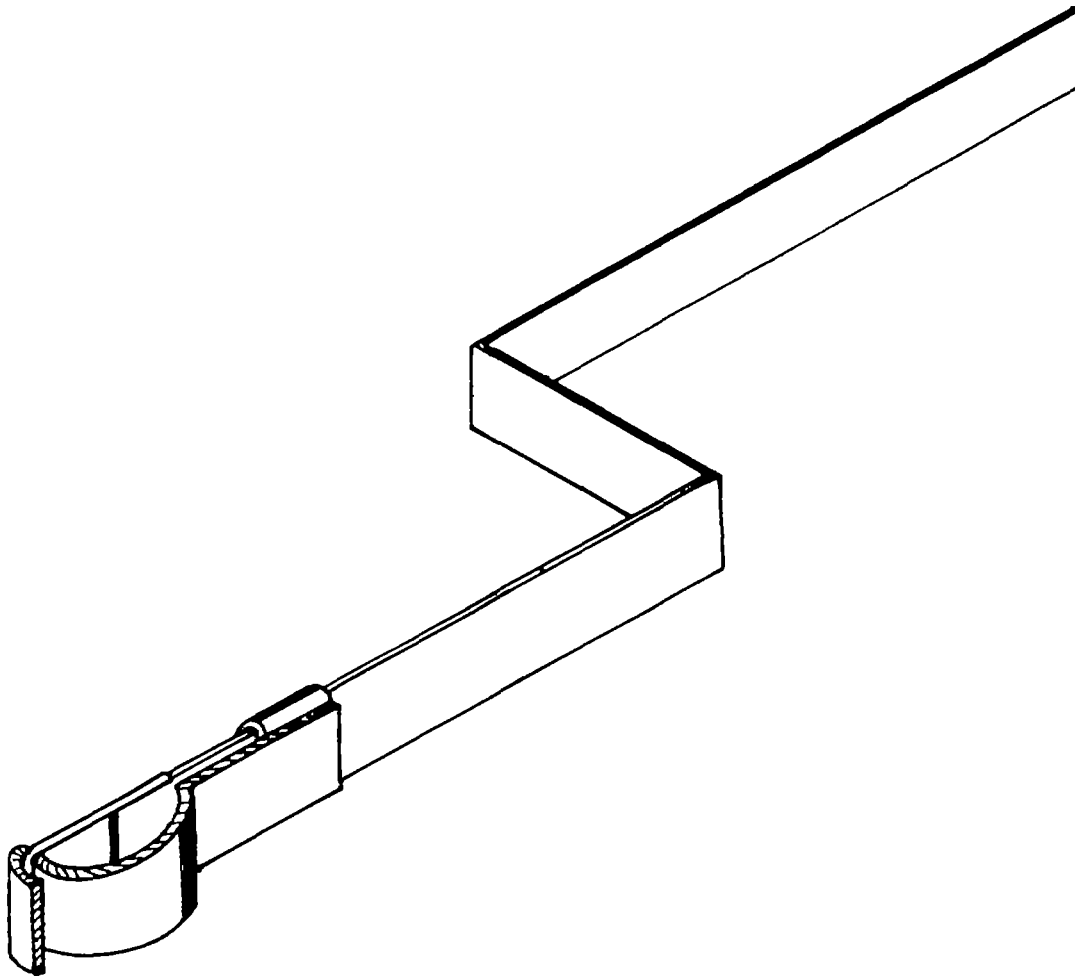
| Amount | Materials | Measures | Section |
|--------|-------------|--------------------|----------------------|
| 1 | Steel strip | 1/8" x 1" x 26 cm | Upper support |
| 1 | Smooth rod | 1/4" x 10 cm | Upper support clamps |
| 1 | Steel strip | 1/8" x 3/4"x 25 cm | Clamps |
| 1 | Steel strip | 1/8" x 3/4" x 6 cm | Clamp holders |
| 1 | Steel strip | 1/8" x 1" x 30 cm | Lower supports |
| 1 | Black pipe | 1 1/4" x 2.5 cm | For pumping pipe |

