



Lotus Condenser and Hertz Dry Cooling system 莲花凝汽器及赫兹干式冷却系统

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of China Power Engineering Consulting Group

Lotus Condenser on IACCC in Xi'an 2015

莲花凝汽器

2015年国际空冷凝汽器会议·西安

■ WD: What was dug out?

■ 发现了什么？

■ WS: What is solved ?

■ 解决了什么？

■ WB: What would be do?

■ 设想了什么？

WD: What was dug out?

发现了什么？

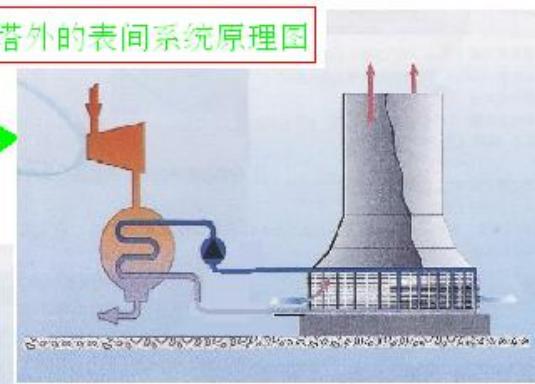
- Most Chinese customer like natural draft much more in dry cooling.
- 干式冷却时，更多的中国雇主偏爱自然抽风。
- Cooling element of Indirect system (with surface condenser) was inclined to erect on ground outside the cooling tower.
- 表间系统的冷却元件趋向安装在塔外地面上。
- Natural draft direct system (NDACC) don't achieve because of difficult.
- 由于存在困难，尚未实现直冷系统的自然通风。

Was inclined to erect on ground outside the tower

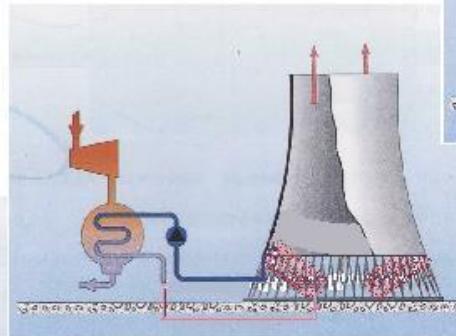
带有表面式凝汽器、三角冷却元件立柱布置在塔外的表间系统原理图

Scal system

Patent right of NCPE



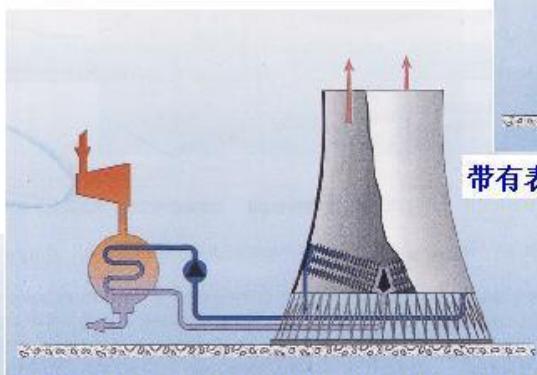
← Would be called
Candiota system



带有表面式凝汽器、三角形冷却元件倾斜布置在塔内进风口处的表间系统原理图

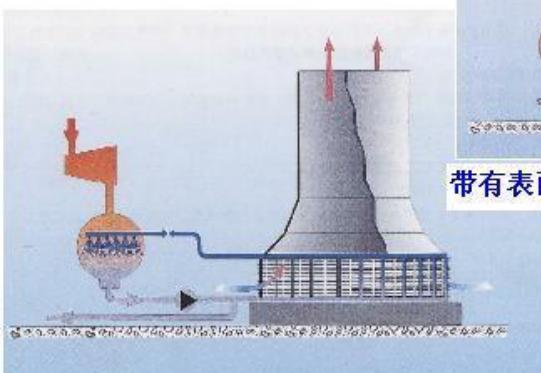
Hamon system

(not a few Chinese call it Hamon system)
(有不少的中国人叫此系统为Hamon系统)



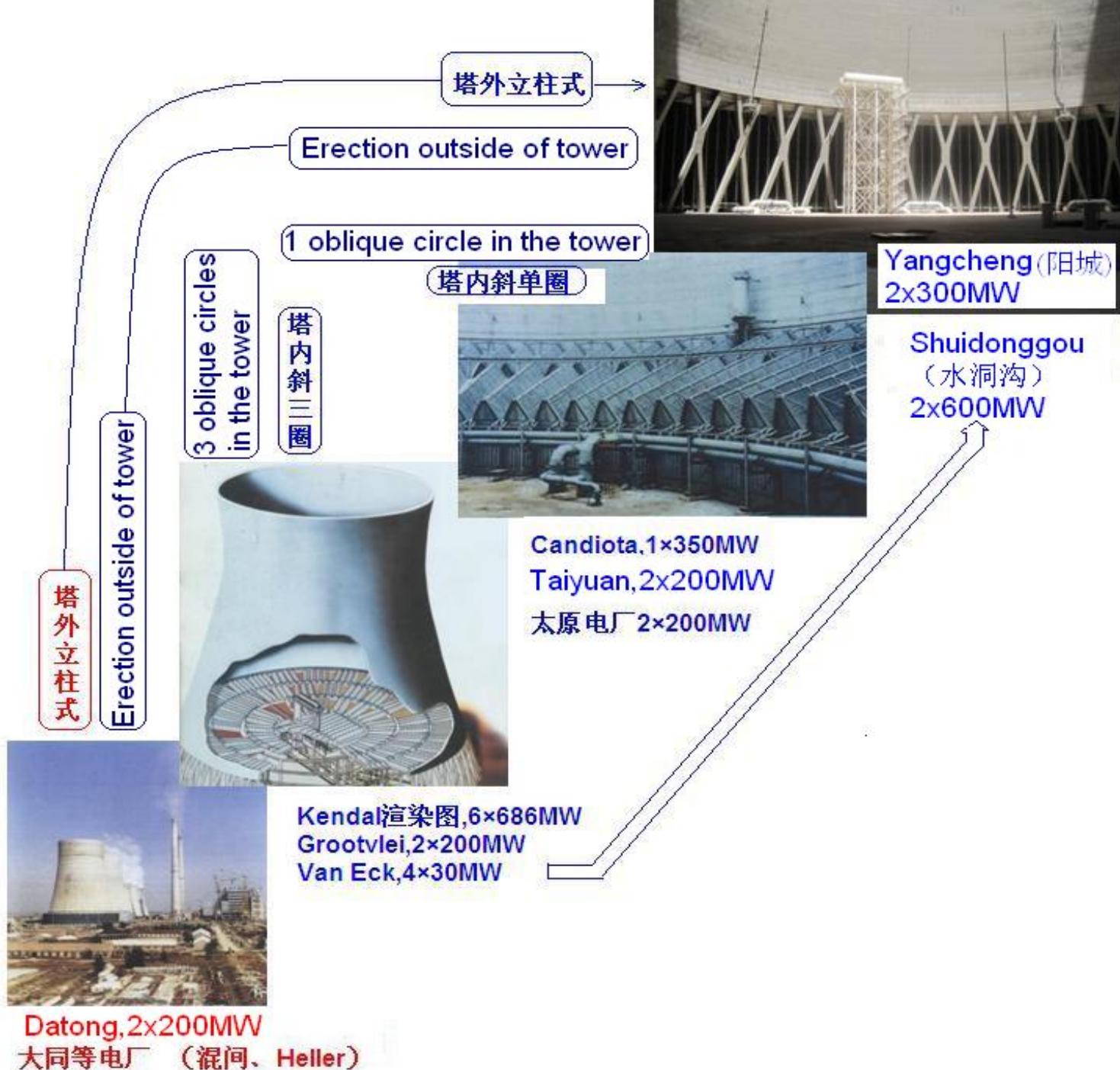
←

Heller system



带有直接接触、喷淋式凝汽器和三角形立柱式冷却元件，布置在塔外的Heller系统原理图

Was
inclined
to erect
on
ground
outside
the
tower



WS: What is solved ?

