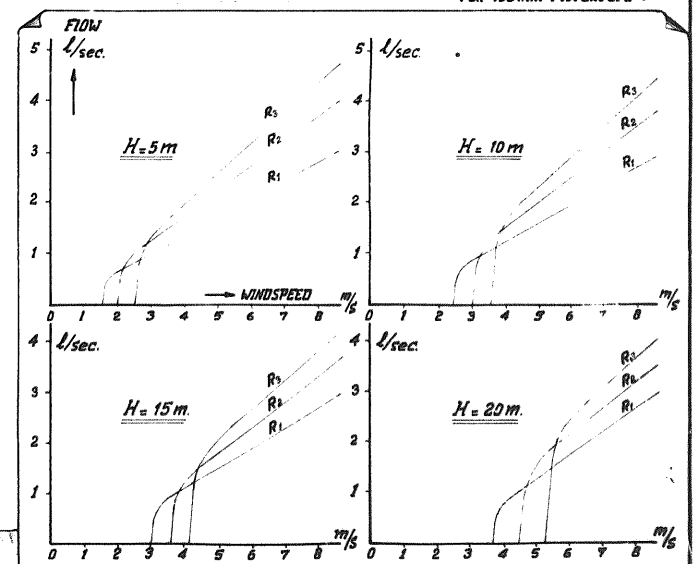
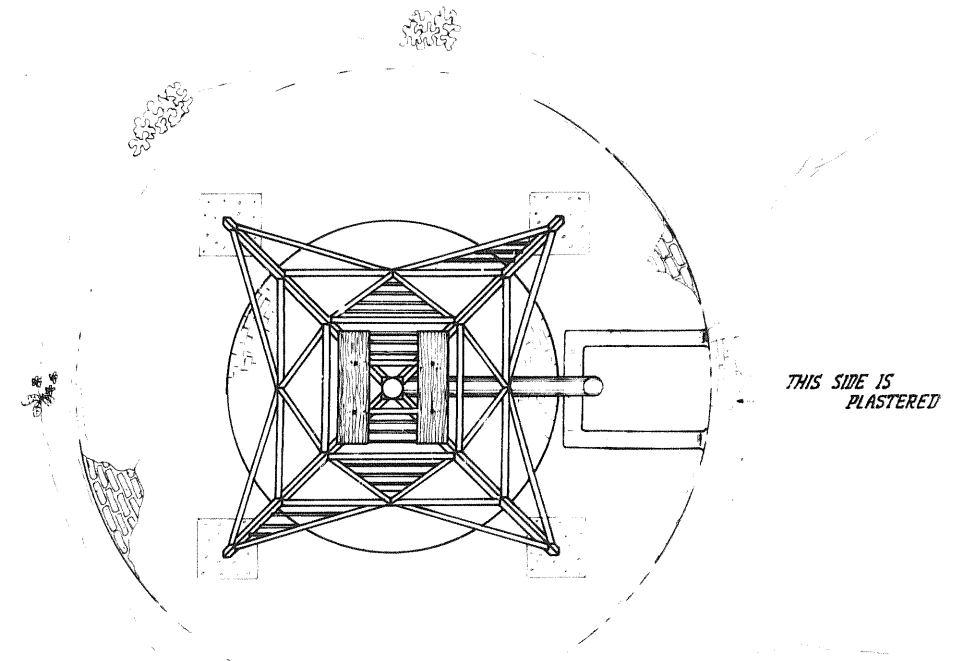
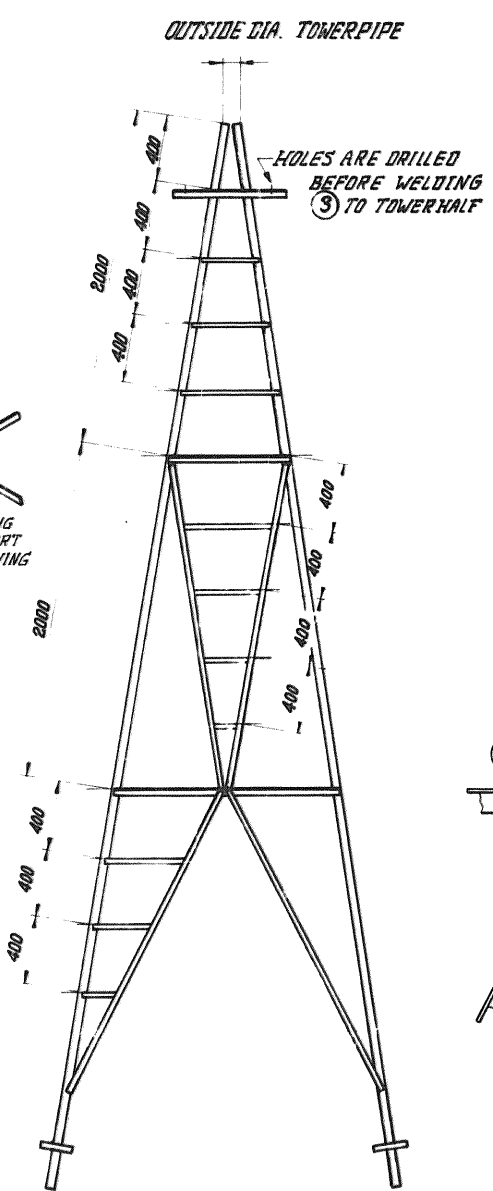
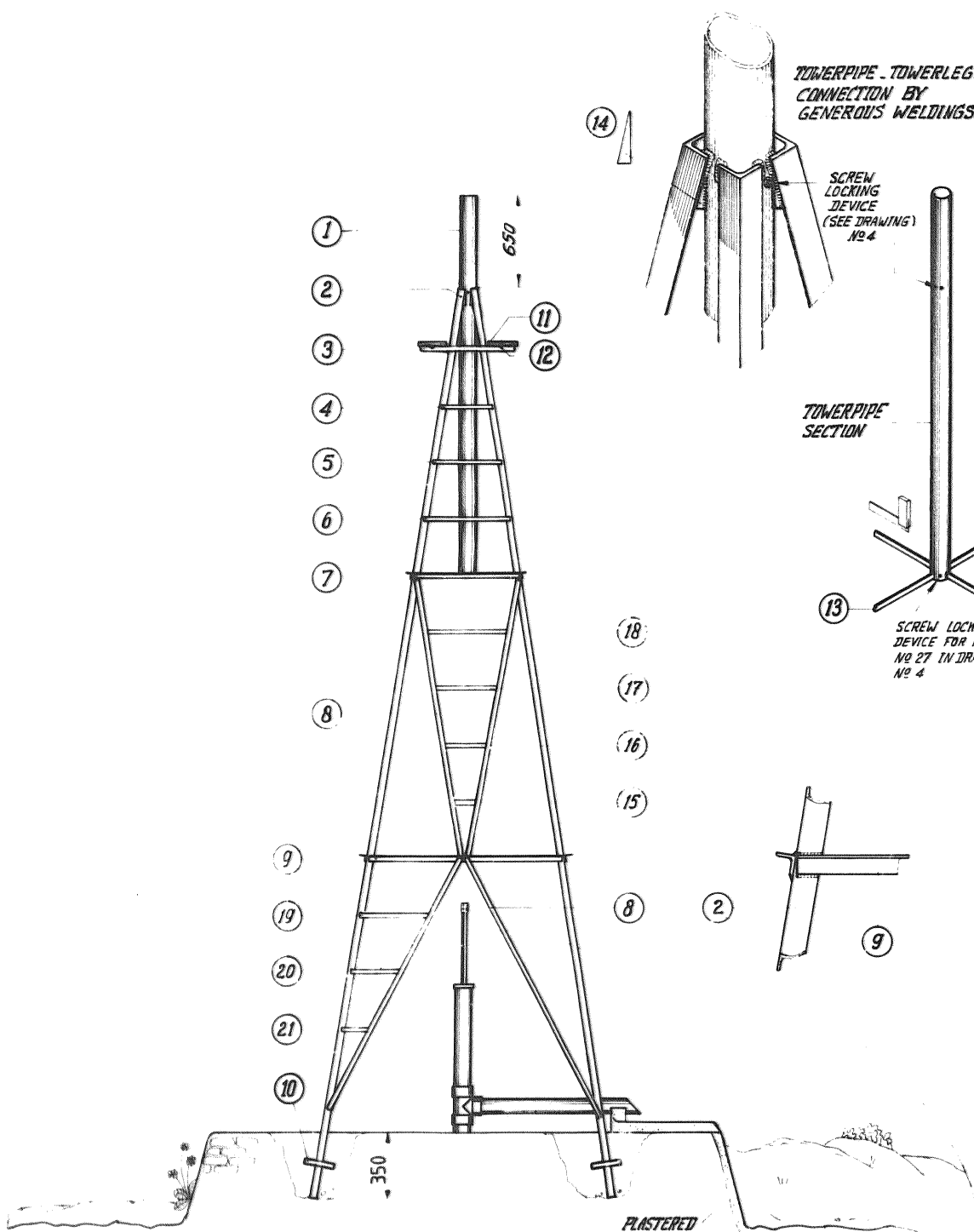


H = ELEVATION HEAD
 $R_1 = 60 \text{ mm}$
 $R_2 = 90 \text{ mm}$ - CRANK RADIUS
 $R_3 = 120 \text{ mm}$
 FOR 150 mm PISTON PUMP:



1 OF 7
12 PU 500 WINDMILL FOR IRRIGATION
 FOR INFORMATION:
 CYCLES, WELLS, AND ELEVATION HEADS

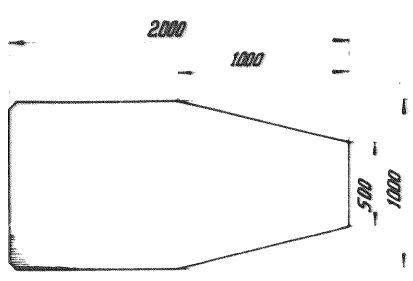
WALL THICKNESS TOWERPIPE NOT LESS THAN 3.5 MM.



IF DESIRED THE LATTICE MEMBERS CAN BE POSITIONED AND WELDED INSIDE THE TOWER LEGS RESULTING IN A MORE ATTRACTIVE APPEARANCE OF THE TOWER. HOWEVER THE FLANGES AT THE ENDS OF THE ANGLE-IRON MEMBERS NO 7 AND NO 9 SHOULD BE CUT AT ANGLES OF 45 DEGREES.