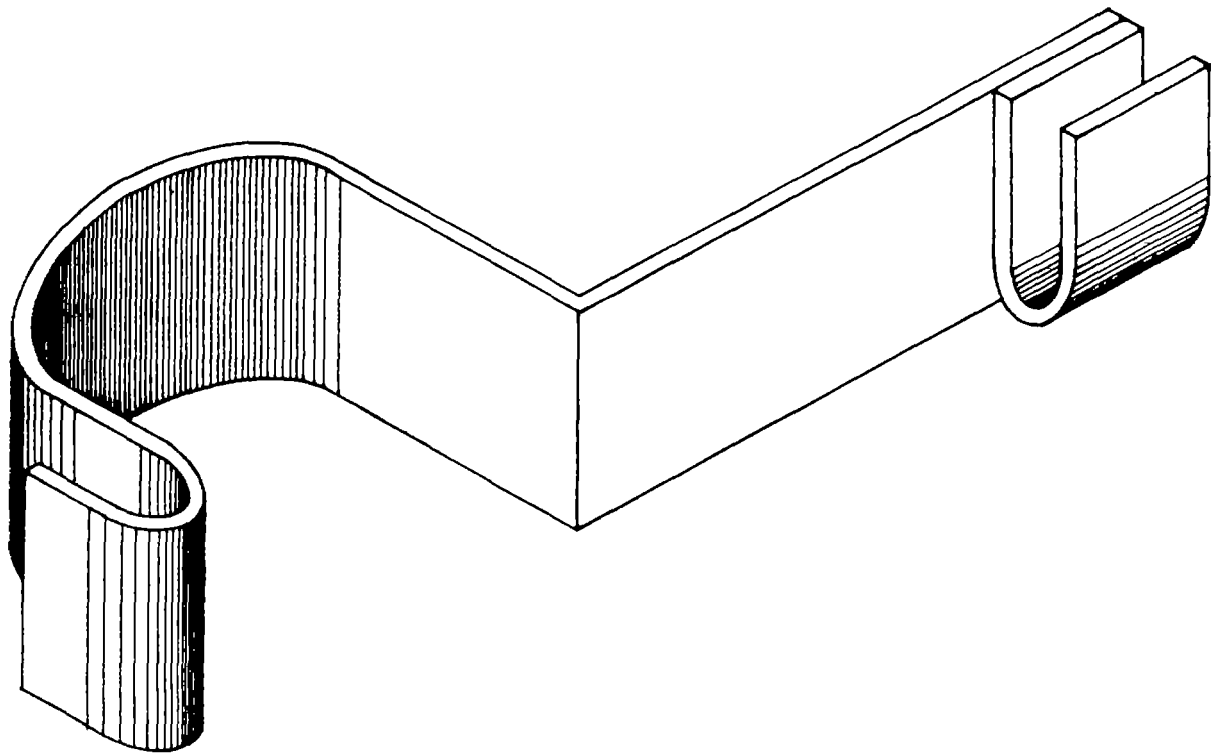
- The family well pump has an upper and a lower support which keep pipes in place.
- Nipple diameter varies with well depth. Three different size clamps are used for the upper support: 2" (0 - 11 meters), 1 1/2" (11 - 19 meters) and 1" (19 - 50 meters). They correspond to the PVC pipe nominal diameter.
- The centre of the lower support for the pumping pipe has a nominal diameter of 1 1/4"



C-g-02

B.F.