解决了什么？

(1) ACC →

(2) NDACC/NDC →

(3) LACC/LC

(1) 空冷凝汽器 →

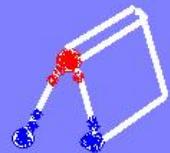
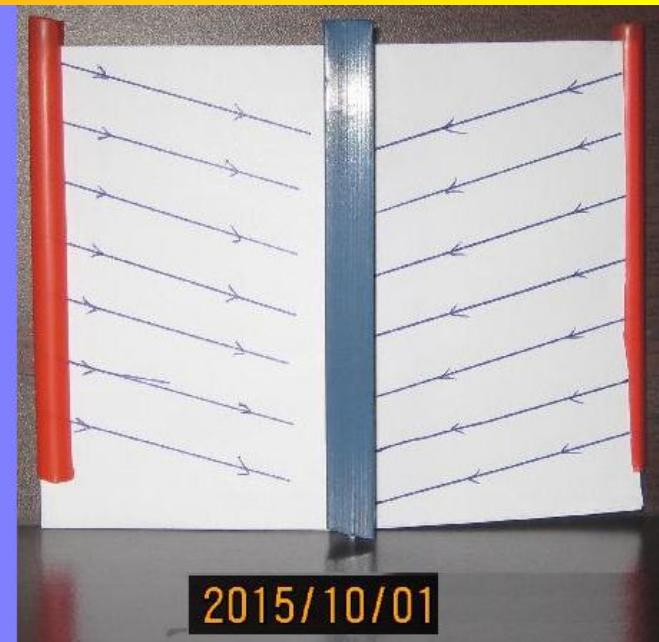
(2) 自然抽风凝汽器 →

(3) 莲花凝汽器

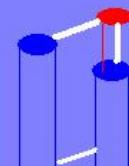
(1)
ACC

(2)
NDC

(3)
LC



2015/10/01



2015/10/01



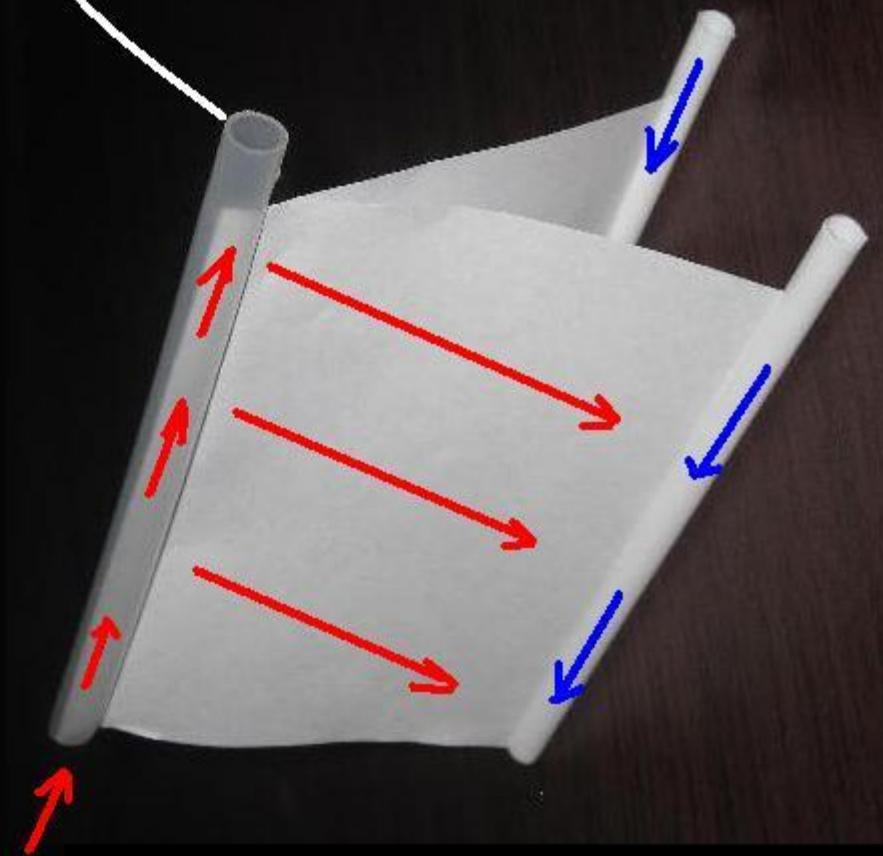
(1)



Traditional
ACC

(2)

Natural Draft
ACC



- Patent
- for
- NDACC

证书号第1496156号



20122506

发明专利证书

发明名称：塔式直接空冷凝汽器及其塔式直接干冷系统

发明人：杨护洲；惠建本；程文良

专利号：ZL 2012 1 0513332.0

专利申请日：2012年12月03日

专利权人：中国电力工程顾问集团西北电力设计院

授权公告日：2014年10月15日

本发明经过本局依照中华人民共和国专利法进行审查，决定授予专利权，颁发本证书，并在专利登记簿上予以登记。专利权自授权公告之日起生效。

本专利的专利权期限为二十年，自申请日起算。专利权人应当依照专利法及其实施细则规定缴纳年费。本专利的年费应当在每年12月03日前缴纳。未按照规定缴纳年费的，专利权自应当缴纳年费期满之日起终止。

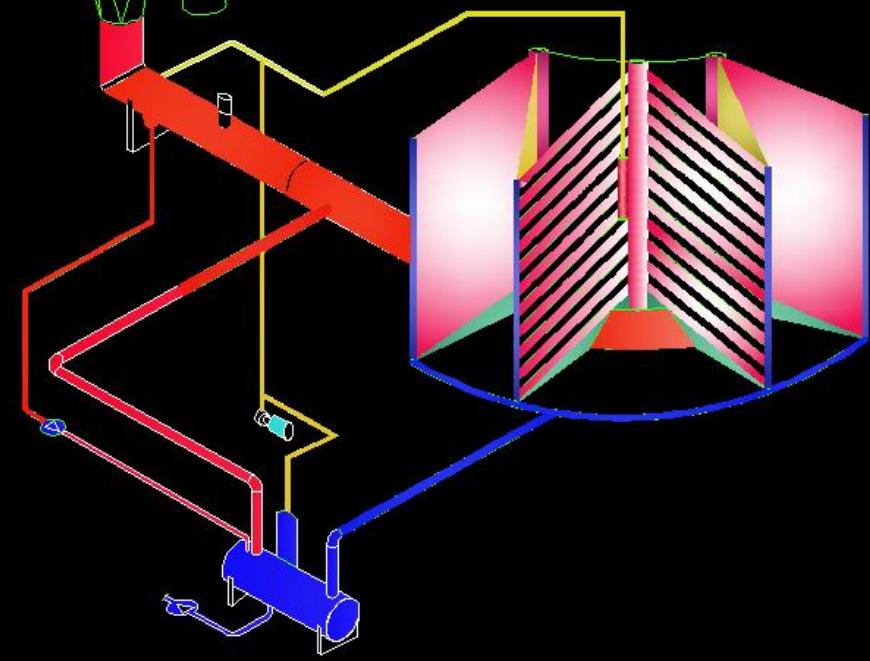
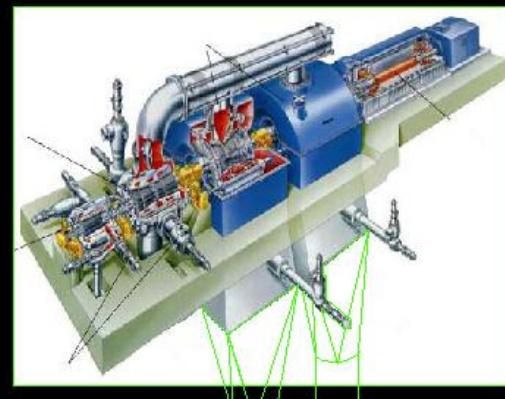
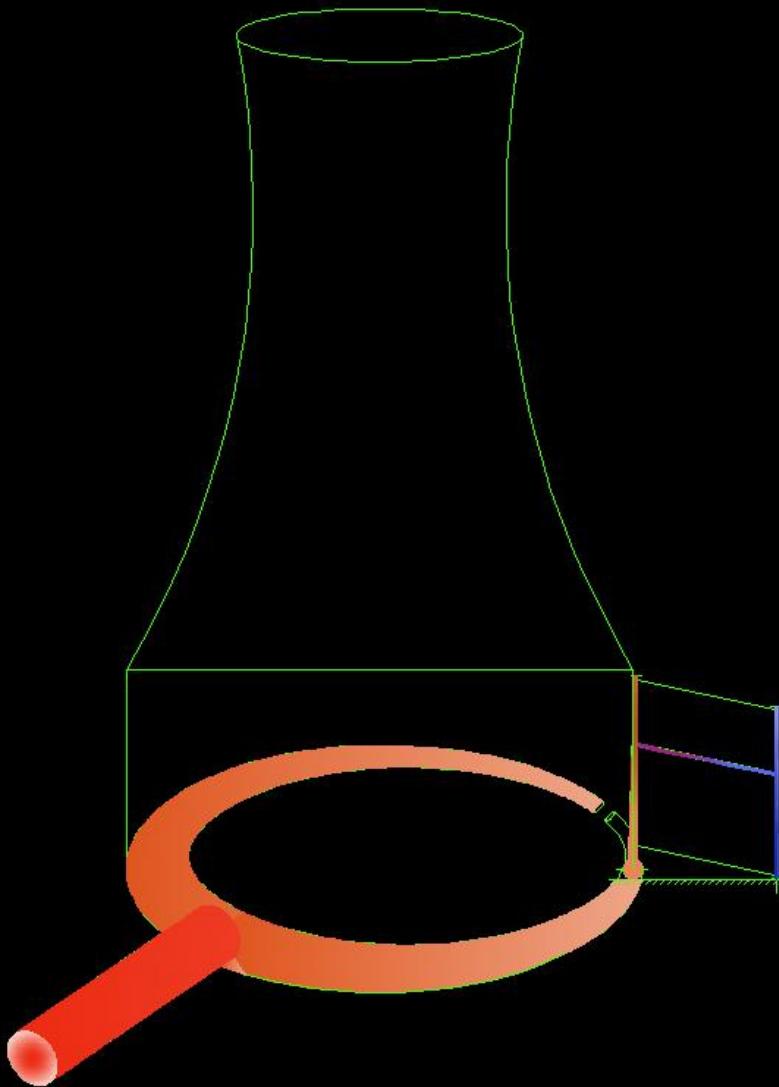
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局长
申长雨