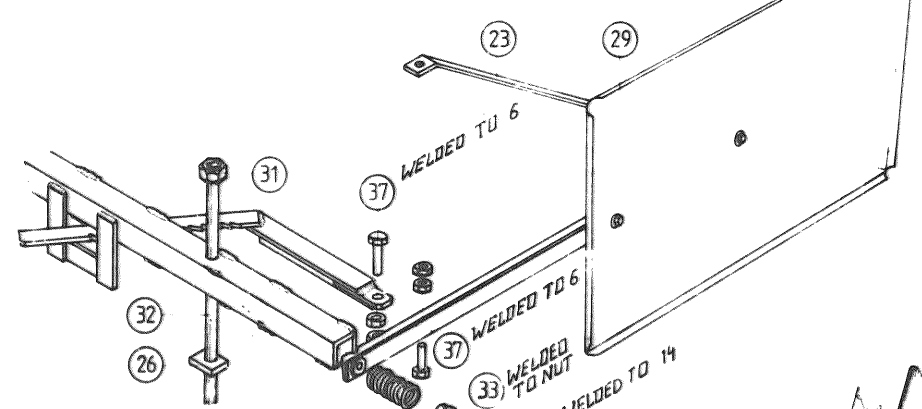
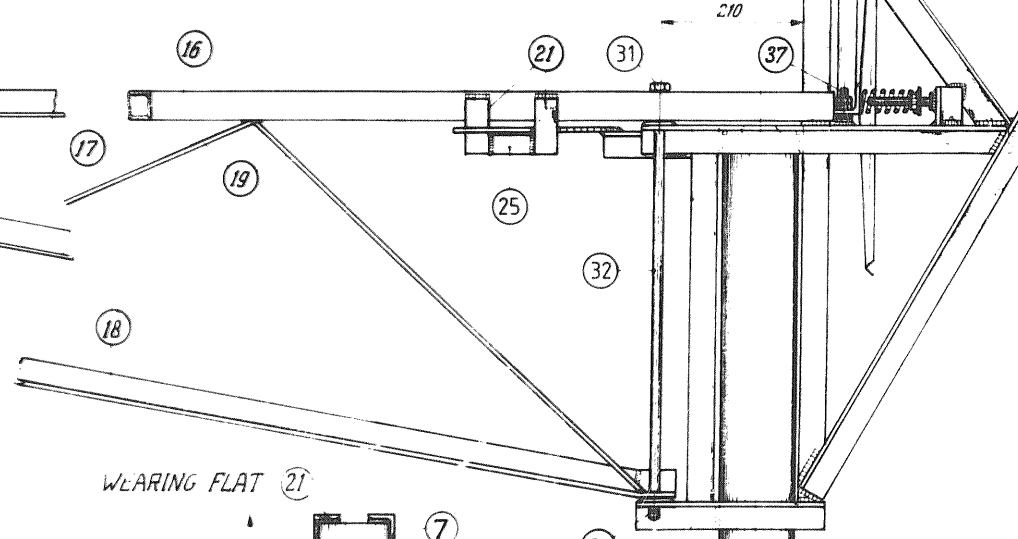
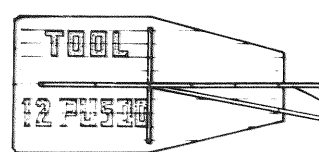
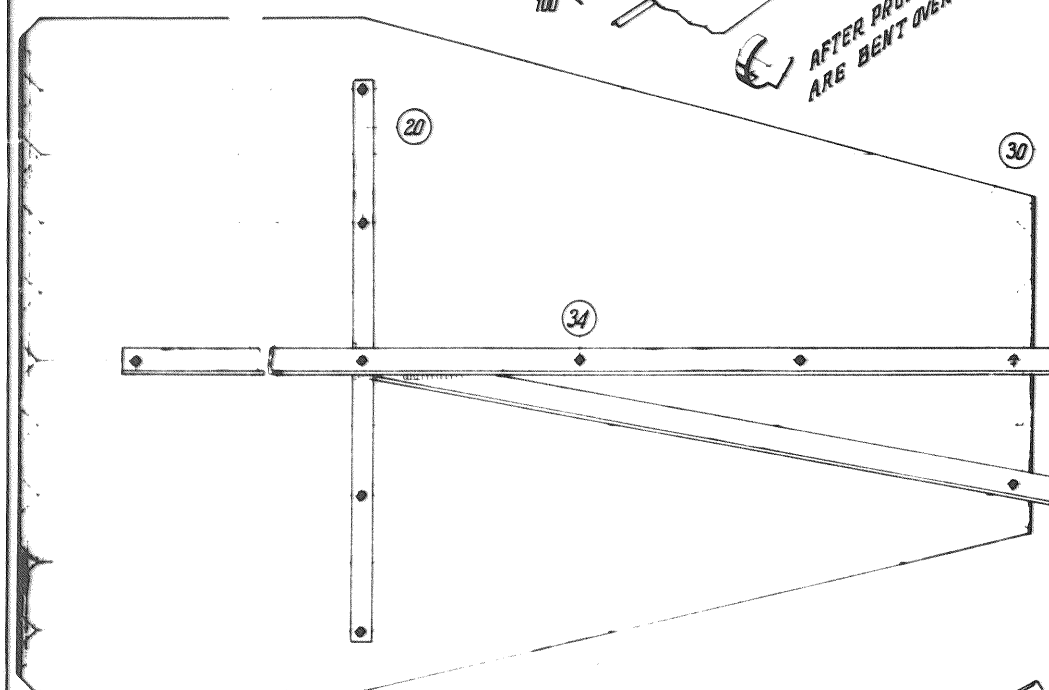
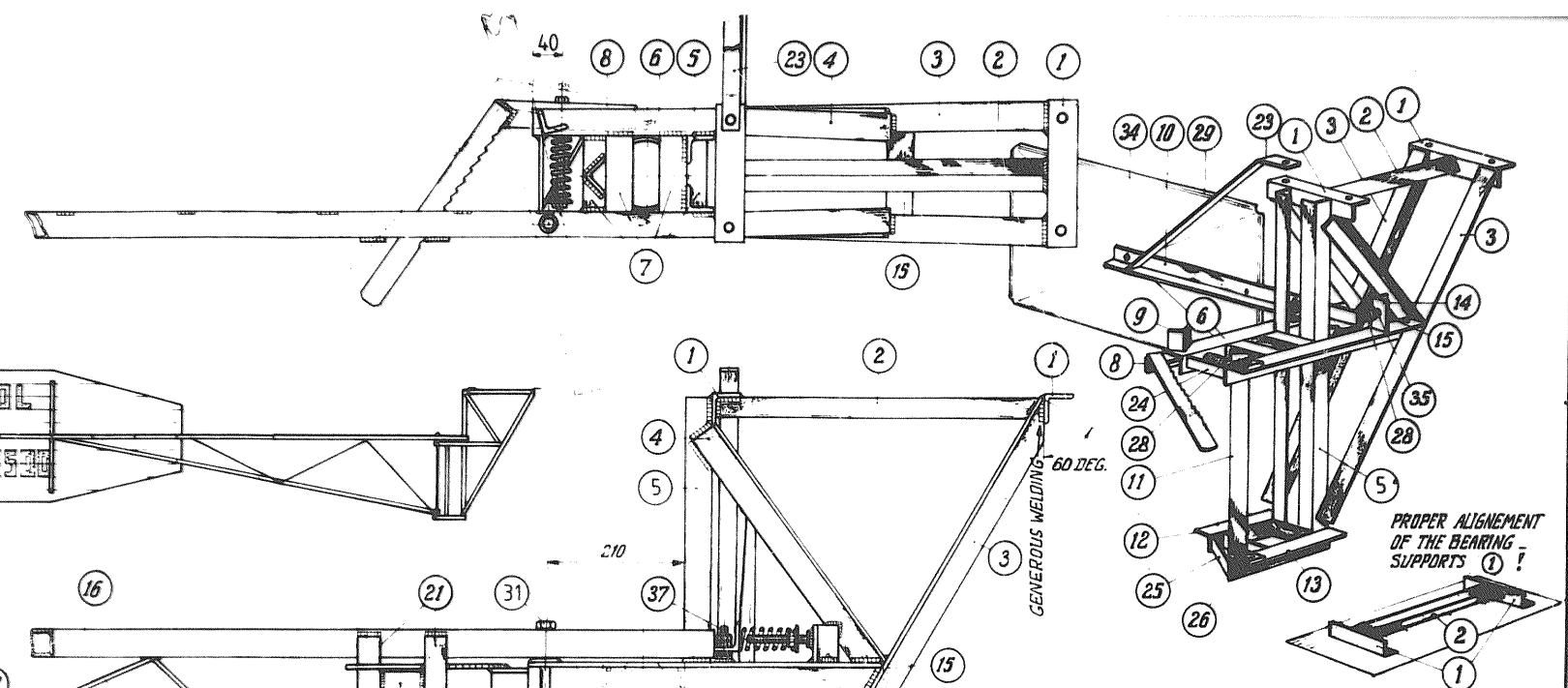
21	2	FLAT-IRON	30 X 6 (1 1/4" X 1/4")	X	220
20	2			X	360
19	2			X	500
18	2			X	570
17	2			X	440
16	2			X	310
15	2			X	180
14	8			X	SCRAP
13	4			X	430
12	4	BOLT-NUT-WASHERS	M8 (W 3/8")		
11	2	PLANK	30 X 200 X 700		
10	4	ANGLE-IRON	30 X 30 X 3 (1 1/4" X 1 1/4")		SCRAP
9	4			X	1350
8	16			X	1960
7	4			X	700
6	2	FLAT-IRON	30 X 6 (1 1/4" X 1/4")	X	570
5	2			X	460
4	2			X	340
3	2	ANGLE-IRON	30 X 30 X 3 (1 1/4" X 1 1/4")	X	660
2	4		40 X 40 X 4 (1 1/2" X 1 1/2")	X	6500
1	1	TOWERPIPE	4" GASPIPE	X	2650

NO. 2 OF 7
12 PU500 - TOWER CONSTRUCTION
 FOR INFORMATION:



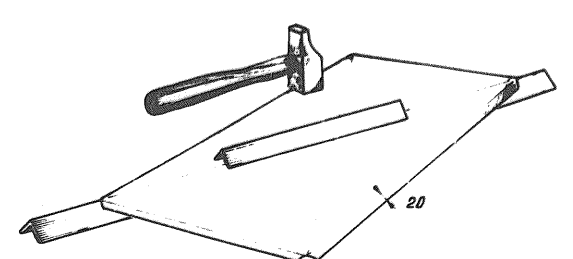
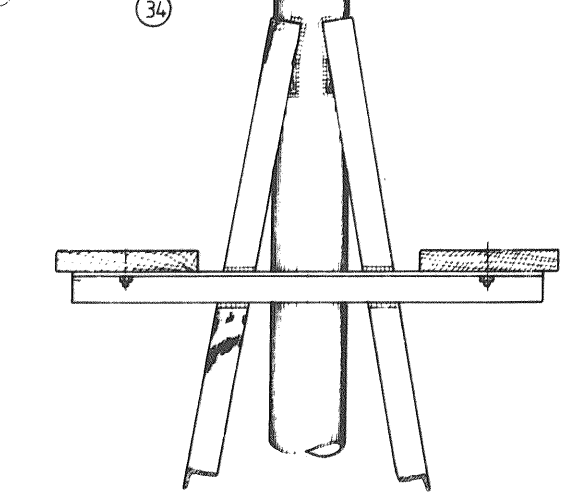
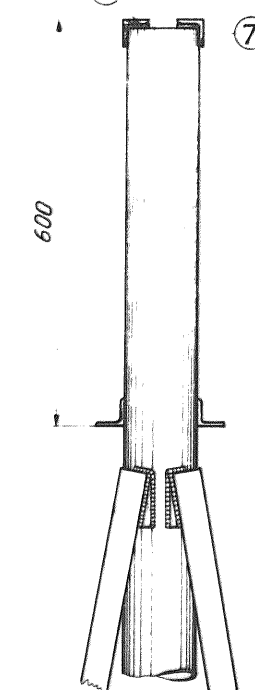
HAMMERING PROFILES INTO THE VANE SHEET INCREASES RIGIDITY

AFTER PROFILING THE EDGES ARE BENT OVER



LOCK MECHANISM KEEPS WINDMILL IN SECURED POSITION (75 DEG. OUT OF THE WIND)

WEARING FLAT 21



HELPVANE SHEET IS PROFILED DIAGONALWISE AND EDGES ARE BENT OVER 45 DEG.

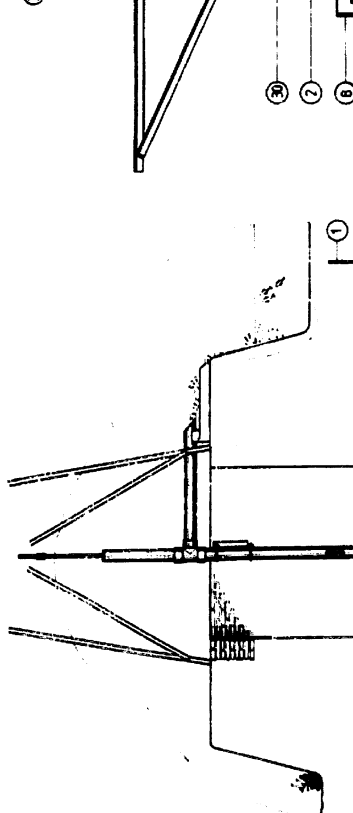
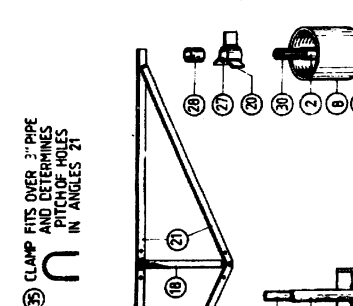
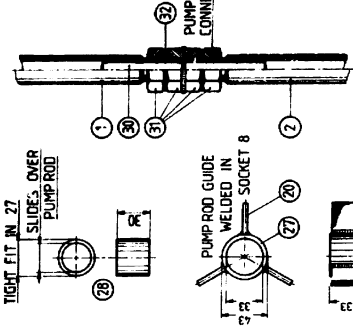
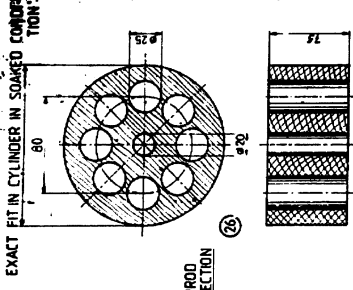
37	2	BOLT. NUT. WASHER	M 12 x 40	(W 1/2" x 1 1/2")
36	1	---	M 10 x 150	(W 3/8" x 6")
35	1	---	M 12 x 100	(W 1/2" x 4")
34	13	---	M 6 x 25	(W 1/4" x 1")
33	2	WASHER	φ 12	(φ 1/2")
32	1	ROD	φ 18 x 650	(φ 3/4" x 2'2")
31	1	NUT	M 20	(W 7/8")
30	1	TAILVANE	1 mm SHEET	2000 x 1000
29	1	HELPVANE	---	1000 x 500
28	2	SPRING	APPR. φ 30 x 100	x φ 4
27	1	FLAT. IRON	30 x 6 (1/4" x 1/4")	LENGTH 100
26	2	---	---	50
25	2	---	---	130
24	1	---	---	115
23	1	---	---	900
22	1	---	---	360
21	4	---	---	90
20	1	---	---	830
19	3	---	---	750
18	1	ANGLE. IRON	40 x 40 x 4 (1 1/2" x 1 1/2")	LENGTH 3000
17	1	---	---	4000
16	1	---	---	1500
15	1	---	---	120
14	1	---	---	60
13	1	---	---	280
12	1	---	---	200
11	1	---	---	590
10	1	---	---	1000
9	1	---	---	45
8	1	---	---	180
7	4	---	---	TOWER PIPE DIA.
6	2	---	---	540
5	2	---	---	1000
4	2	---	---	460
3	2	---	---	1080
2	1	---	---	500
1	2	---	50 x 50 x 5 (2" x 2")	240

NO. NUM. MATERIAL/NAME/REMARKS/MEASUREMENTS

3 OF 7 HEADCONSTRUCTION - 12 PUS500 - WINDMILL

FOR INFORMATION:

THIS BOX WILL BE REVENUED BY THE U.S. DEPARTMENT OF COMMERCE, BUREAU OF STANDARDS, WASHINGTON, D.C.