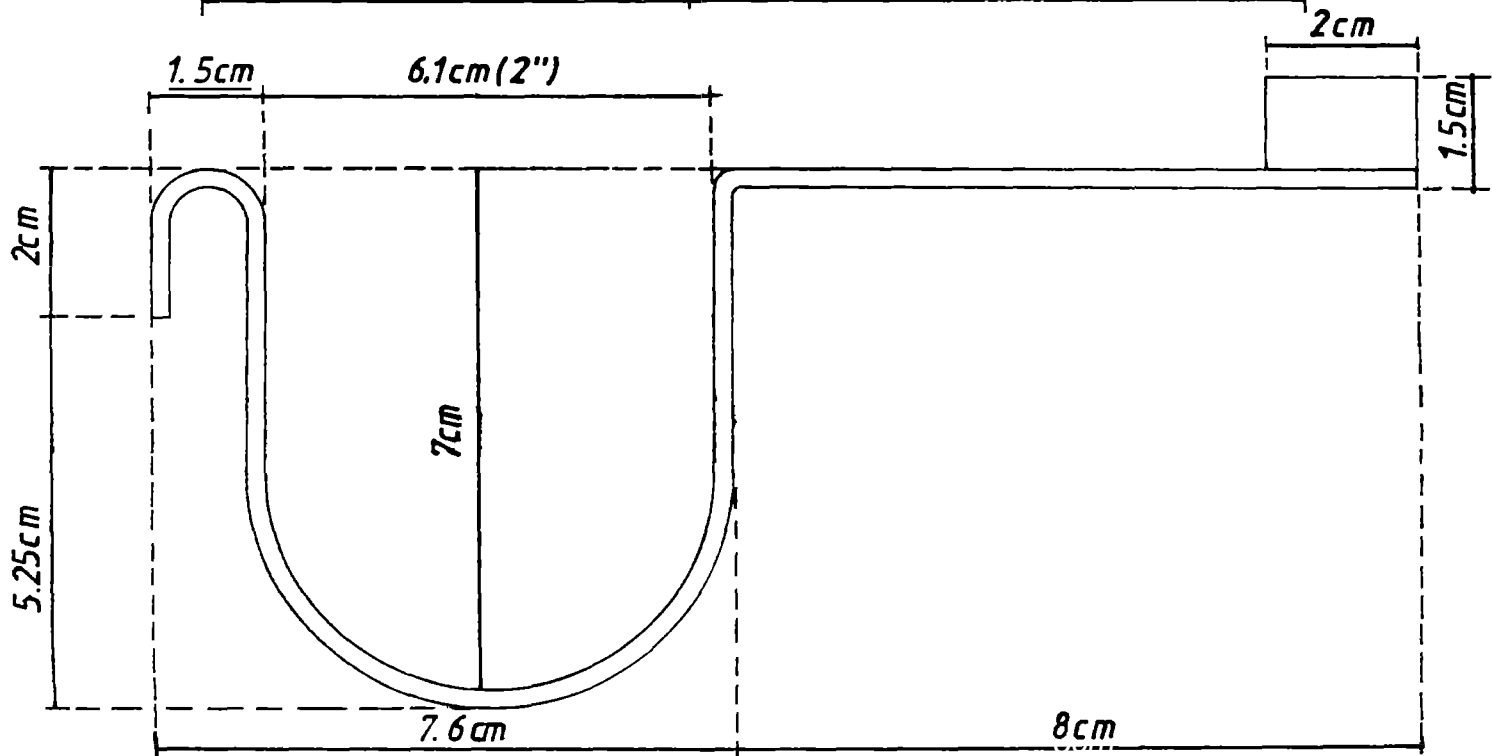
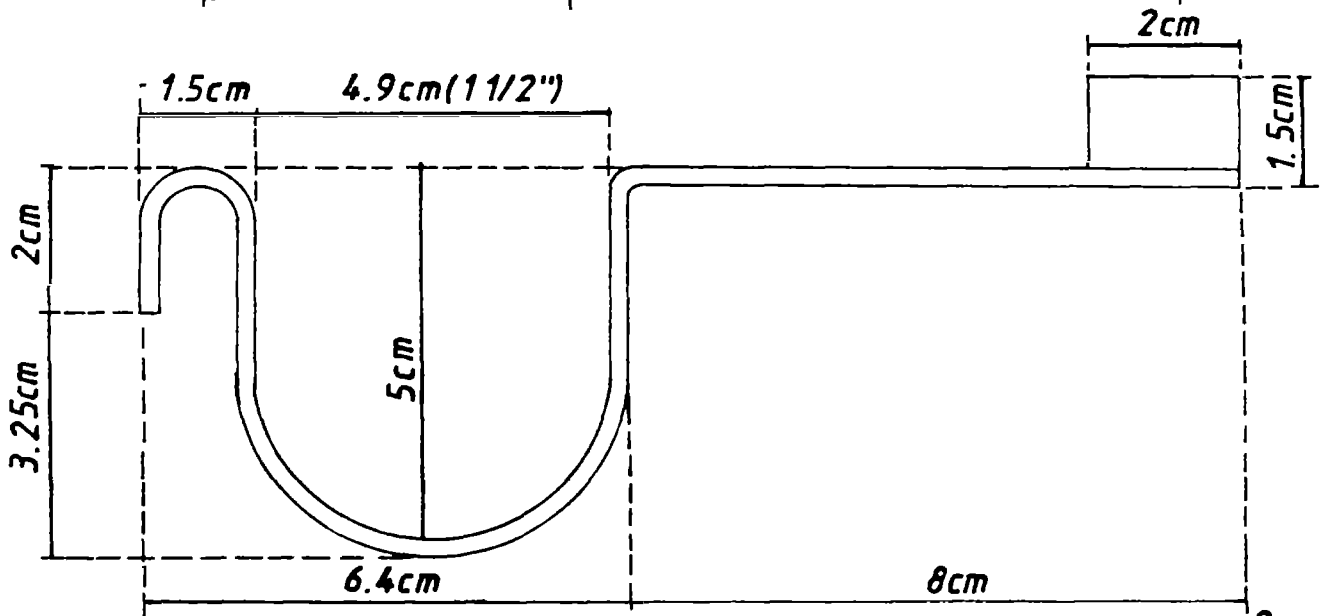
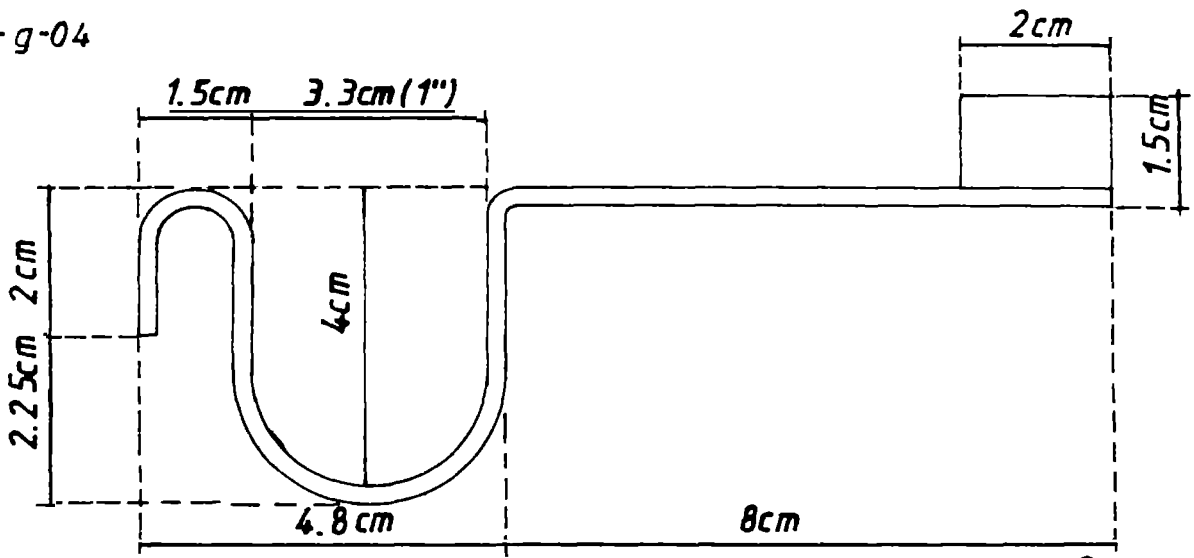