申长雨





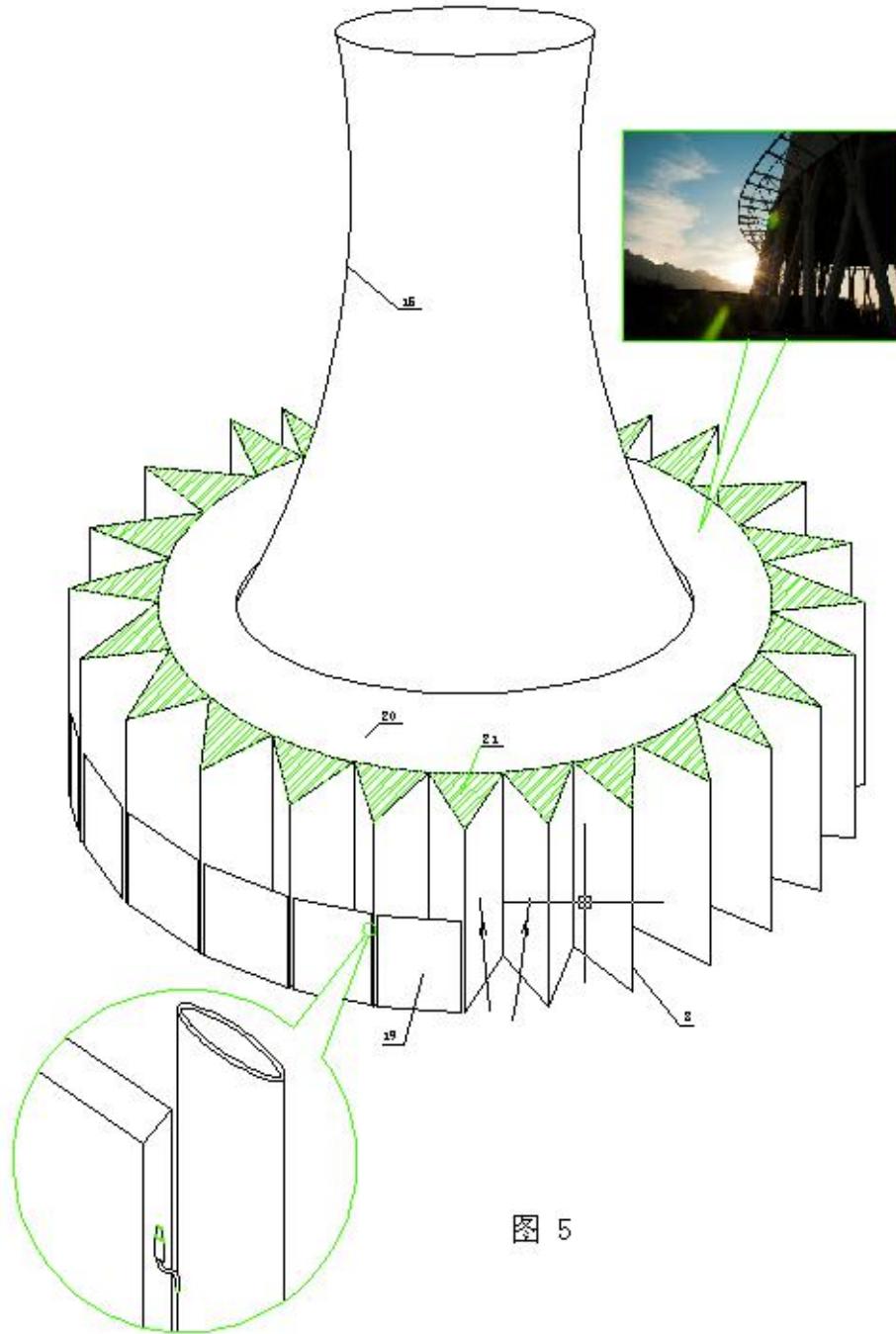


图 5

Test on a 3kW power plant unit



- Test
- on
- a
- 3kW
- Power
- plant
- unit

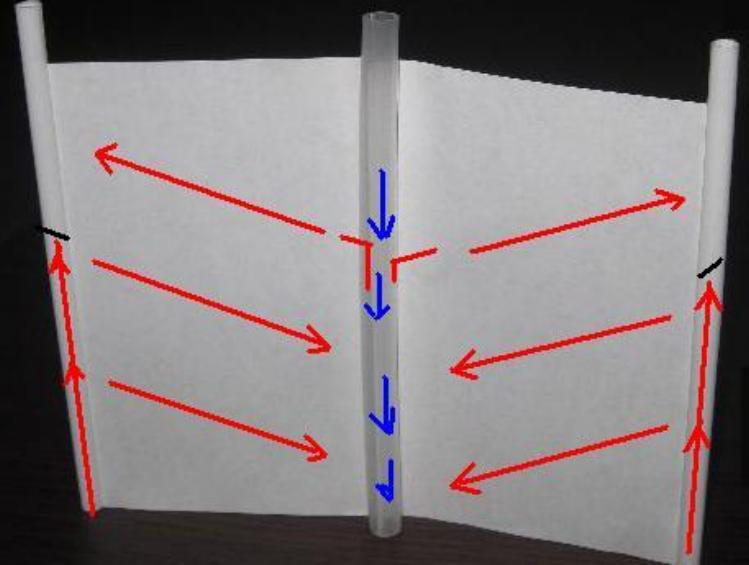
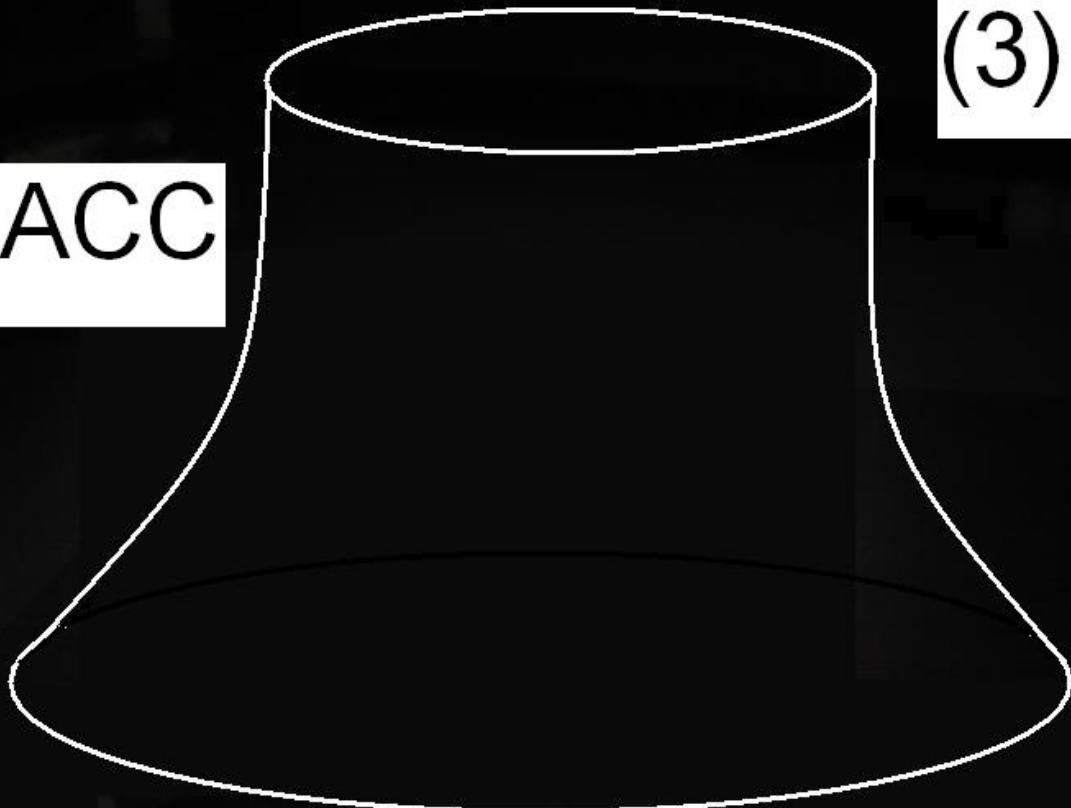


Test on a 3kW power plant unit



(3)