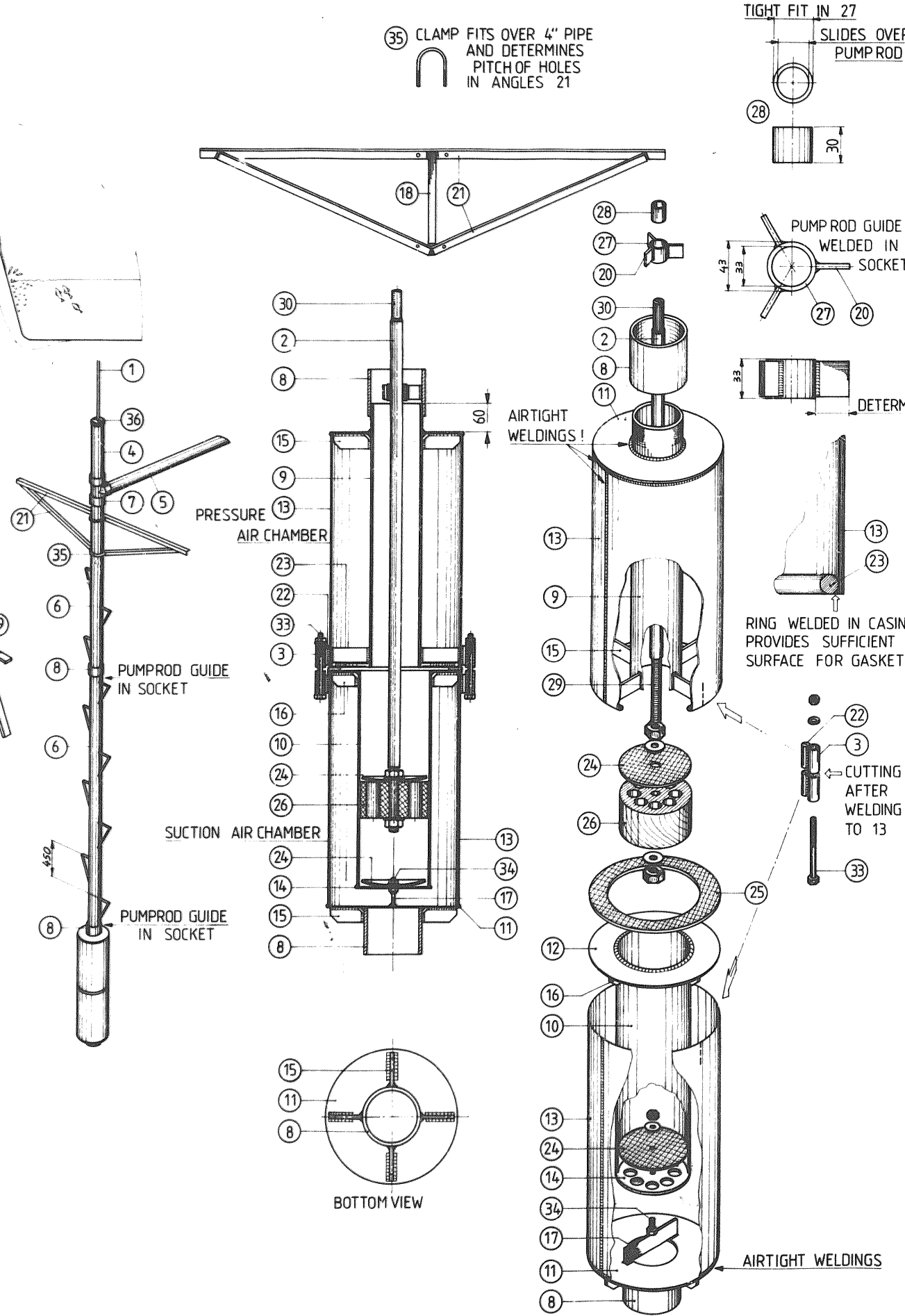
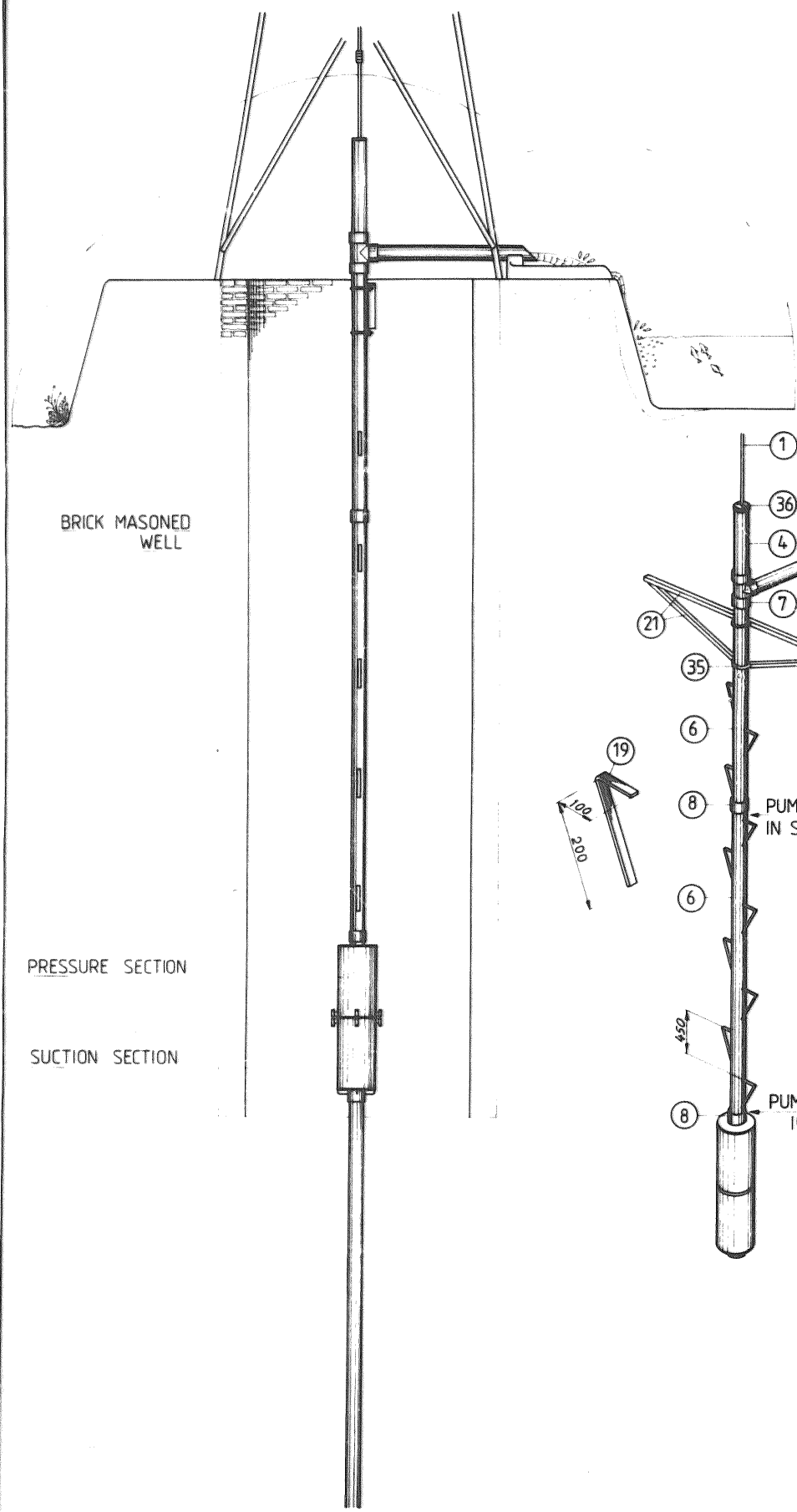


* AMOUNT OR SIZE DEPEND ON CIRCUMSTANCES

36	1	WOODEN PUMP ROD GUIDE	27 IN DRAWING NO 4
35	2	CLAMP	ROD $\phi 12$ (W") $\times 300$
34	1	BOLT - NUT - WASHER	M12 $\times 20$ (W" \times %) $\times 300$
33	4	BOLT - NUT - WASHER	M12 $\times 125$ (W" \times 5") $\times 300$
32	2	SPRING WASHERS	M24 (W" \times %) $\times 300$
31	2	NUTS	M24 (W" \times %) $\times 300$
30	2	THREAD STUD	M24 $\times 100$ (W" \times 4") $\times 300$
29	1	THREAD STUD	M24 $\times 150$ (W" \times 6") $\times 300$
28	1	GUN METAL BUSH	$\phi 33 \times 30$
27	1	STEEL BUSH	$\phi 43 \times 33$
26	1	PISTON	TEAK WOOD
25	1	GASKET	SOLE LEATHER $\phi 250 \times 6$
24	1	VALVE	$\phi 123 \times 6$
23	1	RING	ROD $\phi 8$ (W") $\times 745$
22	8	FILING PIECE	$\times 40$
21	2	ANGLE IRON	20-40-44 (W" \times %) $\times 300$
20	3	FLAT IRON	30 $\times 6$ (W" \times %) $\times 300$
19	1		$\times 450$
18	1		$\times 550$
17	1		$\times 650$
16	4		$\times 750$
15	12		$\times 850$
14	1	FOOT VALVE	2 mm SHEET $\phi 145$
13	2	CASING	500 $\times 775$
12	1	CASING FLANGE	$\phi 250$
11	2	CASING FLANGE	$\phi 250$
10	1	CYLINDER SEAMLESS	5" GASPIPE $\times 460$
9	1	DELIVERY PIPE	FOR 3"
8	1	SOCKET	FOR 3"
7	1	SOCKET	FOR 3"
6	1	DELIVERY PIPE (EXTENSION)	3" \times 3"
5	1	EXHAUST PIPE	3" \times 3"
4	1	TOPPIPE	3" \times 3"
3	4	PIPE	1/2" \times 100
2	1	PUMP ROD	$\times 950$
1	1	PUMP ROD EXTENSION	$\times 950$

NO	NUM BER	MATERIAL / NAME / REMARKS / MEASUREMENTS
6	OF 7	5" PISTON PUMP FOR 12 PU 900
		FOR INFORMATION :

FOR INFORMATION :



* AMOUNT OR SIZE DEPEND ON CIRCUMSTANCES

36	1	WOODEN PUMPROD GUIDE	27 IN DRAWING NO 4
35	2	CLAMP	ROD ϕ 12 ($\frac{1}{2}$ ") x 370
34	1	BOLT - NUT - WASHER	M12 x 20 (W $\frac{1}{2}$ " x $\frac{3}{4}$ ")
33	4	BOLT NUT WASHER	M12 x 125 (W $\frac{1}{2}$ " x 5")
32	*	SPRING WASHERS	M24 (W $\frac{7}{8}$ ")
31	*	NUTS	M24 (W $\frac{7}{8}$ ")
30	*	THREAD STUD	M24 x 100 (W $\frac{7}{8}$ " x 4")
29	1	THREAD STUD	M24 x 150 (W $\frac{7}{8}$ " x 6")
28	*	GUN METAL BUSH	ϕ 33 x 30
27	*	STEEL BUSH	ϕ 43 x 33
26	1	PISTON	TEAK WOOD
25	1	GASKET	SOLE LEATHER ϕ 290 x 6
24	2	VALVE	ϕ 150 x 6
23	1	RING	ROD ϕ 8 ($\frac{3}{8}$ ") x 870
22	8	FILLING PIECE	x 40
21	2	ANGLE IRON	40x40x4 ($\frac{1}{2}$ " x $\frac{1}{2}$ ") x *
20	3	FLAT IRON	30 x 6 ($\frac{1}{4}$ " x $\frac{1}{4}$ ") x *
19	*		x 300
18	1		x 450
17	1		x 180
16	4		x 60
15	12		x 85
14	1	FOOT VALVE	2 mm SHEET ϕ 170
13	2	CASING	500 x 900
12	1	CASING FLANGE	ϕ 290
11	2	CASING FLANGE	ϕ 290
10	1	CYLINDER SEAMLESS	6" GASPIPE x 460
9	1	DELIVERY PIPE	4" x 560
8	*	SOCKET	FOR 4"
7	1	T - SOCKET	4"
6	*	DELIVERY PIPE (EXTENSION)	4" x *
5	1	EXHAUST PIPE	4" x *
4	1	TOPPIPE	4" x 750
3	4	PIPE	$\frac{1}{2}$ " x 100
2	1	PUMPROD	$\frac{3}{4}$ " x 950
1	*	PUMPROD EXTENSION	$\frac{3}{4}$ " x *

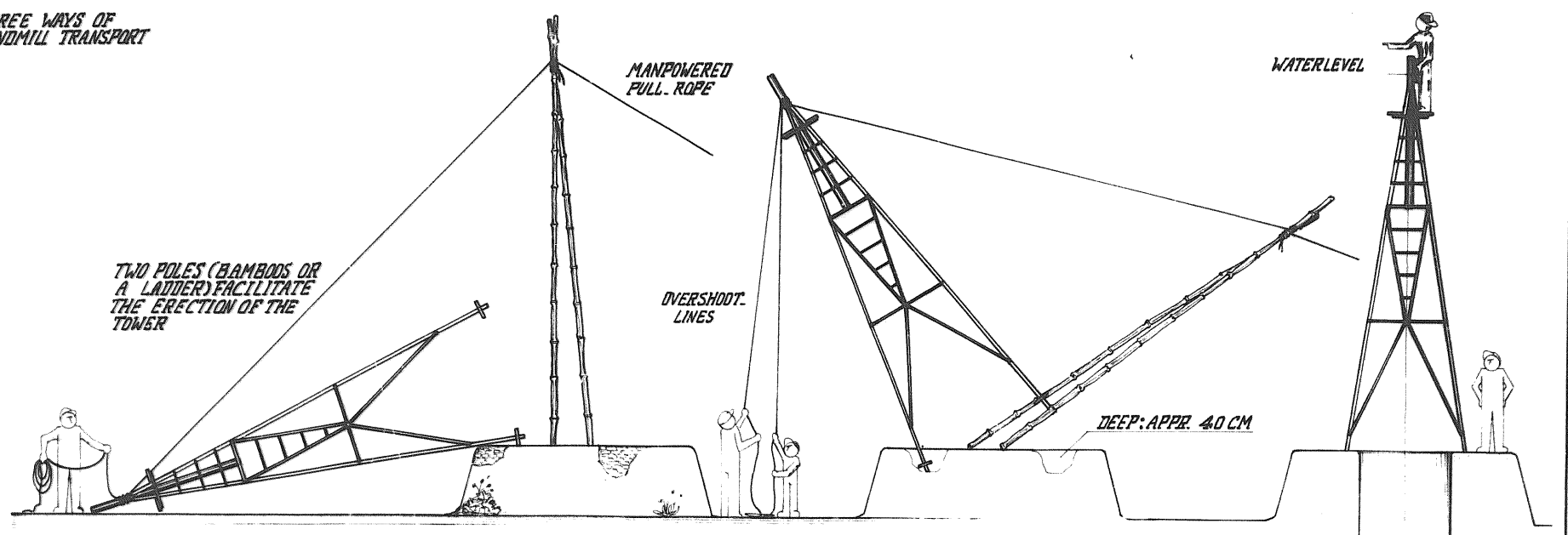
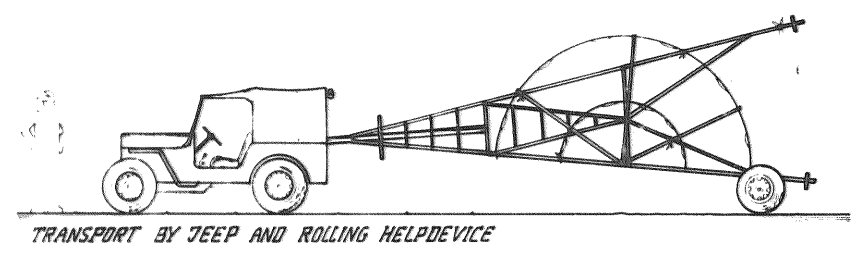
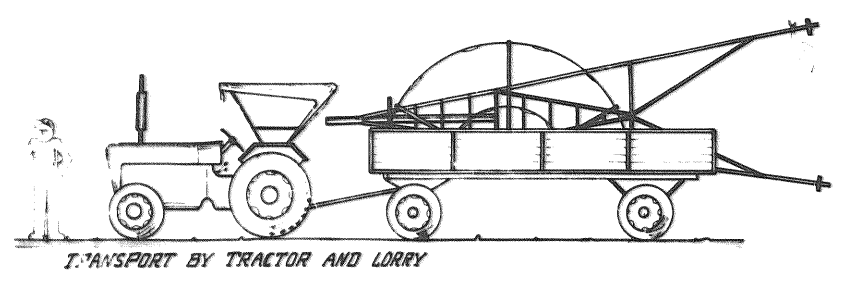
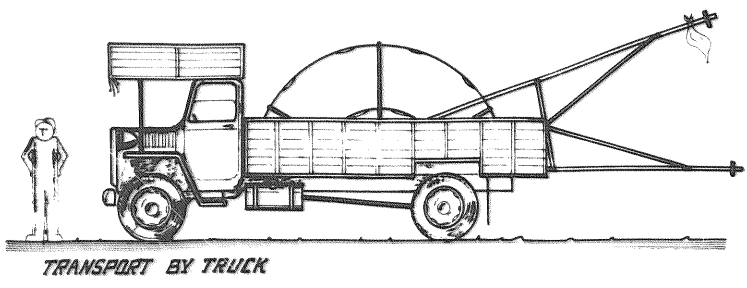
NO	NUMBER	MATERIAL / NAME / REMARKS	MEASUREMENTS
6	OF	PISTONPUMP FOR 12 PUS00 WINDMILL	
7			