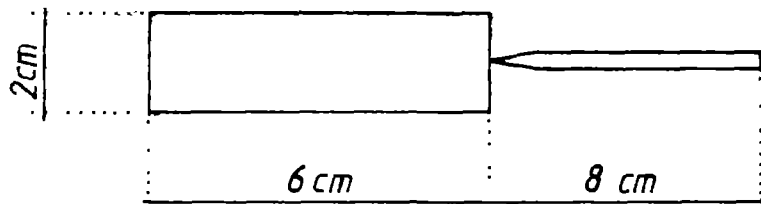
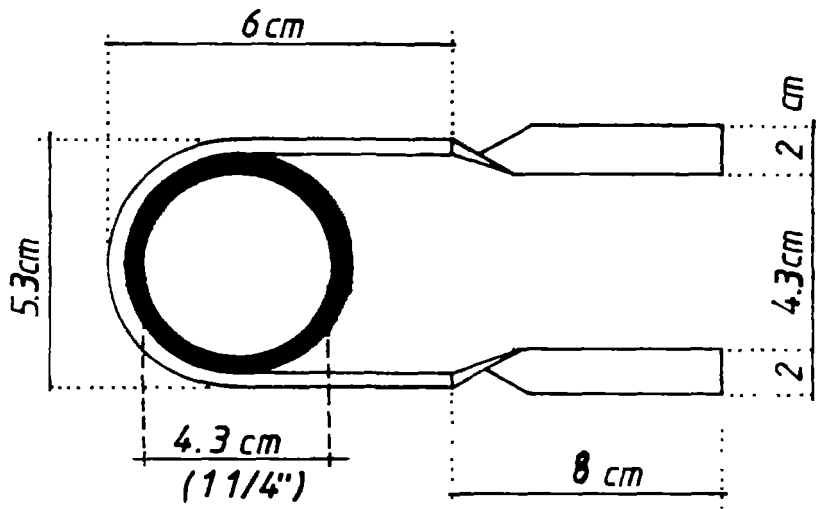
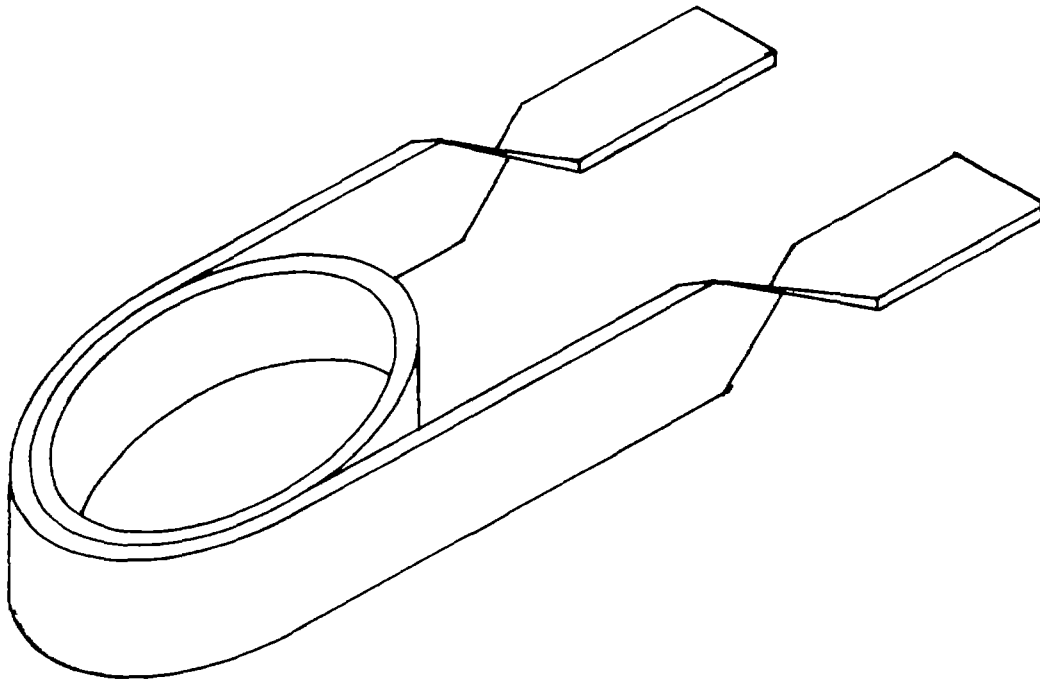