LACC



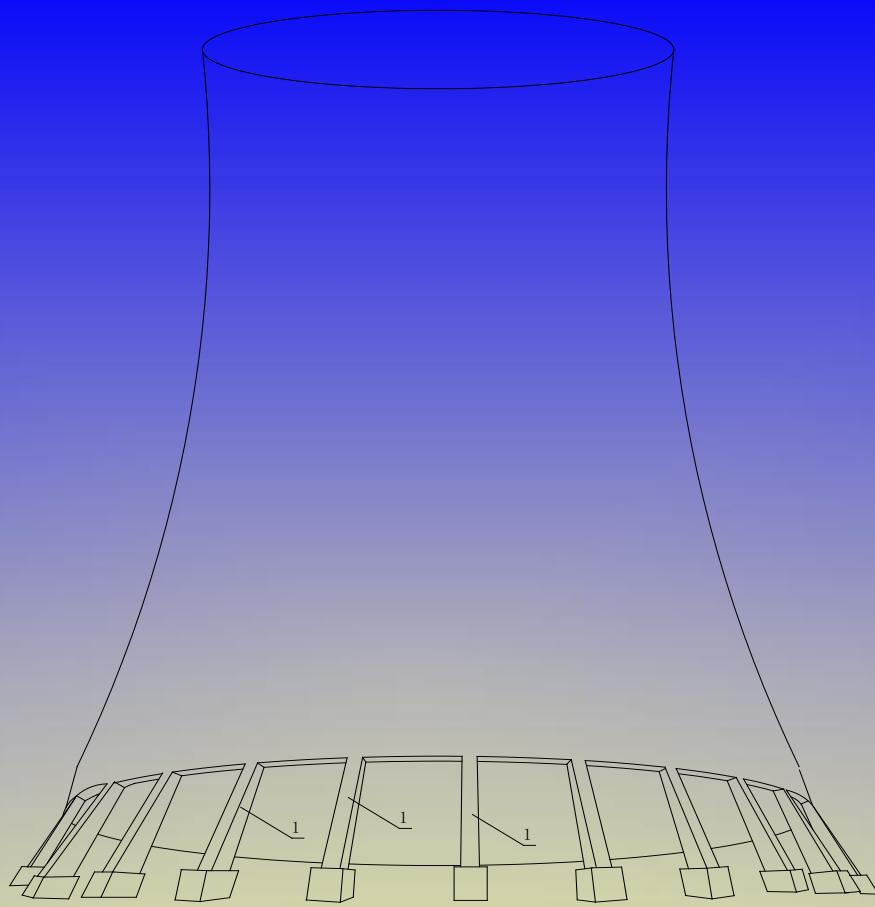


图 1

Fig.1 Natural Draught Cooling Tower



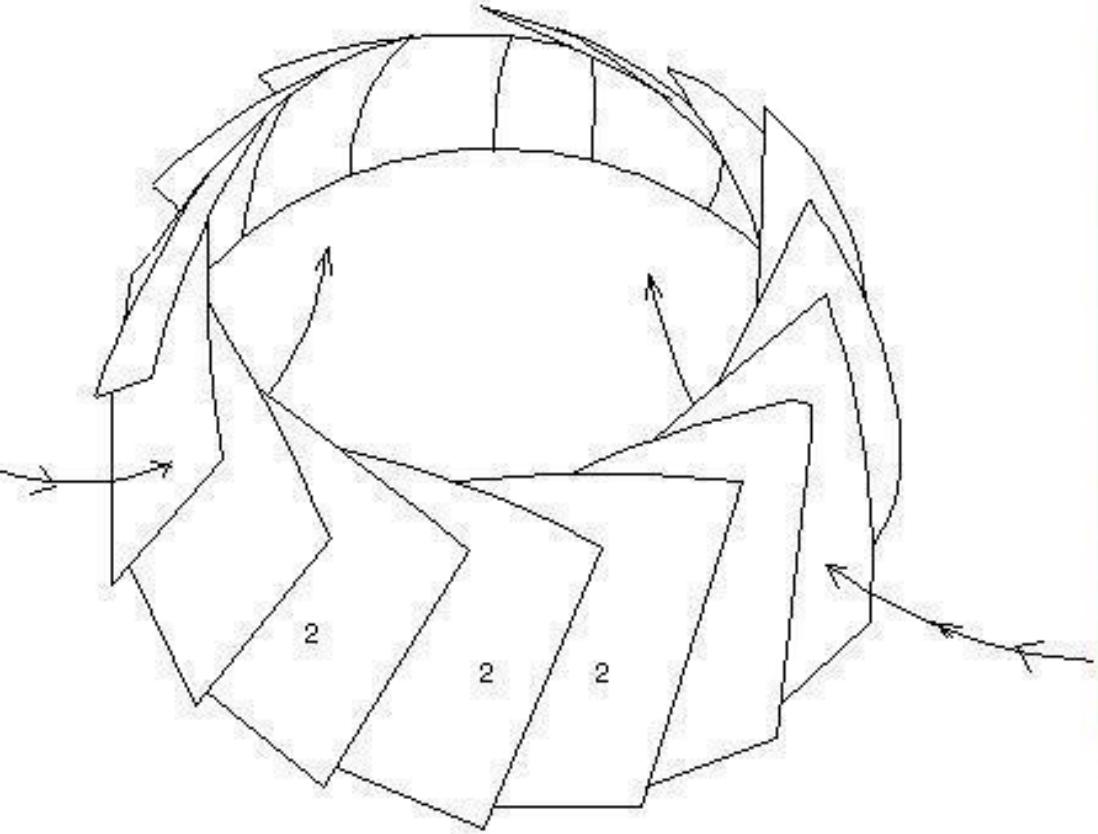


Fig.2 Outside Flat of Lotus Condenser Close in the Summer

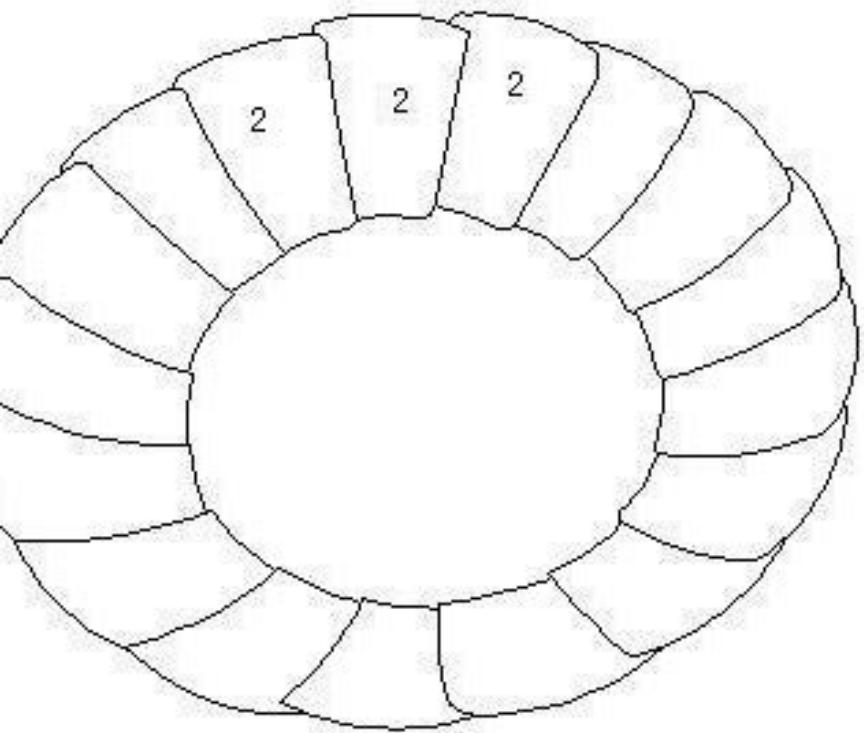


Fig.3 Outside Flat of Lotus Condenser Close Open in the Winter

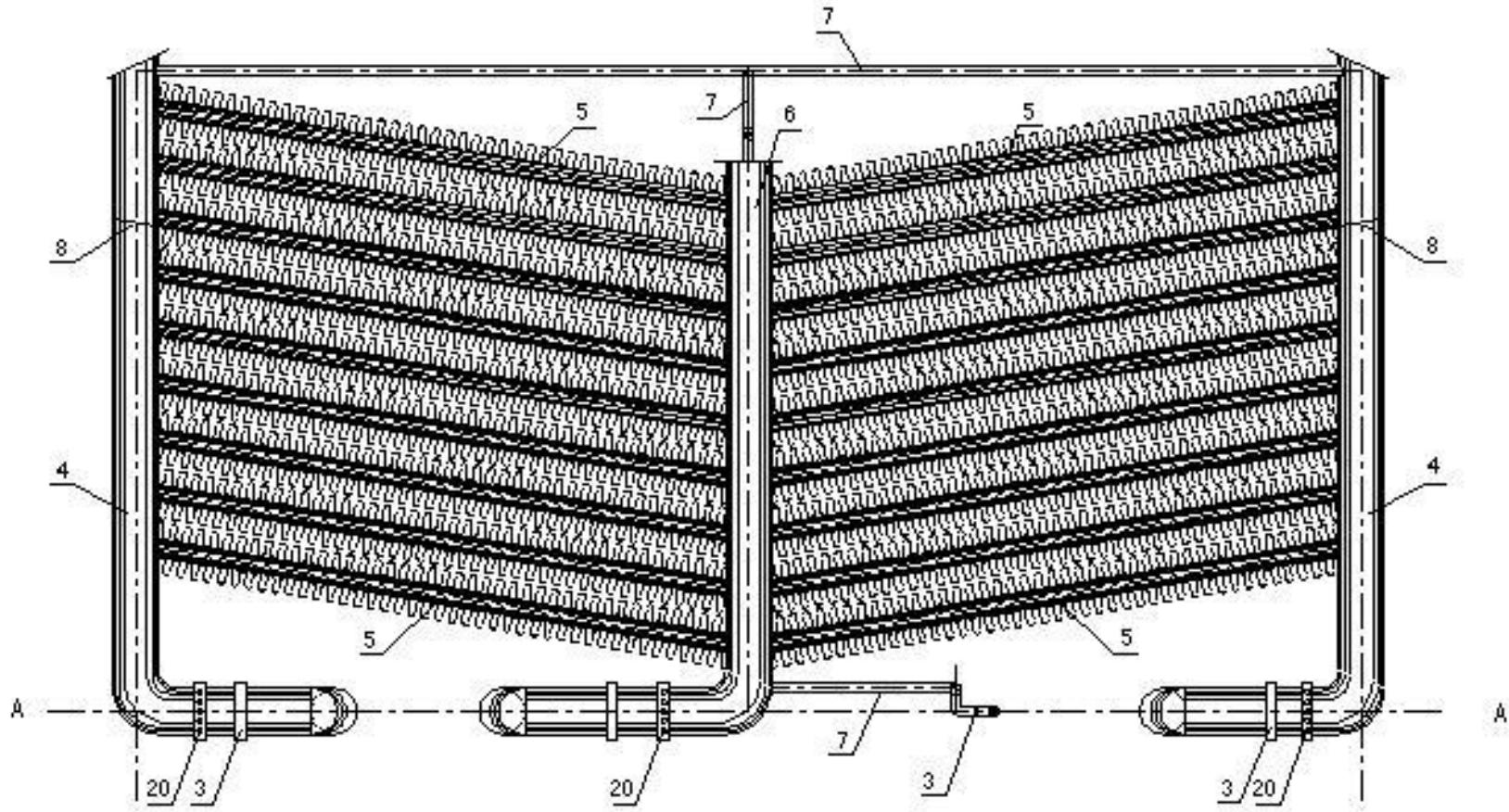


Fig.4 Lotus Condenser Flat

(No louvers and its resistance , Clear fin by pure water in gravity direction/无百叶窗及其阻力，垂直清洗翅片)