FOR INFORMATION :

Workgroup on Developmenttechniques
 T.H. Twente - Vrijhof 152
 P.O. Box 217 Enschede
 The Netherlands

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 TOOL FOUNDATION
 HAARLEM

THREE WAYS OF WINDMILL TRANSPORT

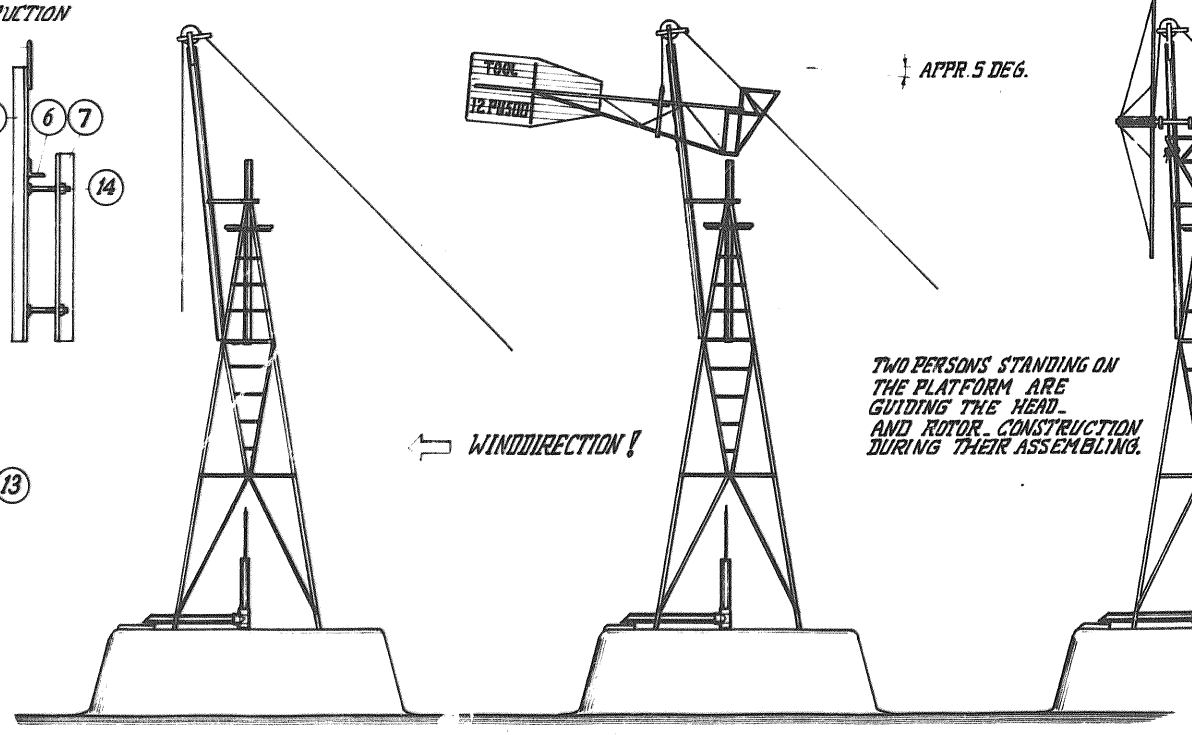
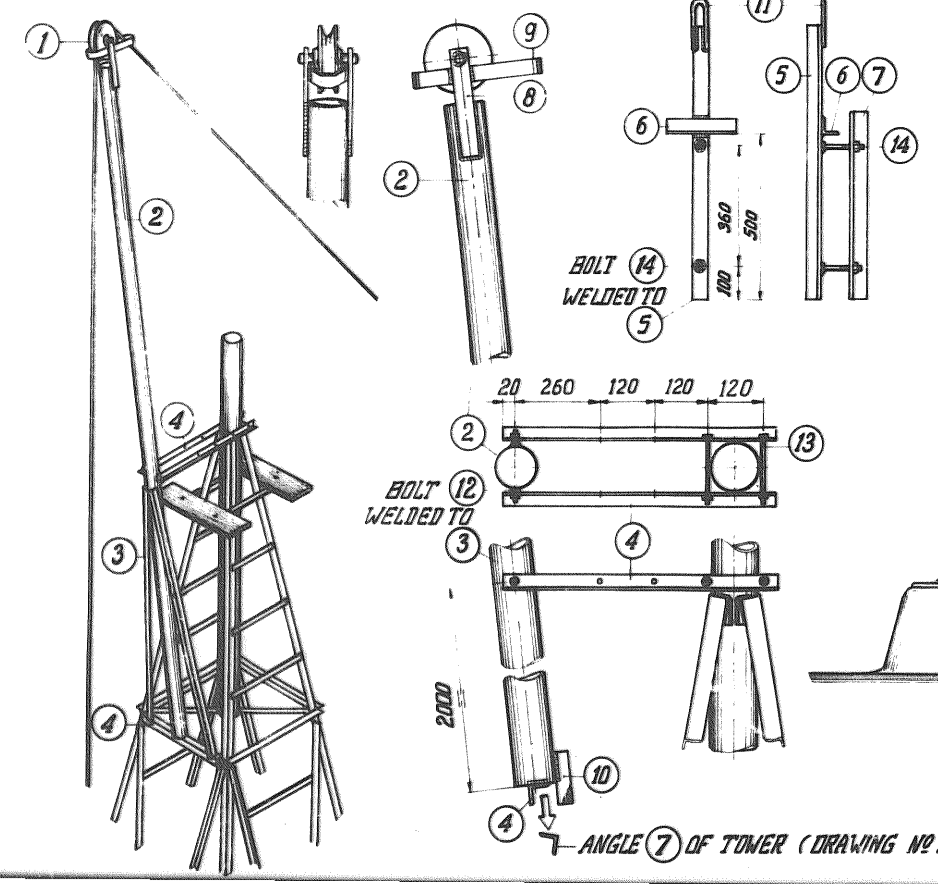


IMPORTANT: AFTER PLACING THE TOWER THE TOWERLEGS ARE POURED IN WITH CONCRETE AND AFTER APPR. 5 DAYS THE HEAD AND ROTOR CONSTRUCTION CAN BE INSTALLED SAFE AND QUICK BY MEANS OF LIFTING DEVICES. DURING THE DRYING PERIOD OF THE CONCRETE FUNDATION THE PISTON PUMP IS FIXED INTO THE WELL ACCORDING TO THE SPECIFICATIONS!

PLUM BOB

"JIB" - LIFTING HELP DEVICE

LIFTING HOOK FOR HEAD CONSTRUCTION



NO	NUM BER	MATERIAL / NAME / REMARKS / MEASUREMENTS
14	2	BOLT NUT WASHER M12 x 75 (W 1/2" x 3")
13	2	M12 x 150 (W 1/2" x 6")
12	2	M12 x 50 (W 1/2" x 2")
11	1	ROD Ø 10 (Ø 3/8") x 200
10	1	FLAT 30x6 (1 1/4" x 1/4") x 100
9	1	x 600
8	2	x 200
7	1	ANGLE IRON 40x40x4 (1 1/2" x 1 1/2" x 5/16")
6	1	x 200
5	1	x 800
4	3	x 600
3	2	x 2000
2	1	GAS PIPE Ø 3" x 4500
1	1	PULLEY SHAFT AND ROPE OR STEEL CABLE (30 M)

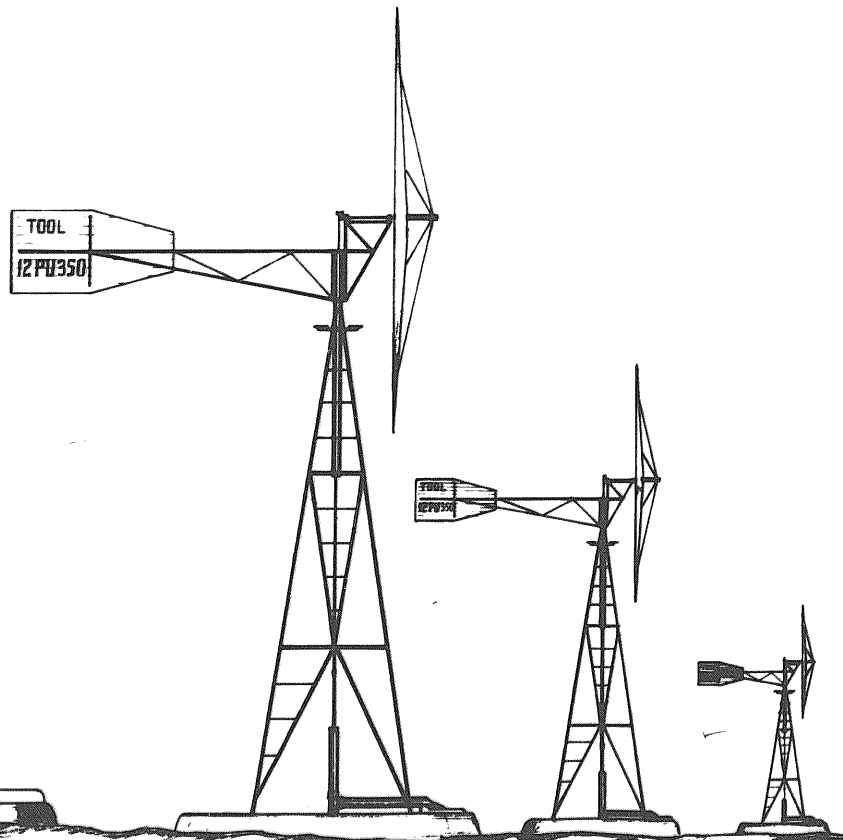
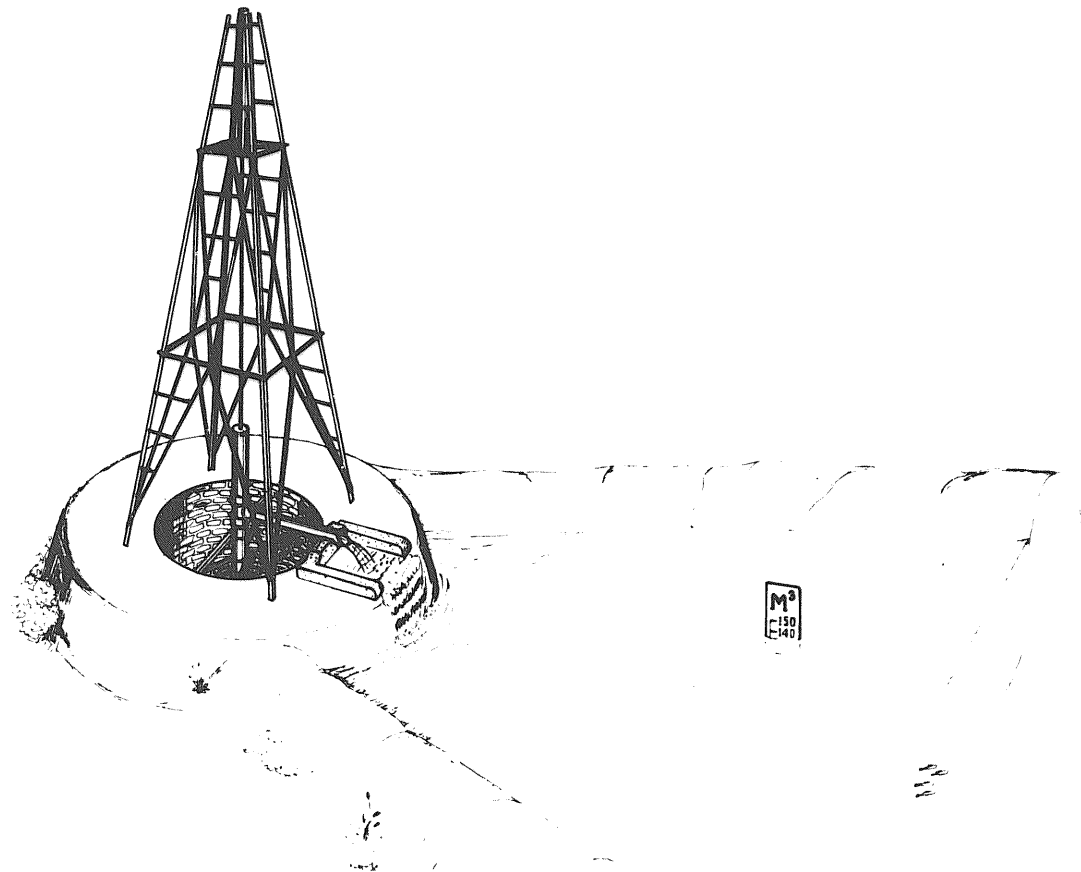
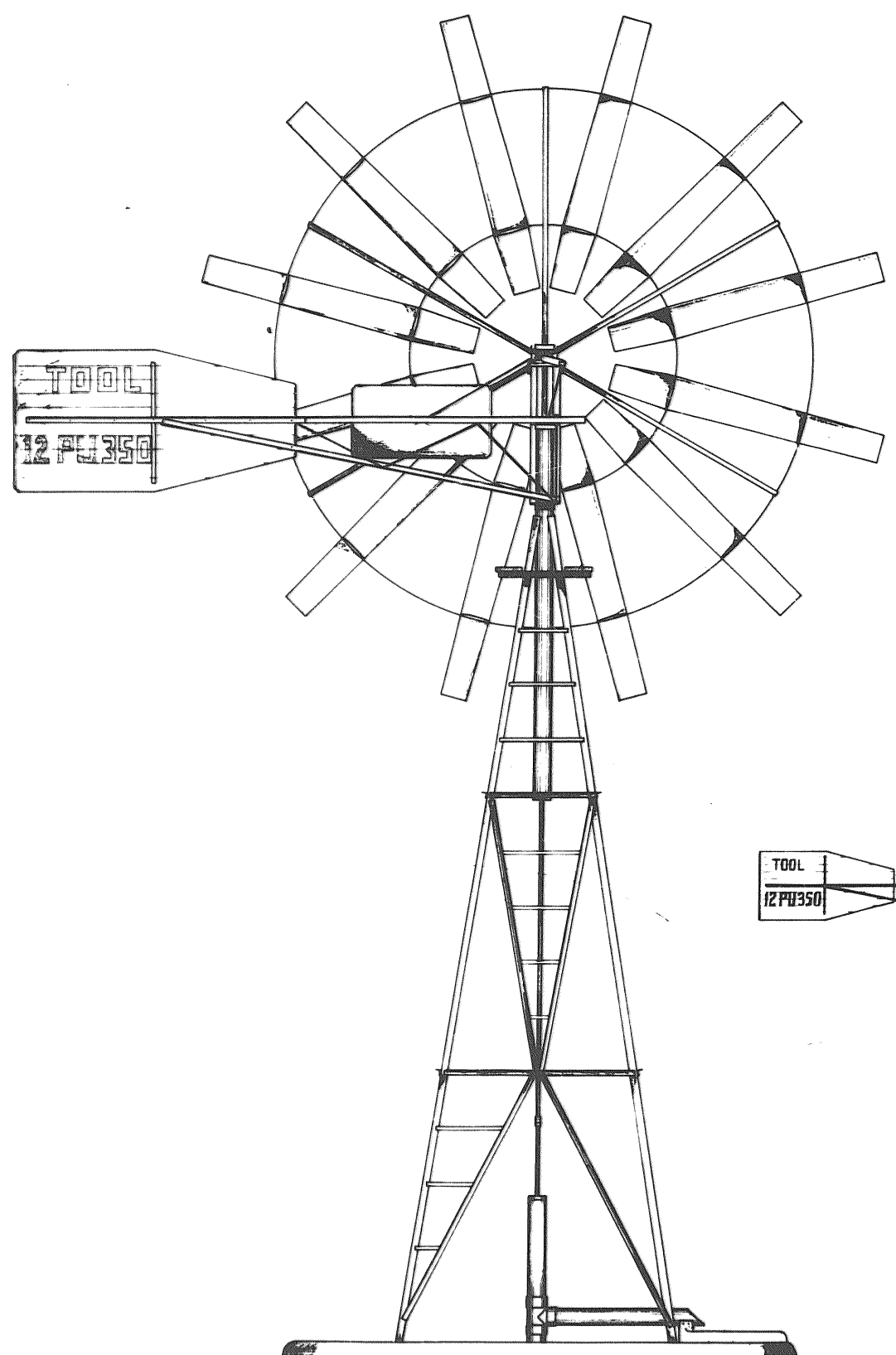
SINCE THE CENTRE OF GRAVITY OF THE HEAD CONSTRUCTION IS SITUATED ABOVE THE UPPER TAIL ANGLE A SPECIAL LIFTING HOOK IS APPLIED. A SMOOTH SLIDING OVER THE TOWER PIPE IS ACHIEVED IF THE FRONT IS OUT OF BALANCE APPR 5 DEGR.