C-g-04

B.F









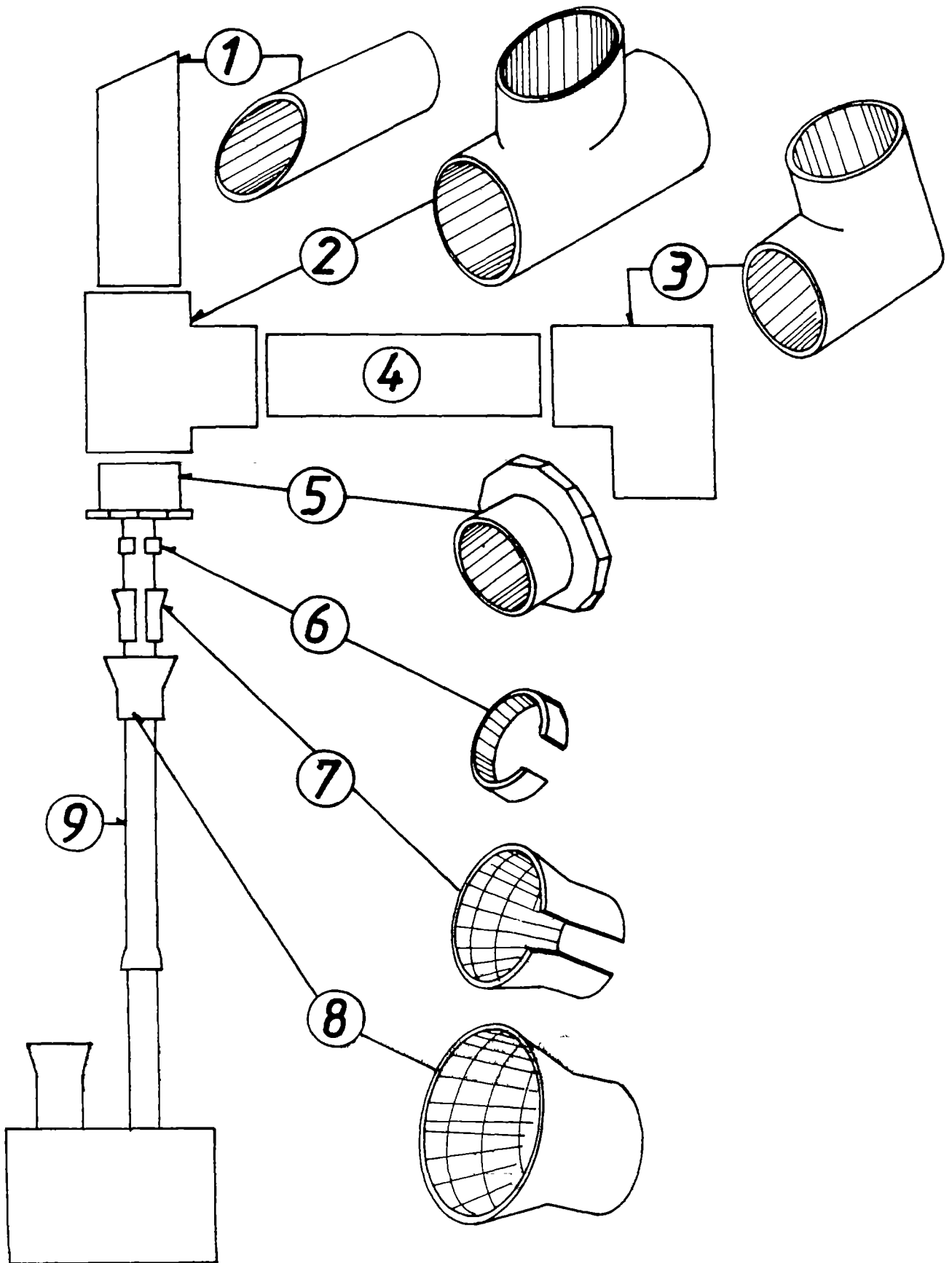
D. INSTALLATION ACCESORIES

ROPE PUMP INSTALLATION (0 - 11 meter deep)