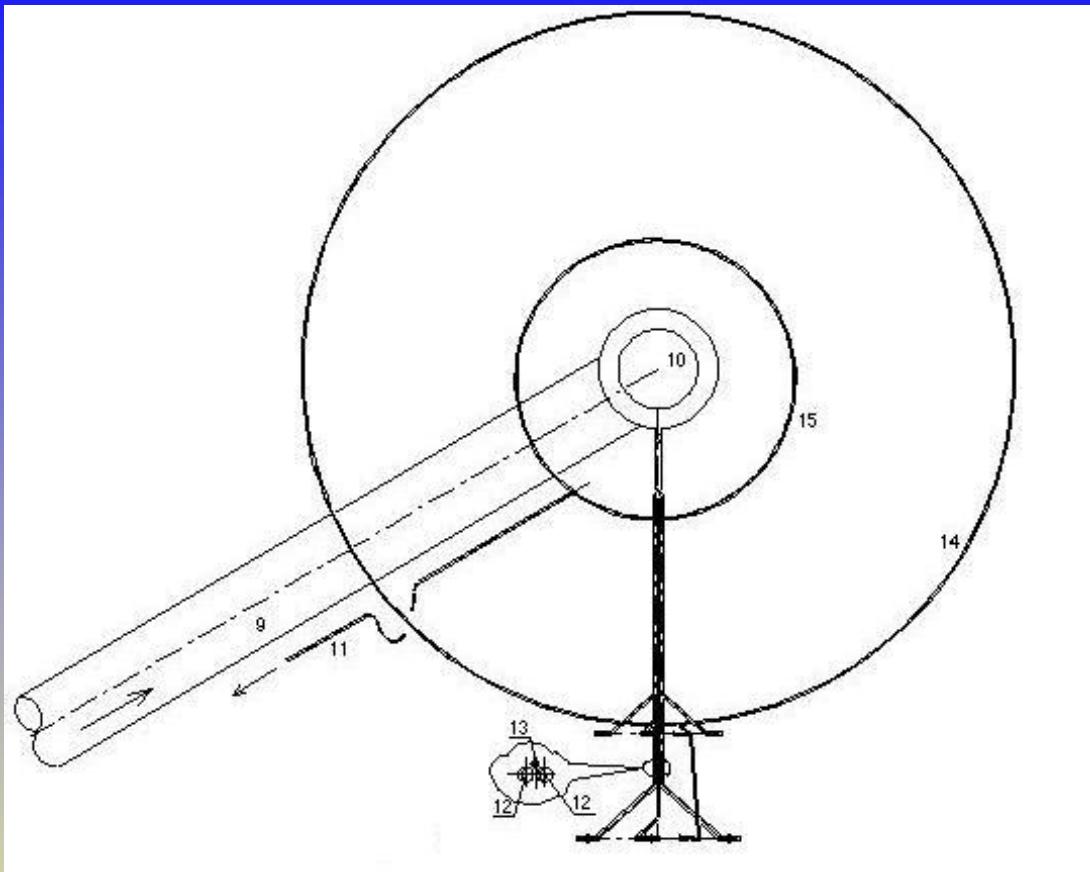


Fig.5 Pipe Arrangement Below A-A Axis

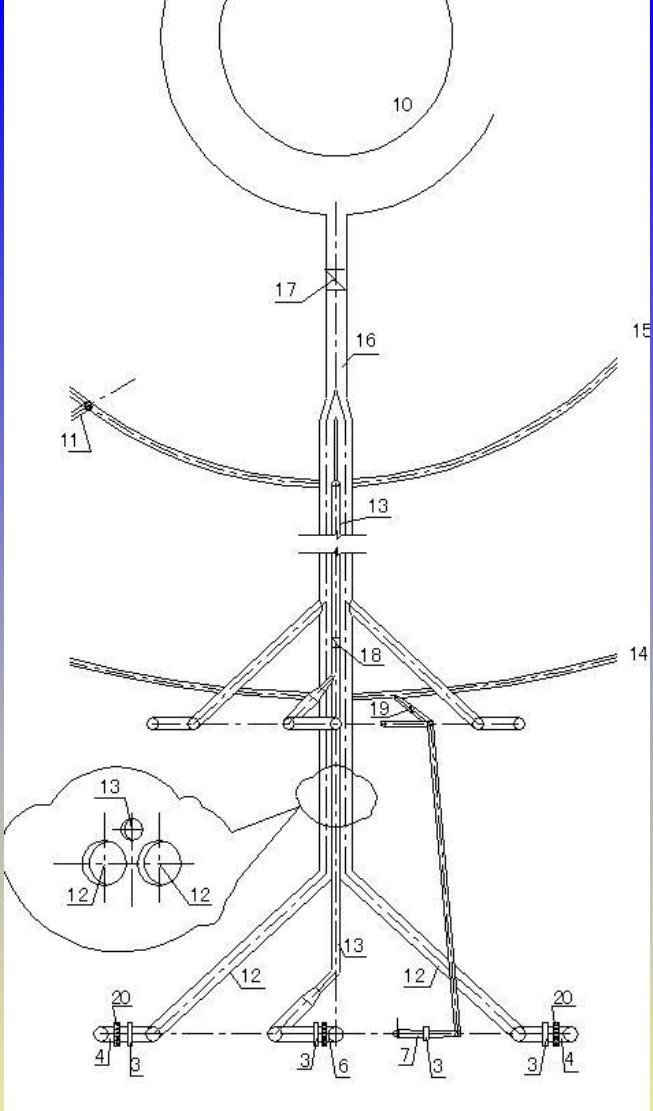