ROTOR IS LIFTED WITH THE SHAFT COMPLETE WITH BEARINGS FIXED IN THE ROTOR HUB IN ITS ORIGINAL POSITION (CENTRE POINTS!) AND FIXED ON THE HEAD CONSTRUCTION. NOW THE "JIB" CAN BE REMOVED AND THE BLADES, SAFETY DEVICE AND MOVING PARTS ARE ASSEMBLED.

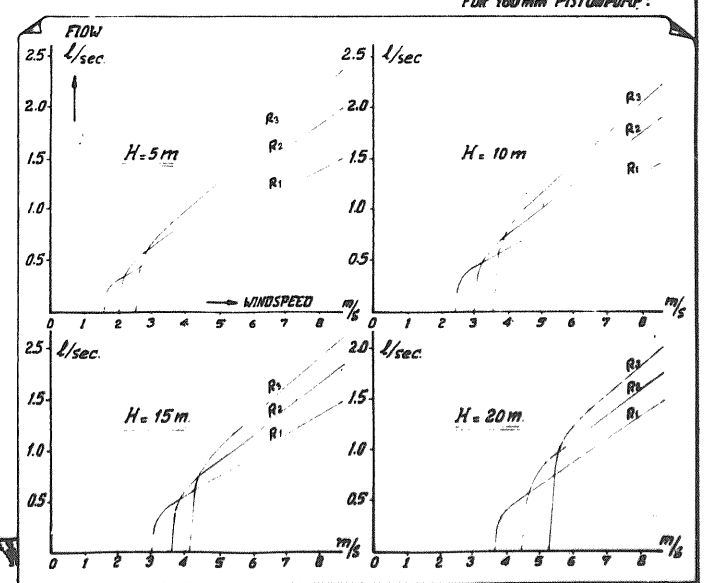
7 OF 7 INSTALLING THE WINDMILL - 12 PU 500 -

FOR INFORMATION:

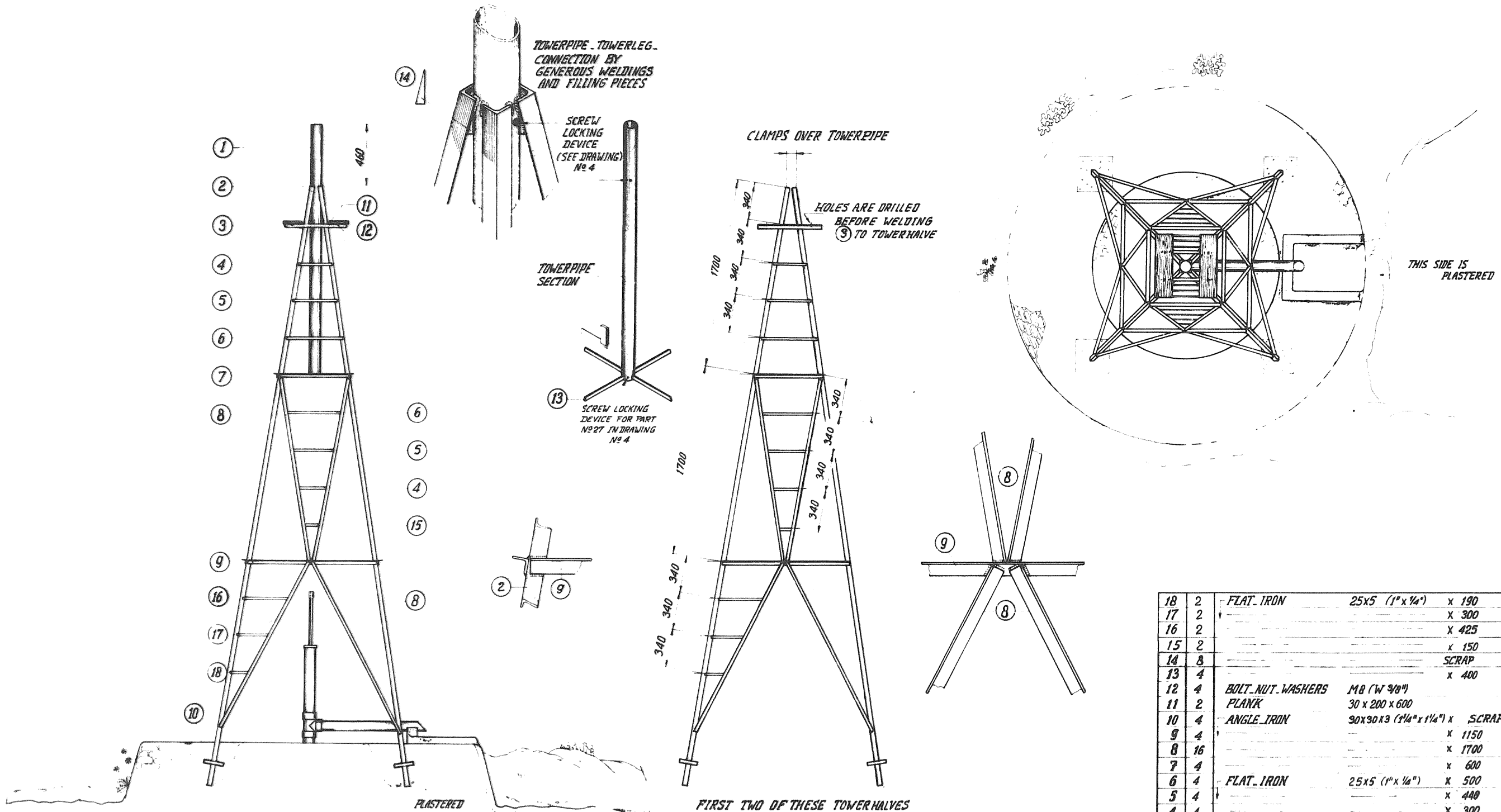
FOR MORE INFORMATION CONTACT THE AUTHOR AT THE ADDRESS BELOW



H = ELEVATION HEAD
 R₁ = 45 mm
 R₂ = 67.5 mm - CRANK RADIUS
 R₃ = 90 mm
 FOR 100 mm PISTON PUMP:



1 OF 7 **12 PU 350 WINDMILL FOR IRRIGATION**
 FOR INFORMATION:

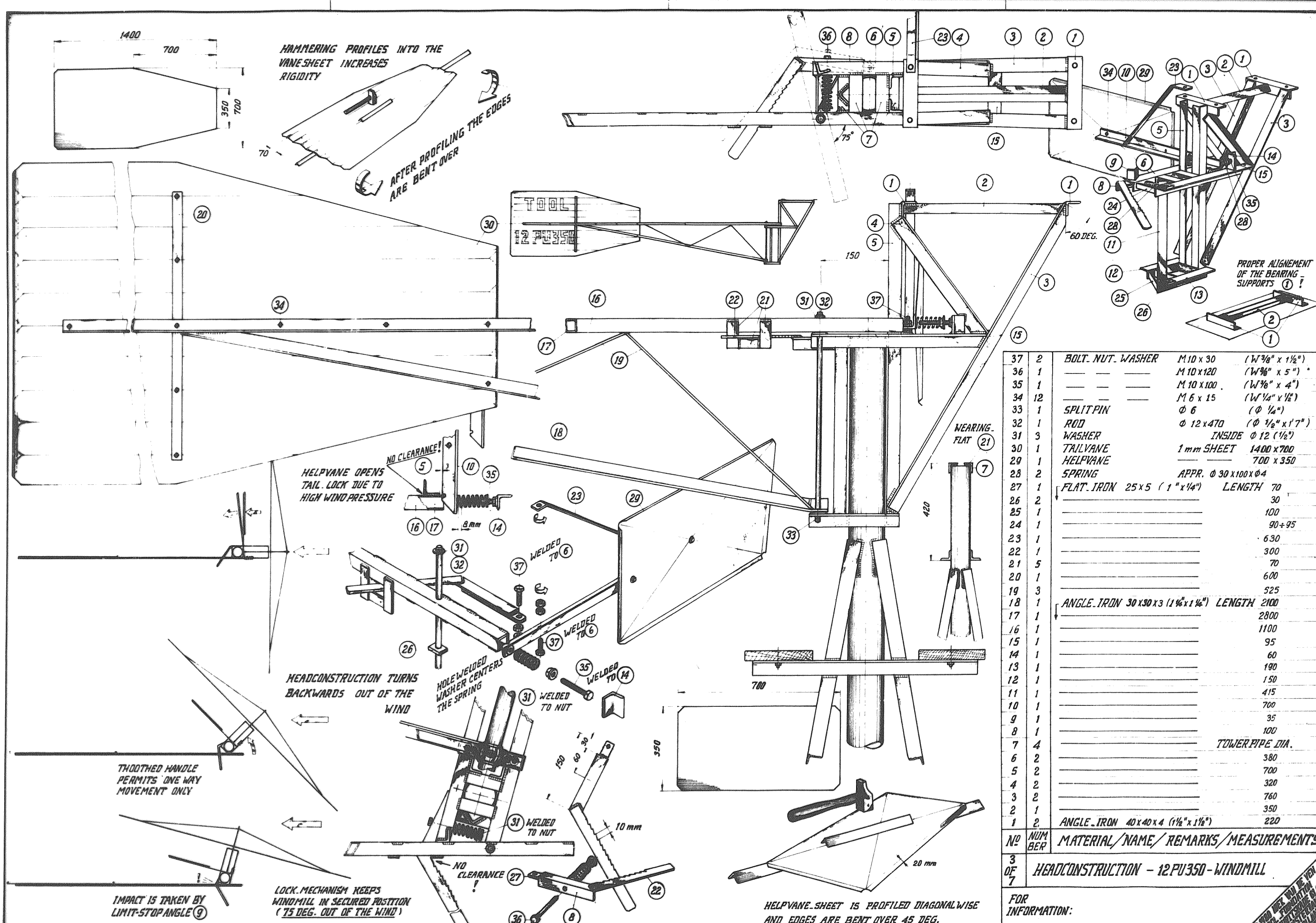


18	2	FLAT IRON	25x5 (1" x 1/4")	x 190
17	2			x 300
16	2			x 425
15	2			x 150
14	8			SCRAP
13	4			x 400
12	4	BOLT NUT WASHERS	M8 (W 9/8")	
11	2	PLANK	30 x 200 x 600	
10	4	ANGLE IRON	90x90x3 (1 1/4" x 1 1/4")	x SCRAP
9	4			x 1150
8	16			x 1700
7	4			x 600
6	4	FLAT IRON	25x5 (1" x 1/4")	x 500
5	4			x 440
4	4			x 300
3	2	ANGLE IRON	90x90x3 (1 1/4" x 1 1/4")	x 550
2	4			5500
1	1	TOWERPIPE	3" GASPIPE	2150