INSTALLATION ACCESORIES

| No. | Accessories | Unit | DEPTH |
|-----|------------------|--------|---------------|
| | | | 0 - 11 meters |
| 1 | Nipple | Inches | 2 " |
| 2 | Tee | Inches | 2 " |
| 3 | Discharge elbow | Inches | 2 " |
| 4 | Discharge pipe | Inches | 2 " |
| 5 | Reduction | Inches | 2 - 1 " |
| 6 | Primary wedge | Inches | 1 " |
| 7 | Secondary wedge | Inches | 1 " |
| 8 | Supporting wedge | Inches | 1 1/4 " |
| 9 | Pumping pipe | Inches | 1 " |

- Installation accessories vary according to well deep.
- The use of a concrete cover and drainage apron is recommended.

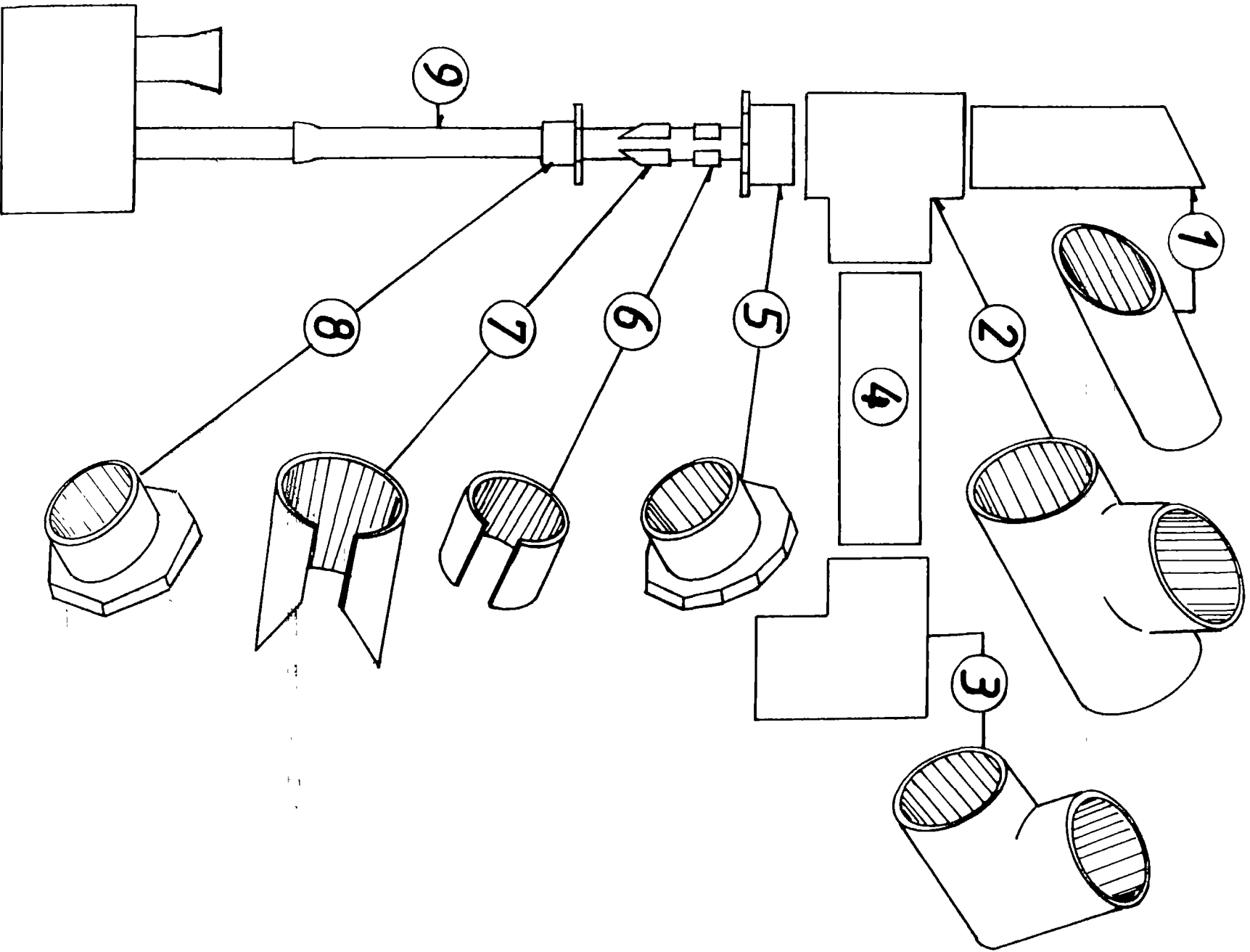


ROPE PUMP INSTALLATION
(19 - 50 meter deep)