Fig.6 Big Size of fig.5
(Heat recovery/回收热量)

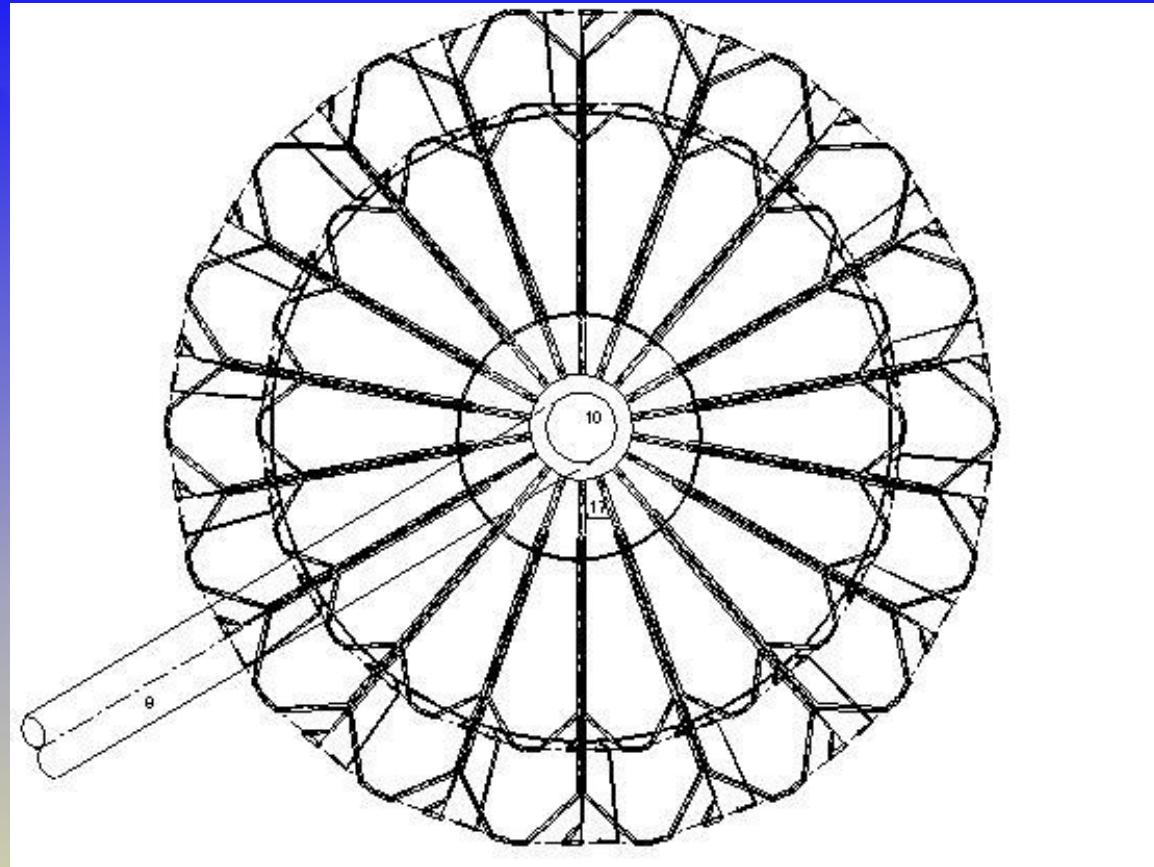
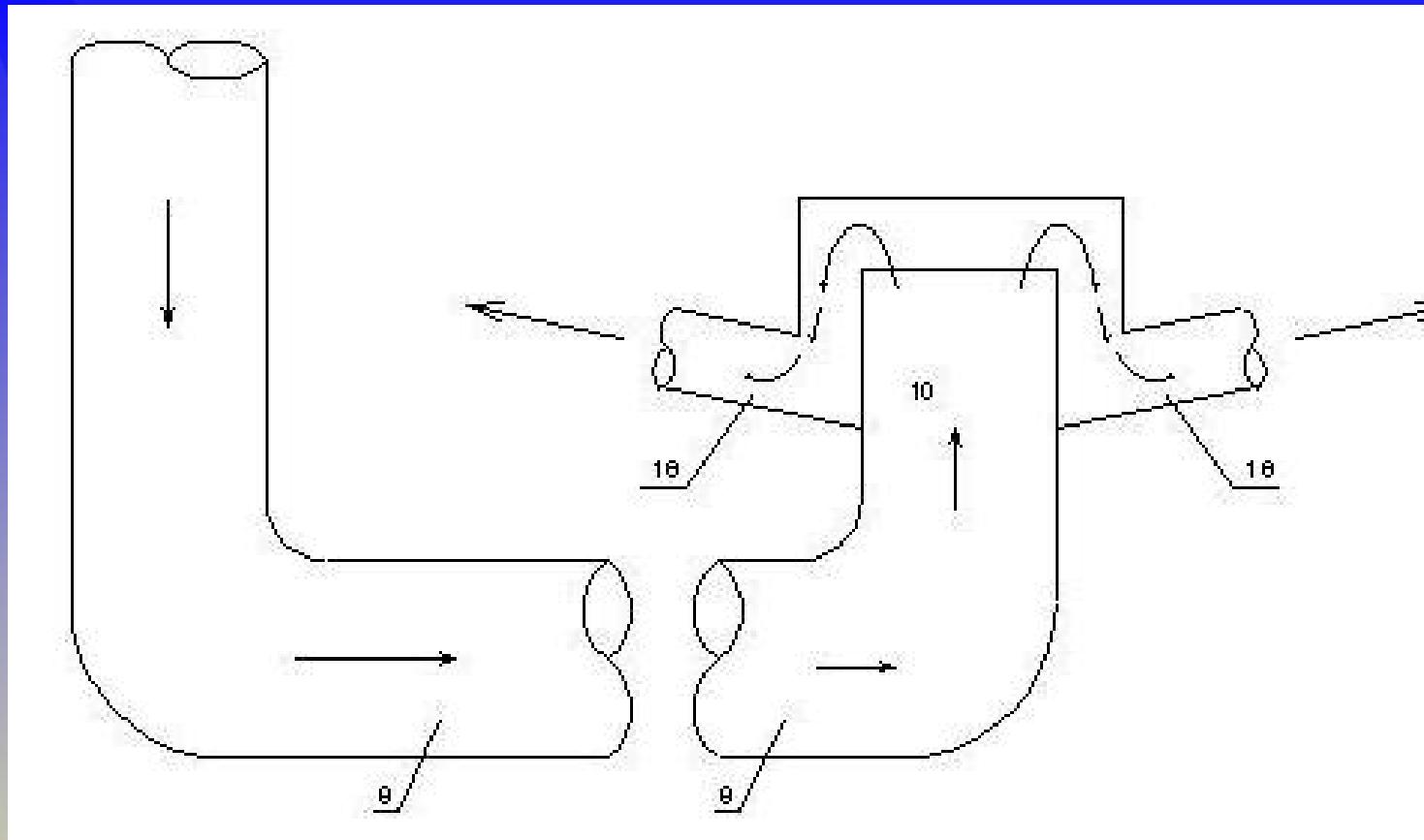