NO. 2 OF 7

-12 PU 350- TOWERCONSTRUCTION

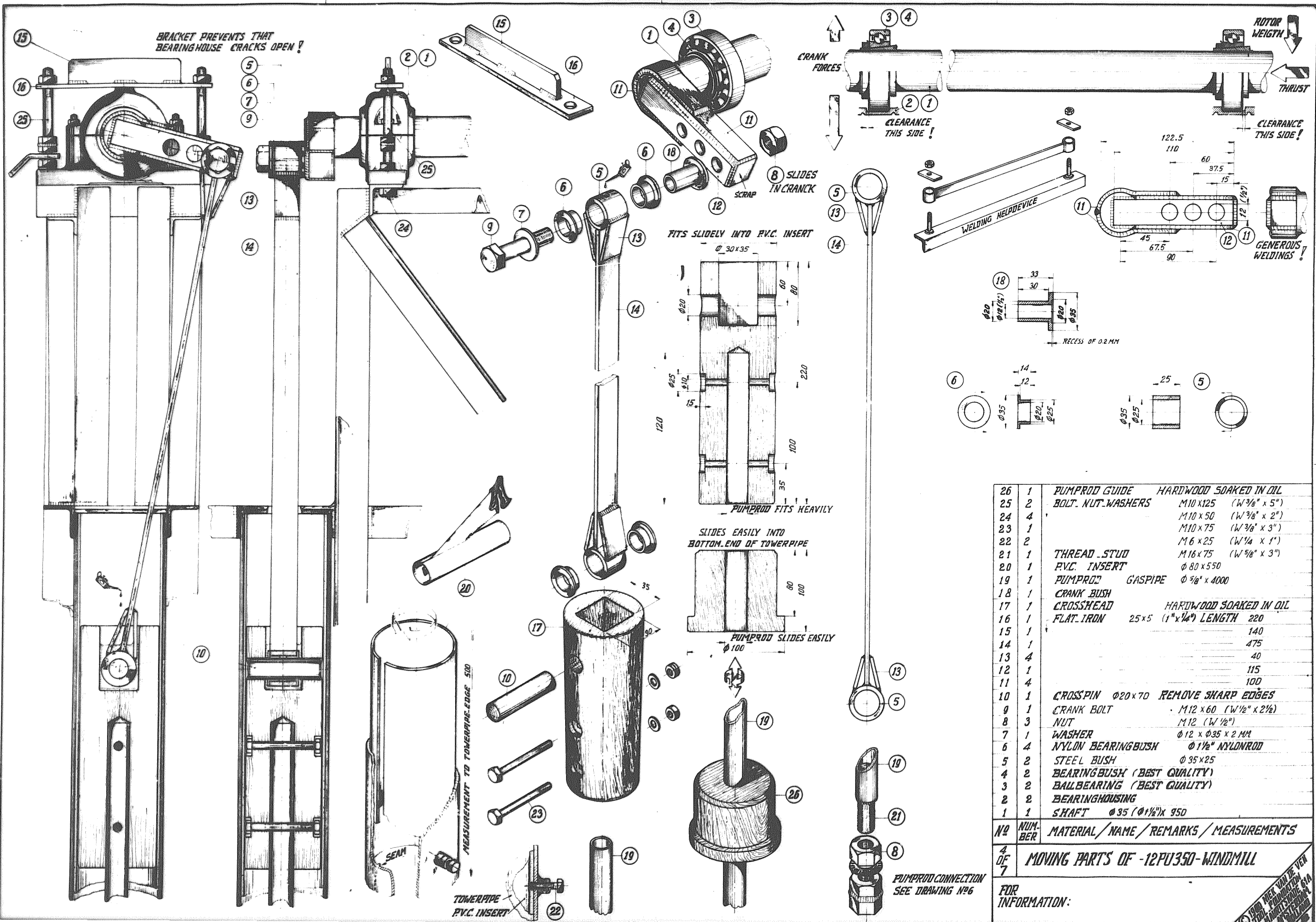
FDR INFORMATION:



37	2	BOLT. NUT. WASHER	M10 x 30	(W 3/8" x 1 1/2")
36	1	---	M10 x 120	(W 3/8" x 5")
35	1	---	M10 x 100	(W 3/8" x 4")
34	12	---	M6 x 15	(W 1/4" x 1 1/2")
33	1	SPLIT PIN	Φ 6	(Φ 1/4")
32	1	ROD	Φ 12 x 470	(Φ 1/2" x 1'7")
31	3	WASHER	INSIDE Φ 12 (1/8")	
30	1	TAILVANE	1 mm SHEET	1400 x 700
29	1	HELPVANE		700 x 350
28	2	SPRING	APPR. Φ 30 x 100 x Φ 4	
27	1	FLAT. IRON	25 x 5 (1" x 1/4")	LENGTH 70
26	2			30
25	1			100
24	1			90+95
23	1			630
22	1			300
21	5			70
20	1			600
19	3			525
18	1	ANGLE. IRON	30 x 30 x 3 (1 1/4" x 1 1/4")	LENGTH 2100
17	1			2800
16	1			1100
15	1			95
14	1			60
13	1			190
12	1			150
11	1			415
10	1			700
9	1			35
8	1			100
7	4			TOWER PIPE DIA.
6	2			380
5	2			700
4	2			320
3	2			760
2	1			350
1	2	ANGLE. IRON	40 x 40 x 4 (1 1/2" x 1 1/2")	220

NO	NUM BER	MATERIAL/NAME/REMARKS/MEASUREMENTS
3	OF	HEADCONSTRUCTION - 12PU350-WINDMILL
7	7	
FOR INFORMATION:		

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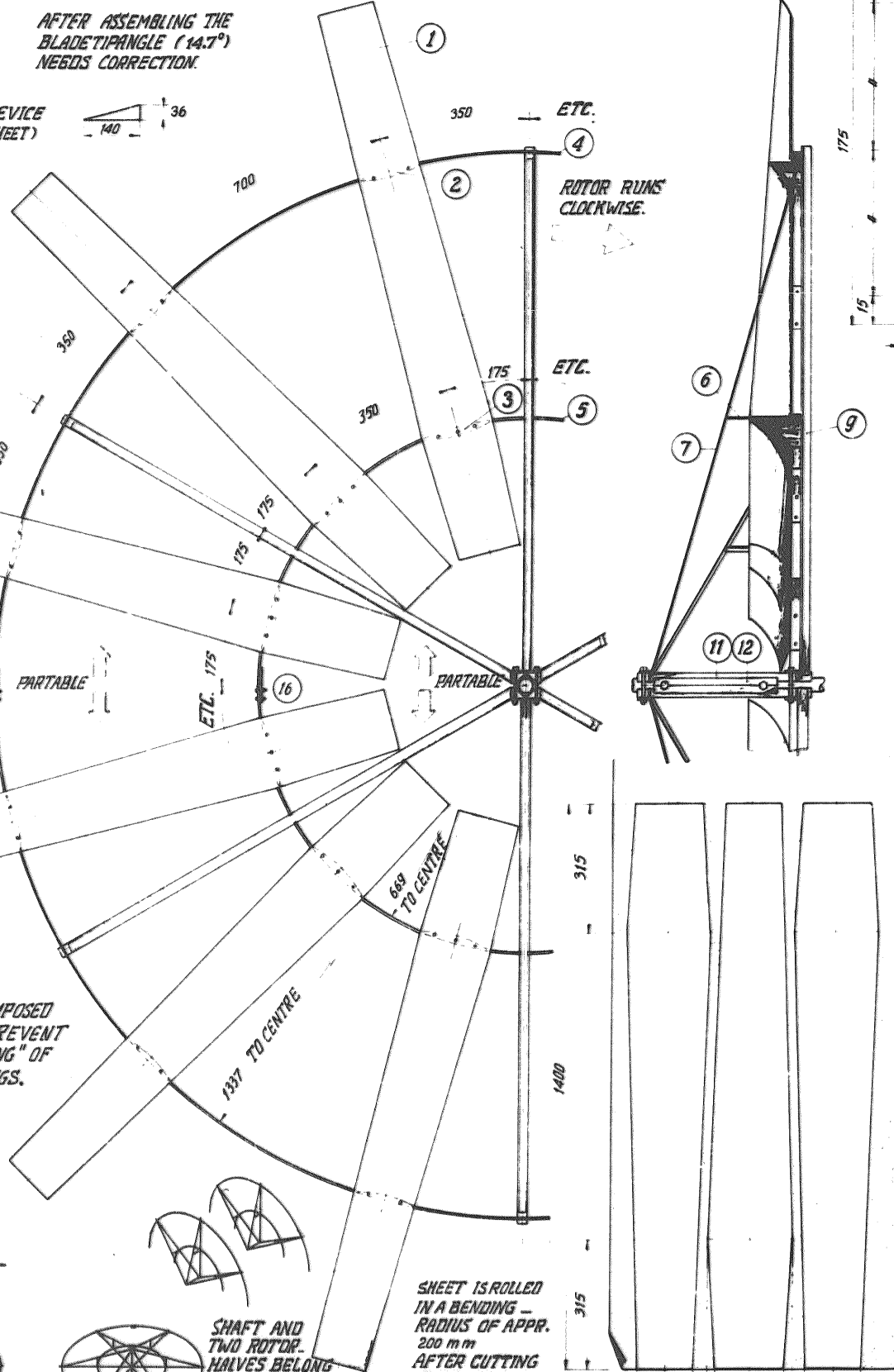


26	1	PUMPROD GUIDE	HARDWOOD SOAKED IN OIL
25	2	BOLT. NUT. WASHERS	M10 x125 (W 3/8" x 5")
24	4		M10 x 50 (W 3/8" x 2")
23	1		M10 x 75 (W 3/8" x 3")
22	2		M 6 x 25 (W 1/4" x 1")
21	1	THREAD STUD	M16 x 75 (W 3/8" x 3")
20	1	PVC INSERT	φ 80 x 550
19	1	PUMPROD	GASPIPE φ 5/8" x 4000
18	1	CRANK BUSH	
17	1	CROSSHEAD	HARDWOOD SOAKED IN OIL
16	1	FLAT IRON	25x5 (1"x1/2") LENGTH 220
15	1		140
14	1		475
13	4		40
12	1		115
11	4		100
10	1	CROSSPIN	φ 20 x 70 REMOVE SHARP EDGES
9	1	CRANK BOLT	M12 x 60 (W 1/2" x 2 1/2")
8	3	NUT	M12 (W 1/2")
7	1	WASHER	φ 12 x φ 35 x 2 MM
6	4	NYLON BEARINGBUSH	φ 1 1/2" NYLONROD
5	2	STEEL BUSH	φ 35 x 25
4	2	BEARINGBUSH (BEST QUALITY)	
3	2	BALL BEARING (BEST QUALITY)	
2	2	BEARINGHOUSING	
1	1	SHAFT	φ 35 (φ 1 1/2") x 950

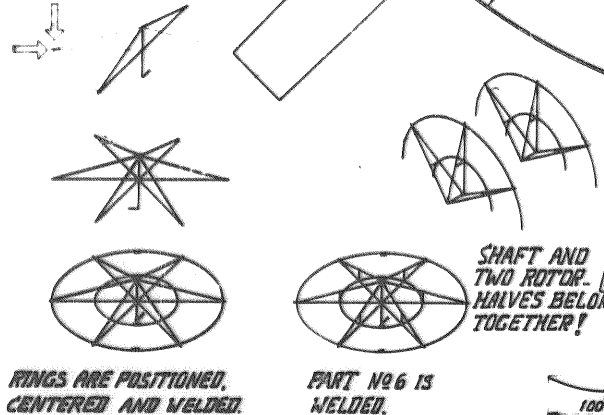
NO. 4 OF 7
 MOVING PARTS OF -12PU350-WINDMILL
 FOR INFORMATION:
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AFTER ASSEMBLING THE BLADE TIP ANGLE (14.7°) NEEDS CORRECTION.

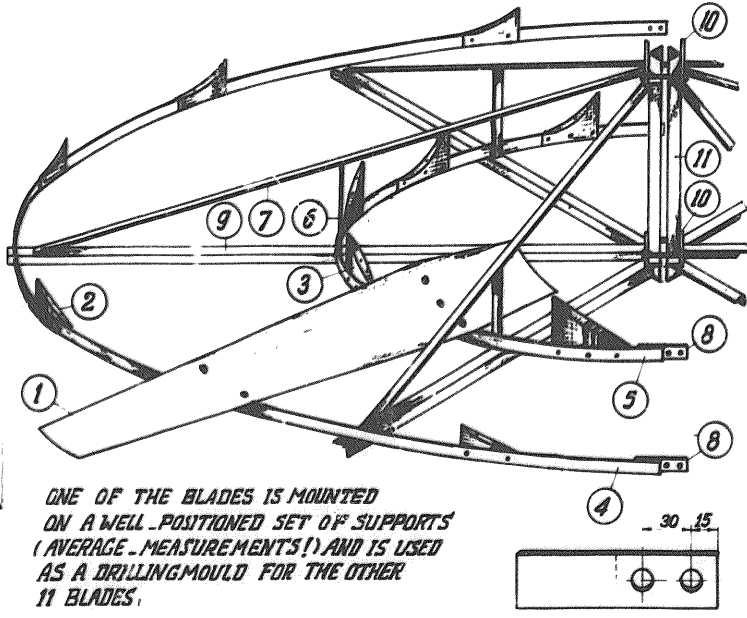
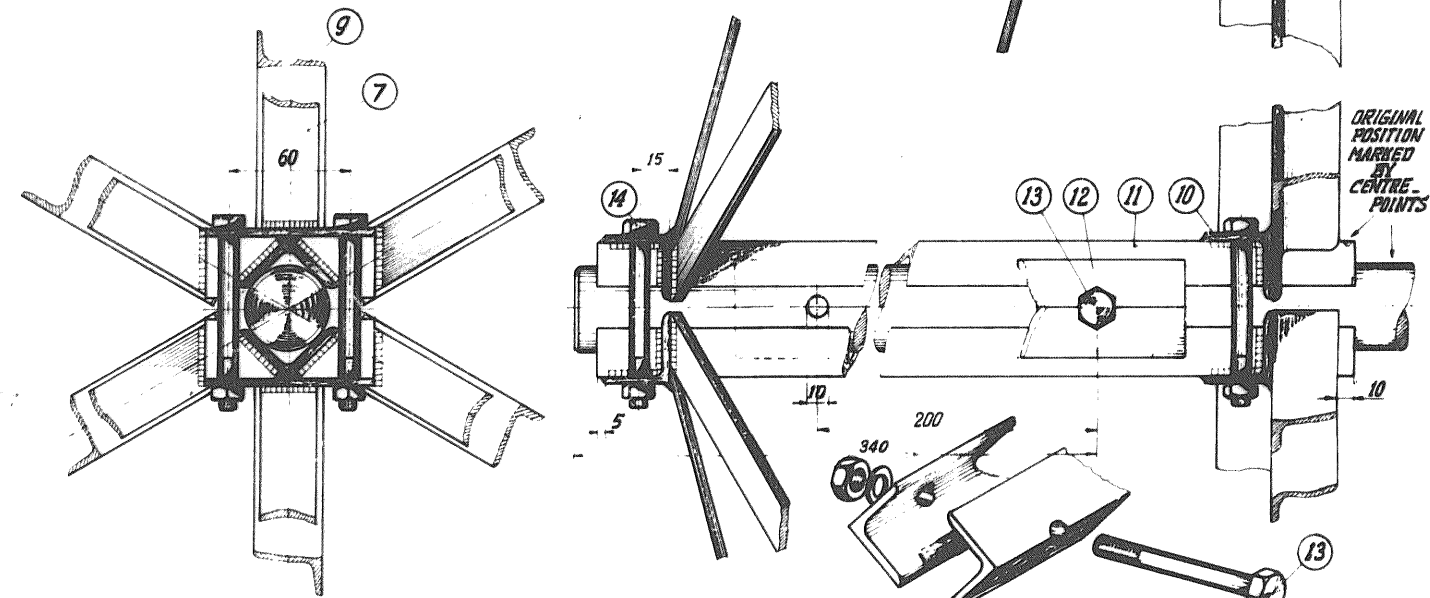
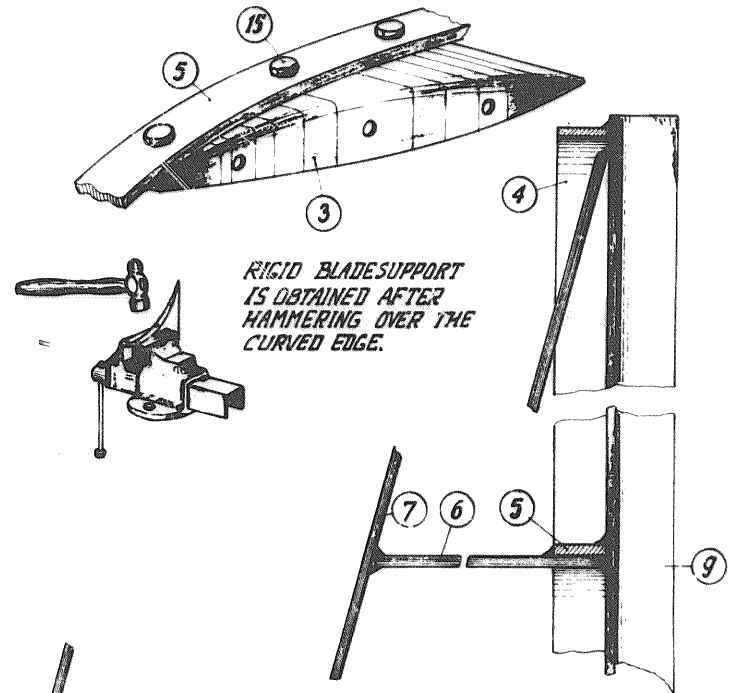
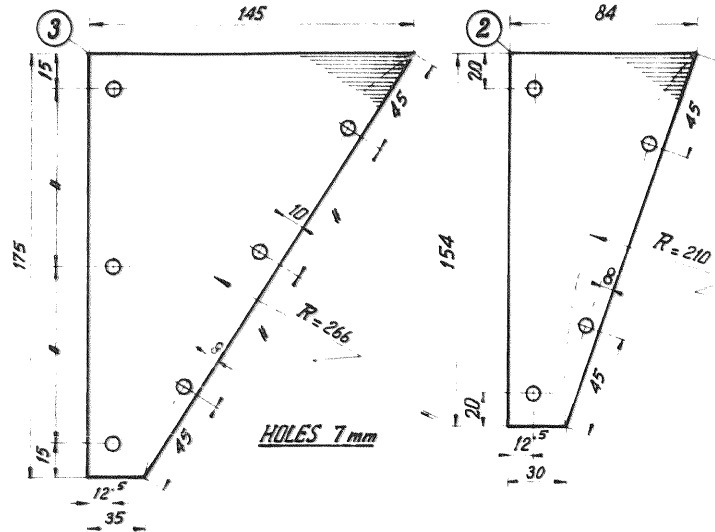
HELP DEVICE (1 MM SHEET)