INSTALLATION ACCESSORIES

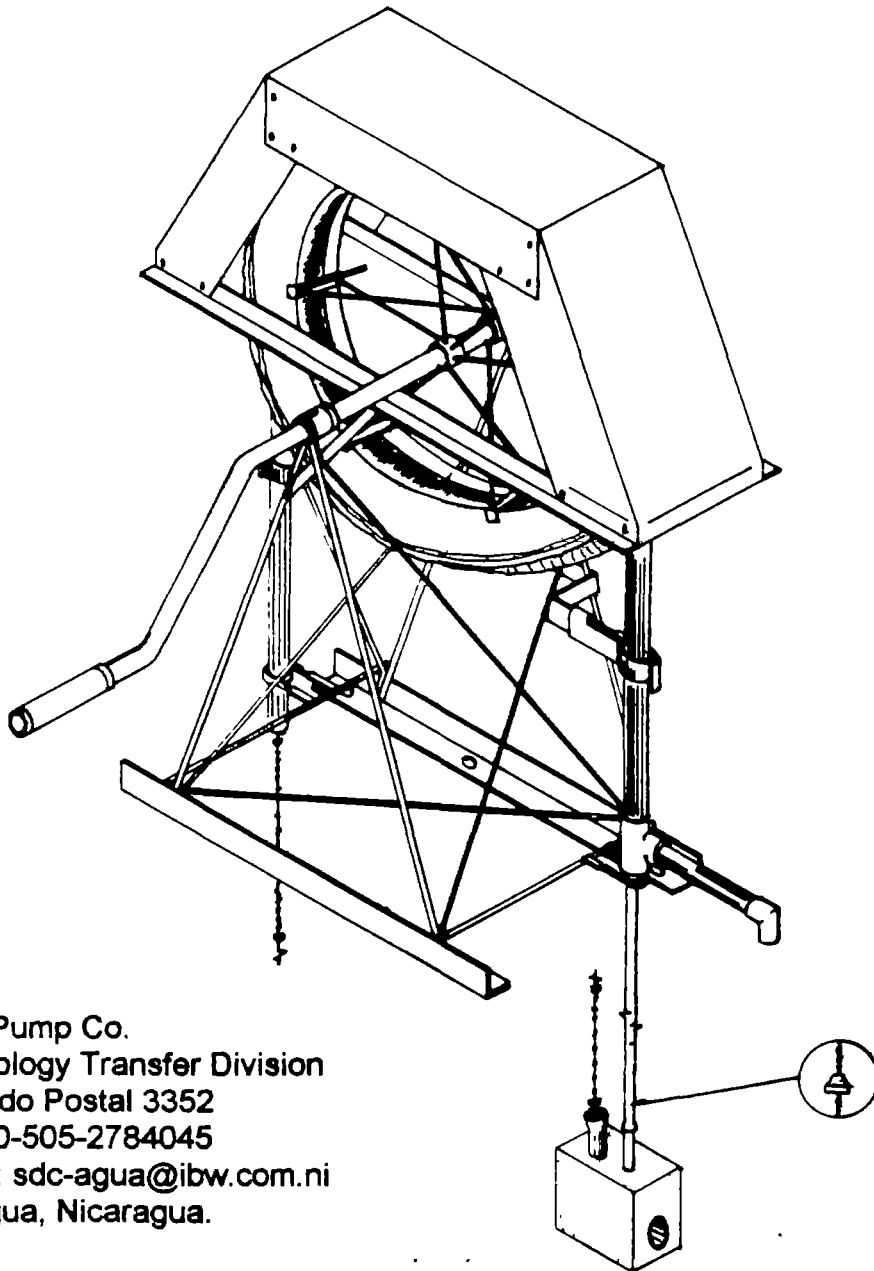
| No. | Accessories | Unit | DEPTH | |
|-----|-----------------|--------|----------------|----------------|
| | | | 11 - 19 meters | 19 - 50 meters |
| 1 | Nipple | Inches | 1 ½ " | 1 " |
| 2 | Tee | Inches | 1 ½ " | 1 " |
| 3 | Discharge elbow | Inches | 1 ½ " | 1 " |
| 4 | Discharge pipe | Inches | 1 ½ " | 1 " |
| 5 | Reduction | Inches | 1 ½ - ¾ " | 1 - ½ " |
| 6 | Primary wedge | Inches | ¾ " | ½ " |
| 7 | Secondary wedge | Inches | ¾ " | ½ " |
| 8 | Reduction | Inches | 1 ¼ - 1" | 1 ¼ - ¾ " |
| 9 | Pumping pipes | Inches | ¾ " | ½ " |

- Installation accessories vary according to well depth.
- Reduction number 8 is used to keep the pumping pipe in place in the lower support.
- The use of a concrete cover and drainage apron is recommended.