Fig. 7 Lotus Condenser



**Fig.8 Exhaust steam duct with plastic liner
and distribution steam silo with a cover**

(Adjust section, to fit two slope/调整段，以适应双向坡度)

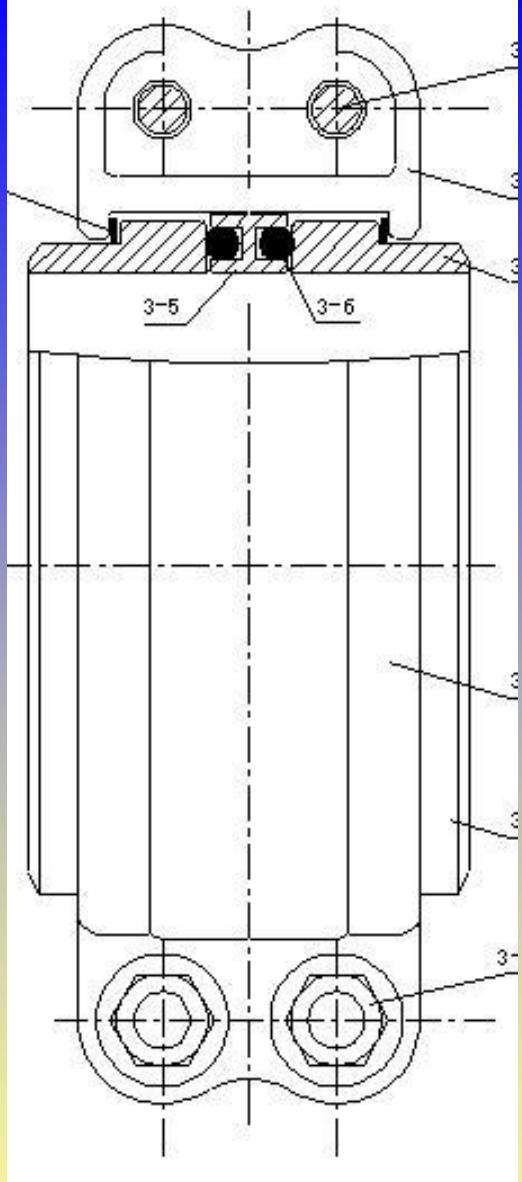


Fig. 9 Clamps joint activities

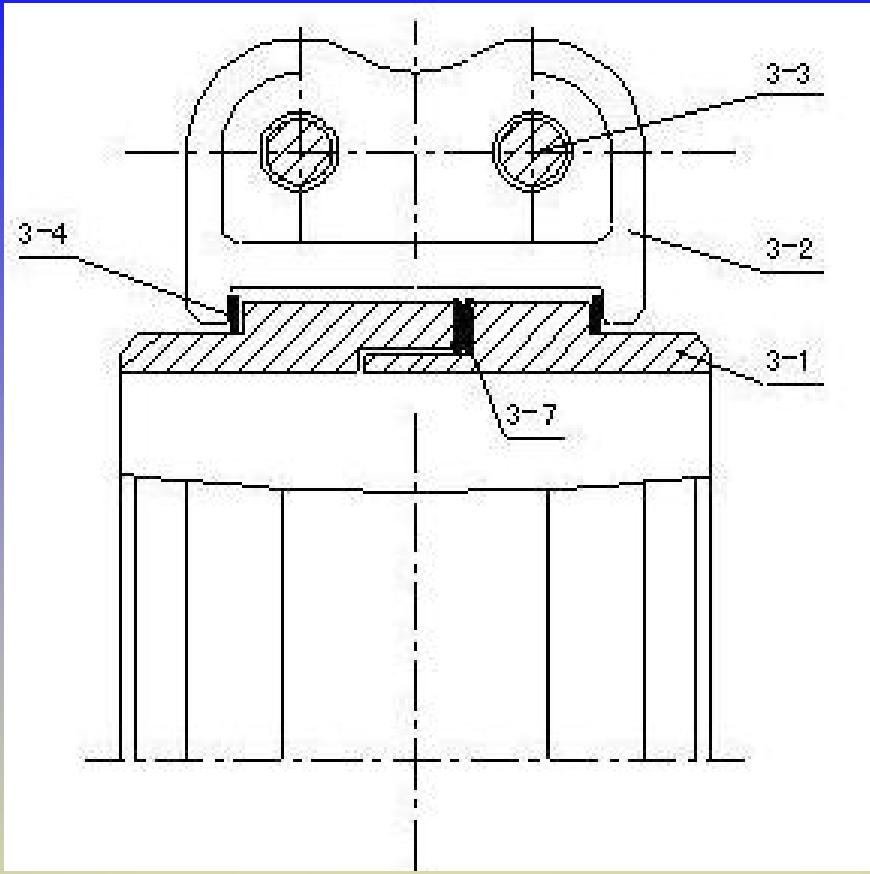
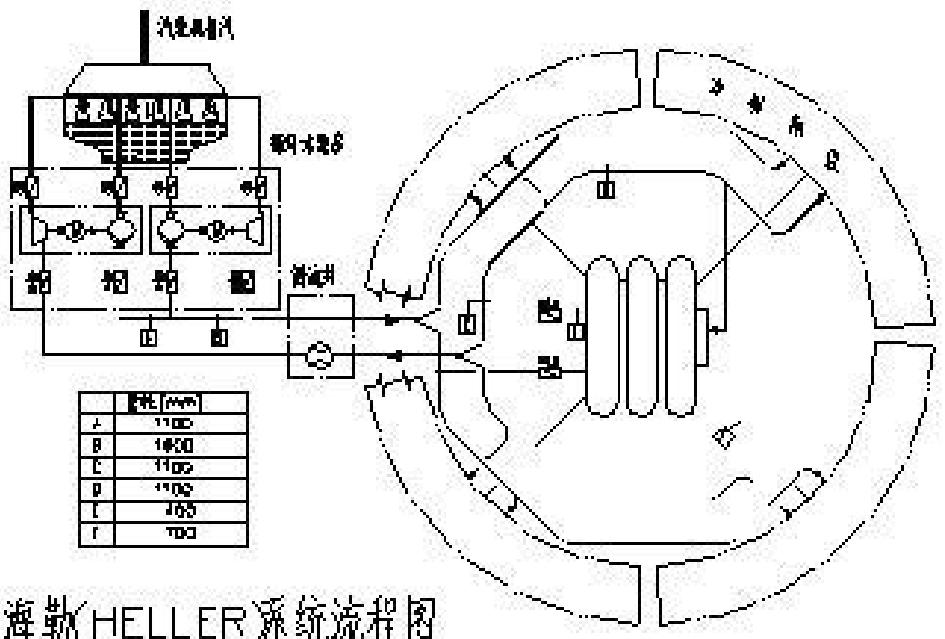