IMPORTANT:
ROTOR FRAME IS COMPOSED ON ITS SHAFT TO PREVENT "JUMPING AND DANCING" OF THE SPOKES AND RINGS. REFERENCES!



SHEET IS ROLLED IN A BENDING - RADIUS OF APPR. 200 mm AFTER CUTTING THE RADIUS IS CORRECTED SO THAT 10% CURVED AIRFOILS WILL RESULT.

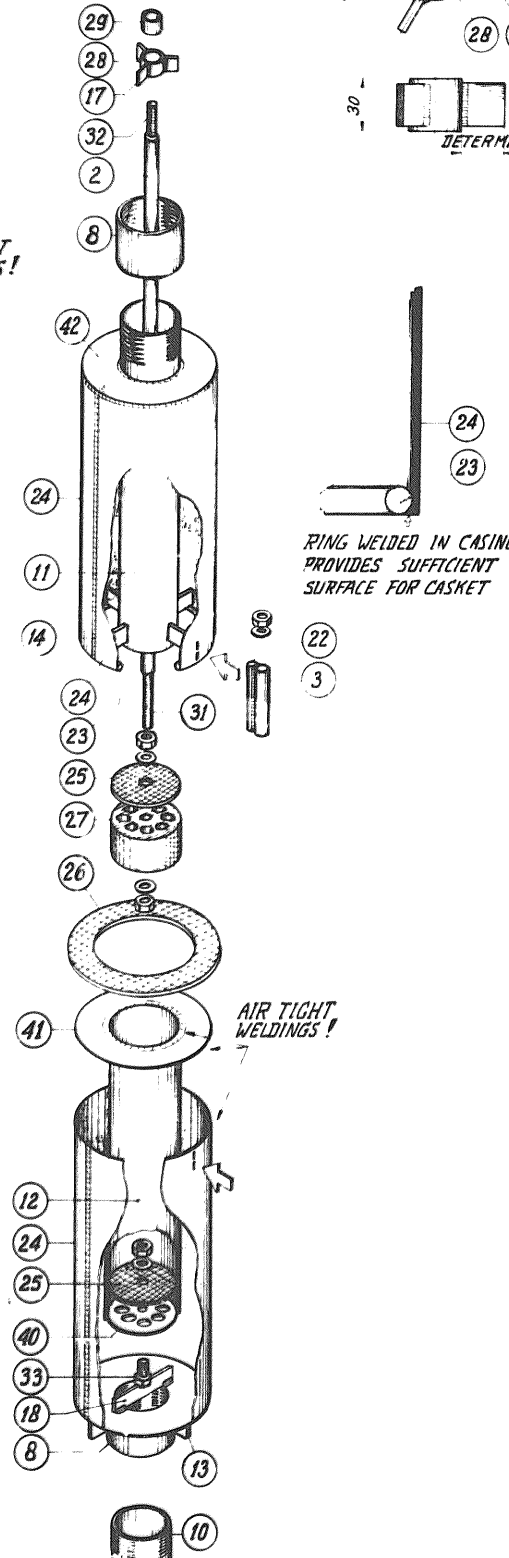
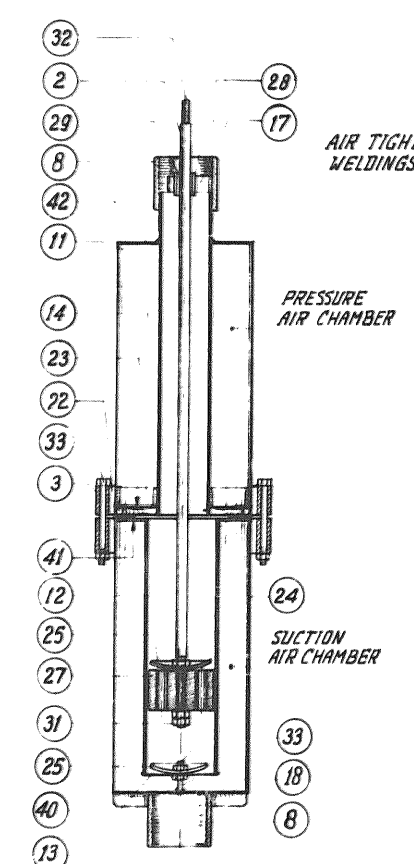
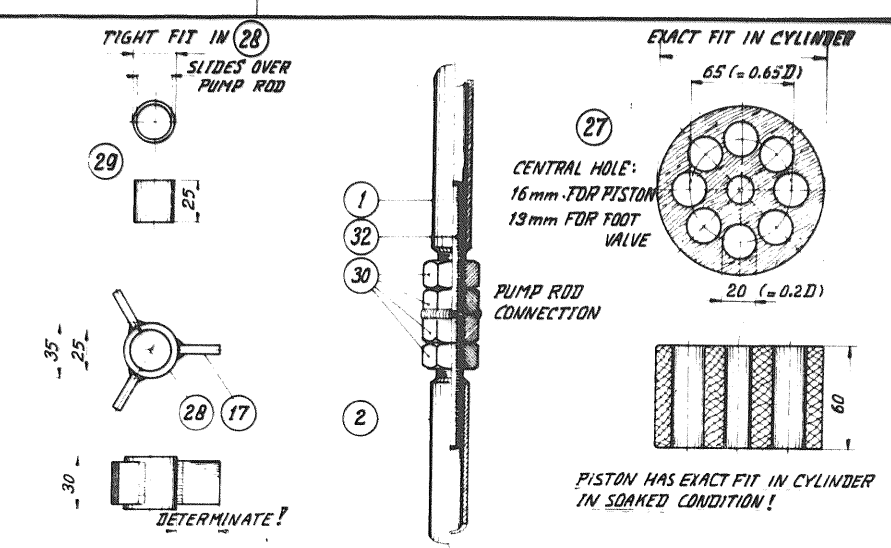
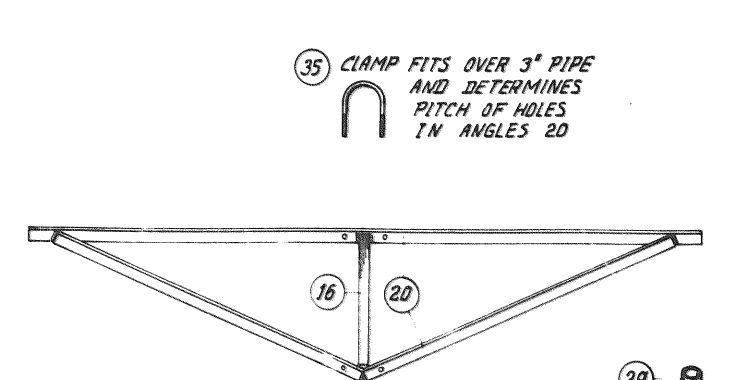
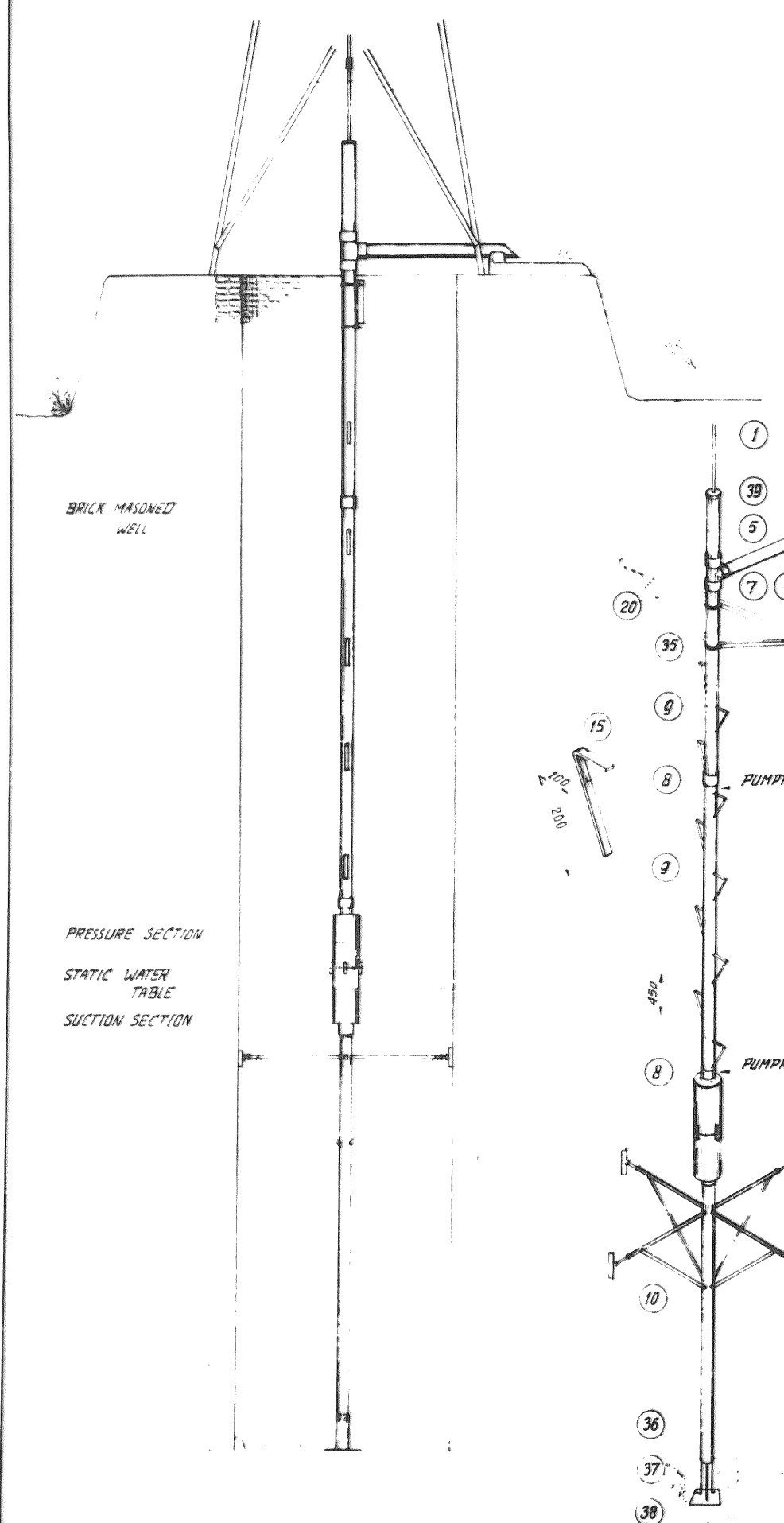


16	8	BOLT NUT WASHER	M 10 x 25 (W 3/8" x 1")
15	120		M 6 x 15 (W 1/8" x 1/2")
14	4		M 10 x 100 (W 3/8" x 4")
13	2		M 10 x 100 (W 3/8" x 4")
12	2	ANGLE IRON	30 x 30 x 3 (1 1/4" x 1 1/4") x 300
11	2		x 465
10	4		x 100
9	6		x 1330
8	4	FLAT IRON	25 x 5 (1" x 1/4") x 120
7	6		x 1330
6	6		x 190
5	1		2 x 2100
4	1		2 x 4200
3	12	BLADE SUPPORT	1 mm SHEET
2	12	BLADE	1 mm SHEET
1	12	BLADE	1 mm SHEET

NO. OF ROTOR FOR - 12 PU 350 - WINDMILL (A-2)

FOR INFORMATION:

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42	2	CASING - FLANGE	2mm SHEET	Ø220
41	1	FOOT VALVE	(SCRAP FROM NO 41)	
39	1	WOODEN PUMPROD GUIDE: 26 IN DRAWING NO 4		
38	1	BOTTOM SHEET	2mm SHEET	Ø 300
37	1	MESH		Ø 350
36	3	FOOT BAR	ROD	Ø 8 (3/8) x 400
35	2	CLAMP	ROD	Ø 8 (3/8) x 300
34	4	BOLT - NUT	M24 x 200 (W 1" x Ø")	
33	5	BOLT - NUT WASHER	M12 x 75 (W 1/2" x 3")	
32	*	THREAD STUD	M16 x 75 (W 5/8" x 3")	
31	1		M16 x 125 (W 5/8" x 5")	
30	*	NUTS	M16	(W 5/8")
29	1	BRONZE BUSH	Ø 25 x 25	
28	1	STEEL BUSH	Ø 35 x 30	
27	2	PISTON / FOOTVALVE	TEAKWOOD	
26	1	GASKET	SOLE LEATHER	Ø 225 x 6 mm
25	2	VALVE		Ø 100 x 6 mm
24	2	CASING	2mm SHEET	350 x 660
23	1	RING	ROD	Ø 8 (Ø 3/8")
22	4	FILLING PIECE	ROD	Ø 8 (Ø 3/8") x 40
21	4	ANGLE IRON		30x30x3 (1 1/4" x 1 1/4" x 200
20	2			*
19	4			x 700
18	1	FLAT IRON		25x5 (1" x 1/4") x 120
17	3			x *
16	1			x 450
15	*			x 300
14	4			
13	4			
12	1	CYLINDER	SEAMLESS	4" GASPIPE x 325
11	1	DELIVERY PIPE		3" x 425
10	1	SUCTION PIPE		3" x *
9	1	DELIVERY PIPE (EXTENSION)		3" x 3M
8	*	SOCKET	FOR	3"
7	1	T-SOCKET		3"
6	1	EXHAUST PIPE		3" x *
5	1	TOP PIPE		3" x 700
4	4	POSITIONING PIPE		1" x *
3	4	PIPE		5/8" x 50
2	1	PUMPROD		5/8" x 750
1	*	PUMPROD EXTENSION		5/8" x *

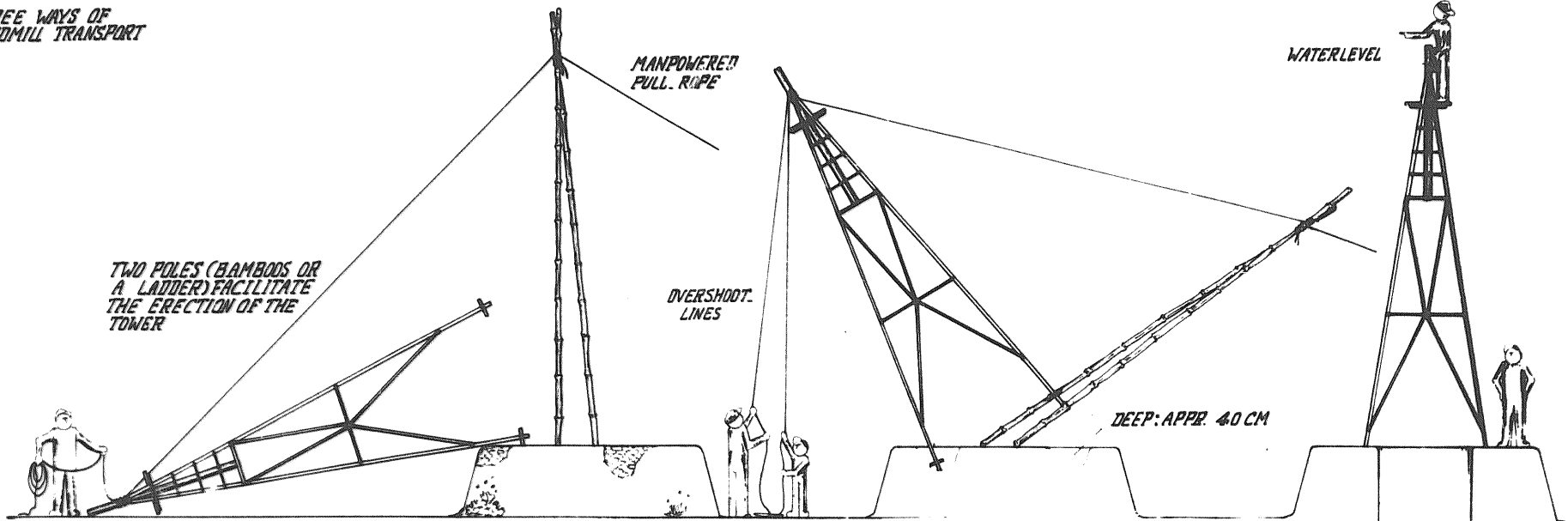
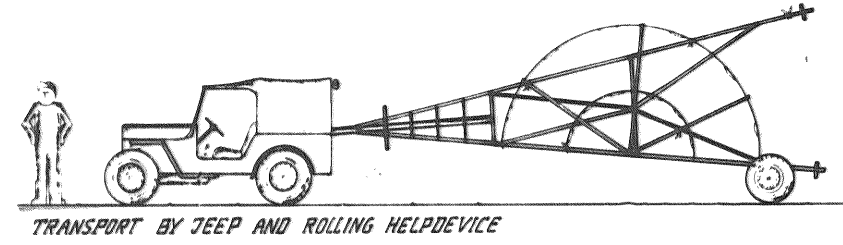
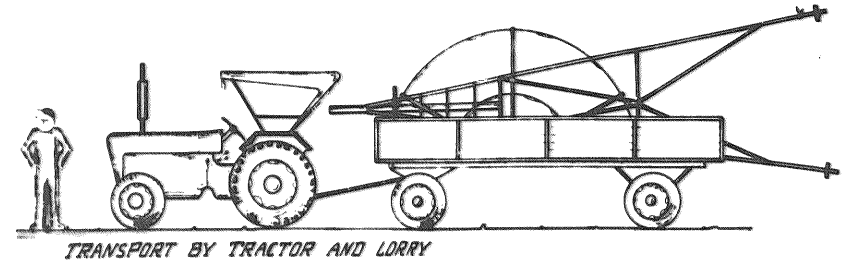
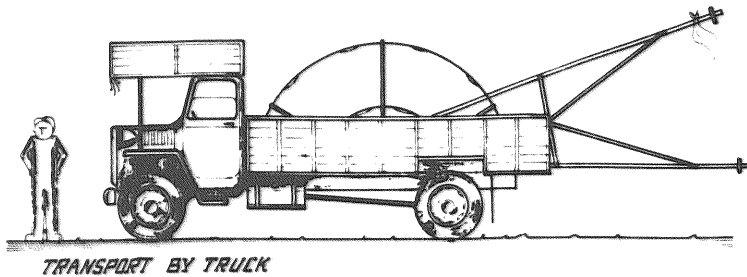
NO NUM. MATERIAL/NAME/REMARKS/MEASUREMENTS

6 OF 7 4" PISTON PUMP FOR 12 PU350 WINDMILL

FOR INFORMATION:

© 1980 WICK VAN DE VEN
TUL. FOUNDRY
HOUTSTADT
WINDMILL

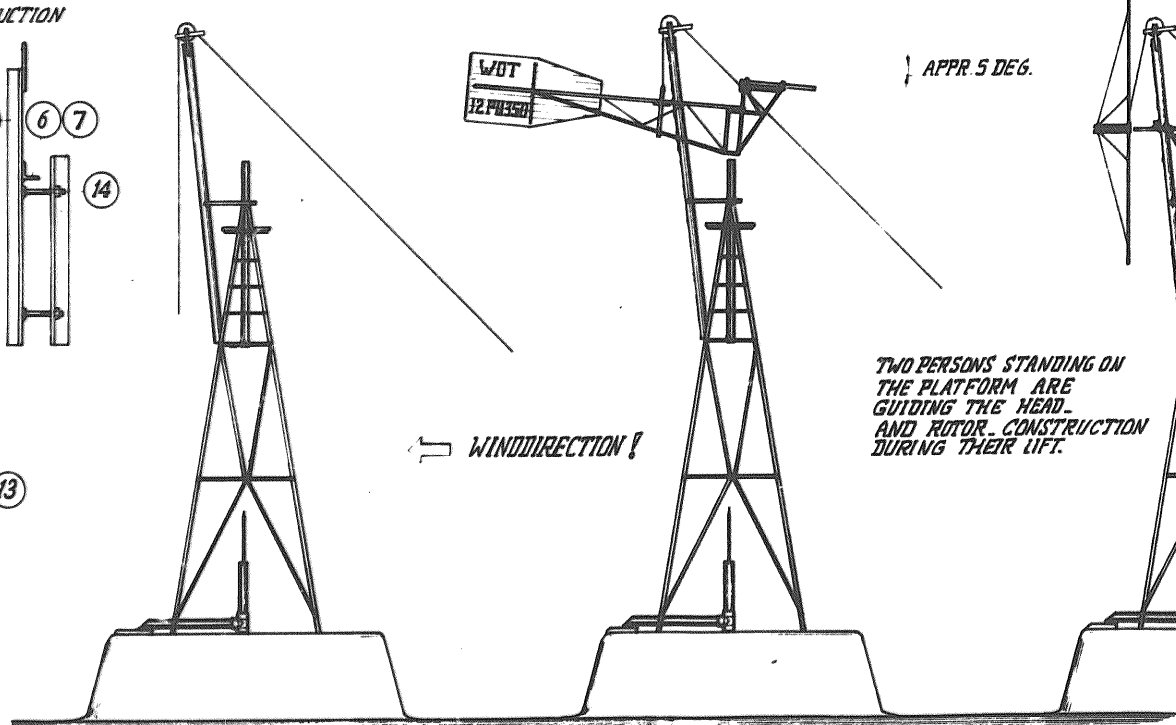
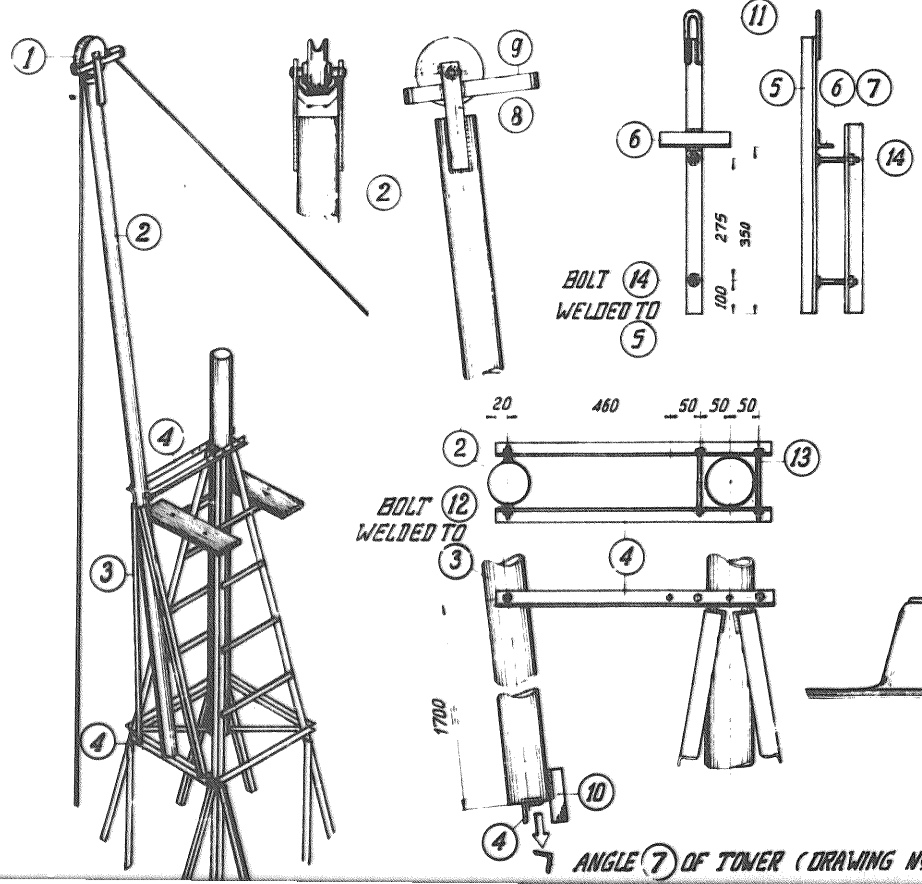
THREE WAYS OF WINDMILL TRANSPORT



IMPORTANT: AFTER PLACING THE TOWER THE TOWERLEGS ARE POURED IN WITH CONCRETE AND AFTER APPR. 5 DAYS THE HEAD AND ROTOR CONSTRUCTION CAN BE INSTALLED SAFE AND QUICK BY MEANS OF LIFTING DEVICES. DURING THE DRYING PERIOD OF THE CONCRETE FUNDATION THE PISTON PUMP IS FIXED INTO THE WELL ACCORDING TO THE SPECIFICATIONS!

'JIB' - LIFTING HELPDEVICE

LIFTING HOOK FOR HEAD CONSTRUCTION



TWO PERSONS STANDING ON THE PLATFORM ARE GUIDING THE HEAD AND ROTOR CONSTRUCTION DURING THEIR LIFT.

SINCE THE CENTRE OF GRAVITY OF THE HEAD CONSTRUCTION IS SITUATED ABOVE THE UPPER TAIL ANGLE A SPECIAL LIFTING HOOK IS APPLIED. A SMOOTH SLIDING OVER THE TOWER PIPE IS ACHIEVED IF THE FRONT IS OUT OF BALANCE APPR 5 DEGR.

ROTOR IS LIFTED AND POSITIONED AT THE TOP OF ITS SHAFT AND SHIFTED IN ITS ORIGINAL POSITION (CENTRE POINTS!) AND FIXED. NOW THE 'JIB' CAN BE REMOVED AND THE BLADES, SAFETY DEVICE AND MOVING PARTS ARE ASSEMBLED.

NO	NUM. BER	MATERIAL / NAME / REMARKS / MEASUREMENTS
14	2	BOLT NUT WASHER M.10 x 75 (W 3/8" x 3")
13	1	M.10 x 125 (W 3/8" x 5")
12	2	M.10 x 50 (W 3/8" x 2")
11	1	ROD Ø 10 (Ø 3/8") x 200
10	1	FLAT 25 x 5 (1" x 1/4") x 100
9	1	x 550
8	2	x 200
7	1	ANGLE IRON 30 x 30 x 3 (1 1/4" x 1 1/4") x 385
6	1	x 200
5	1	x 550
4	3	x 500
3	2	x 1700
2	1	GAS PIPE Ø 3" x 4000
1	1	PULLEY SHAFT AND ROPE OR STEELCABLE (30 M)
<p>FOR INFORMATION:</p> <p>INSTALLING THE WINDMILL - 12 PU 350 -</p>		