EXTRA-STRONG ROPE PUMP

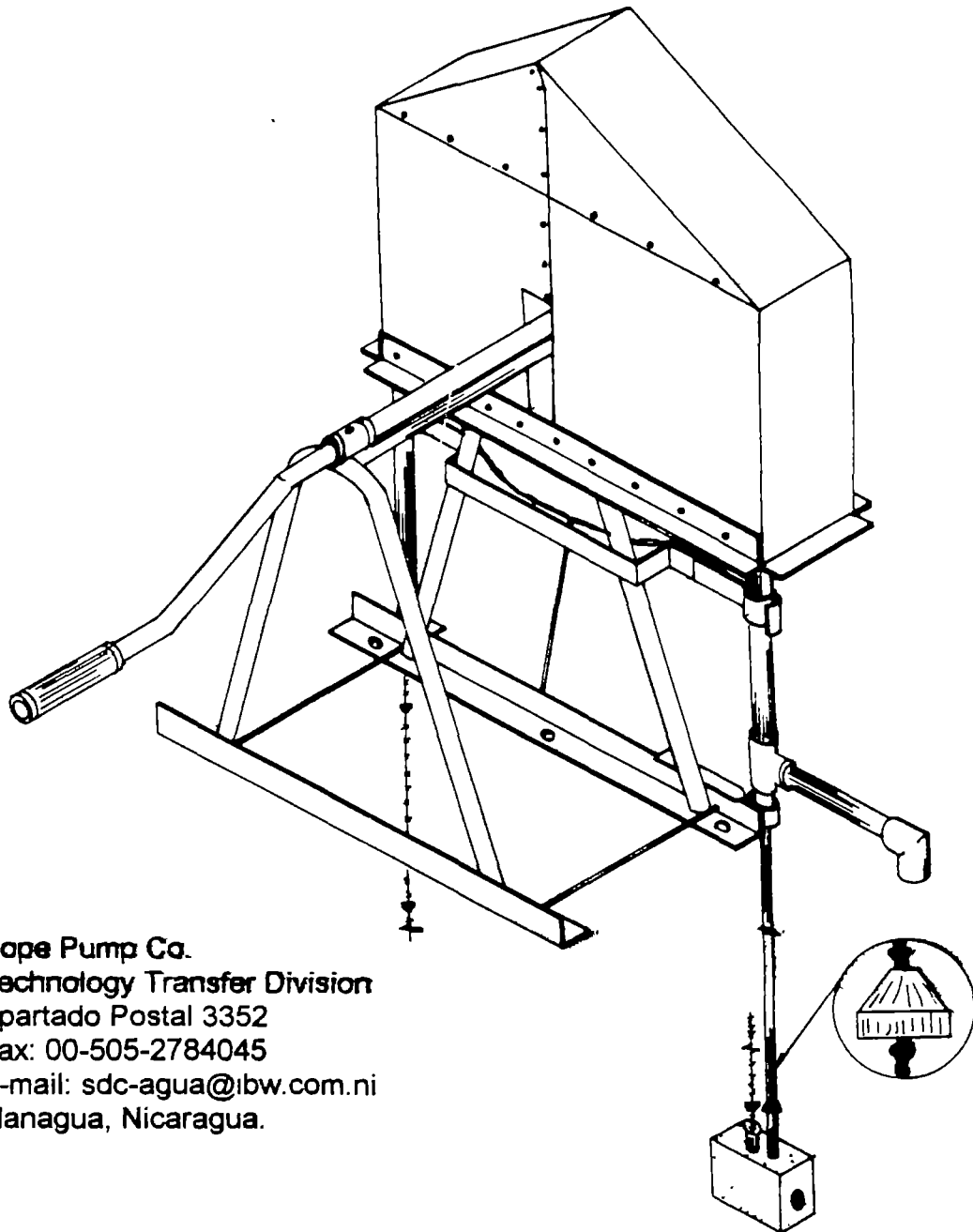
MANUAL OF TECHNICAL DRAWINGS



Rope Pump Co.
Technology Transfer Division
Apartado Postal 3352
Fax: 00-505-2784045
E-mail: sdc-agua@ibw.com.ni
Managua, Nicaragua.

COMMUNITY WELL ROPE PUMP

MANUAL OF TECHNICAL DRAWINGS



Rope Pump Co.
Technology Transfer Division
Apartado Postal 3352
Fax: 00-505-2784045
E-mail: sdcaqua@bw.com.ni
Managua, Nicaragua.