Fig.9A Clamps joint activities



海勒(HELLER)系统流程图

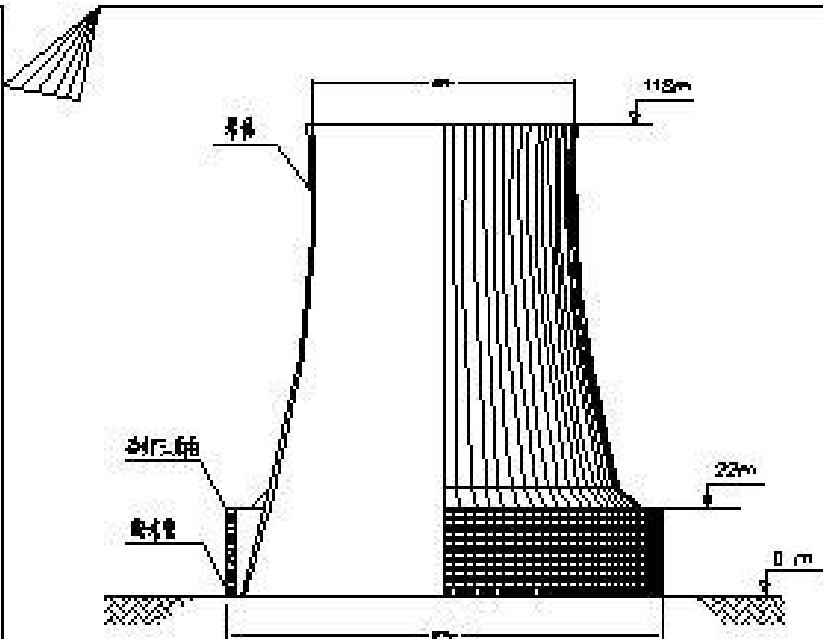


Fig 10 Flow Diagram of Heller System

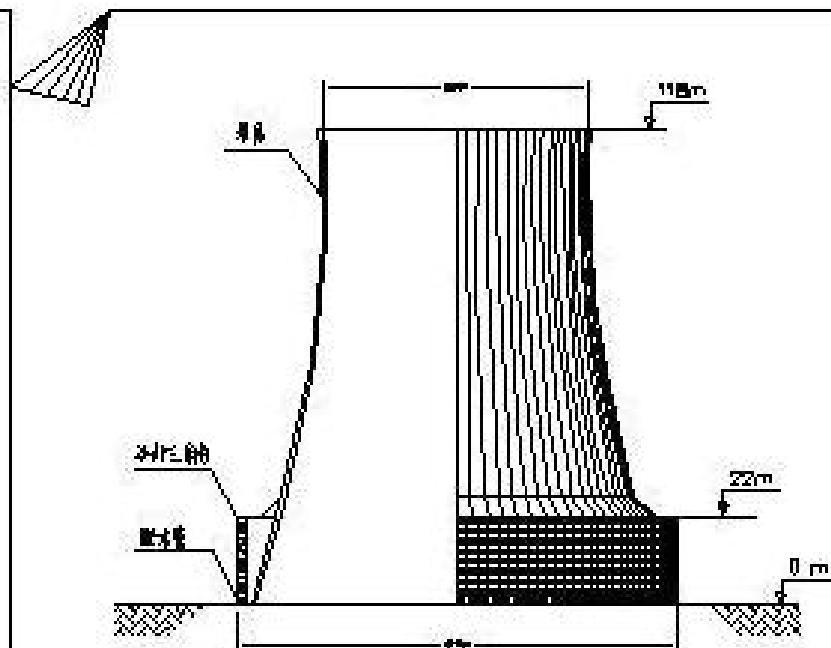
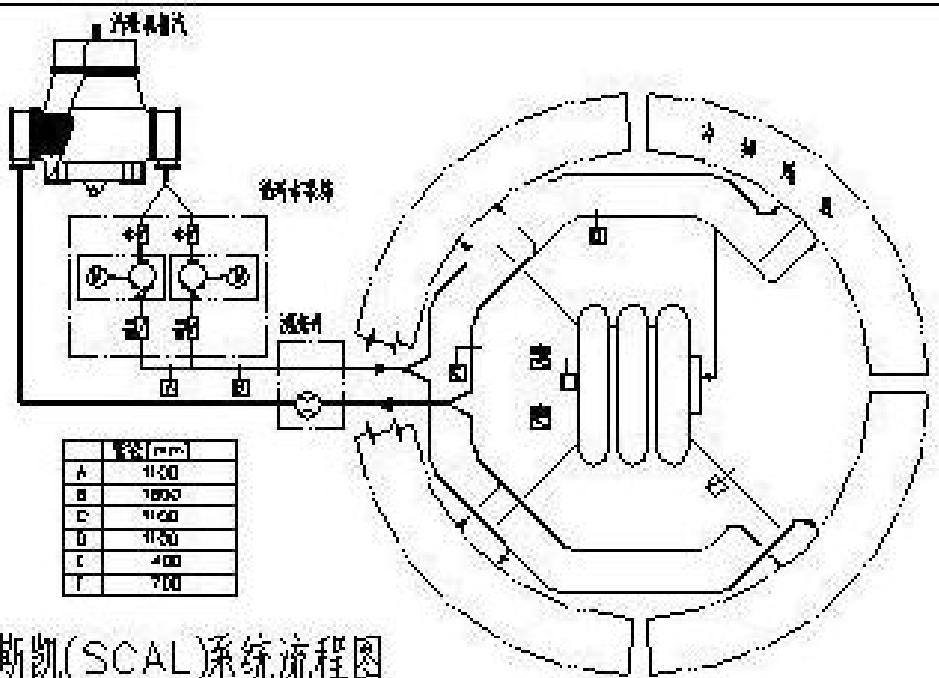


Fig 11 Flow Diagram of Scal System

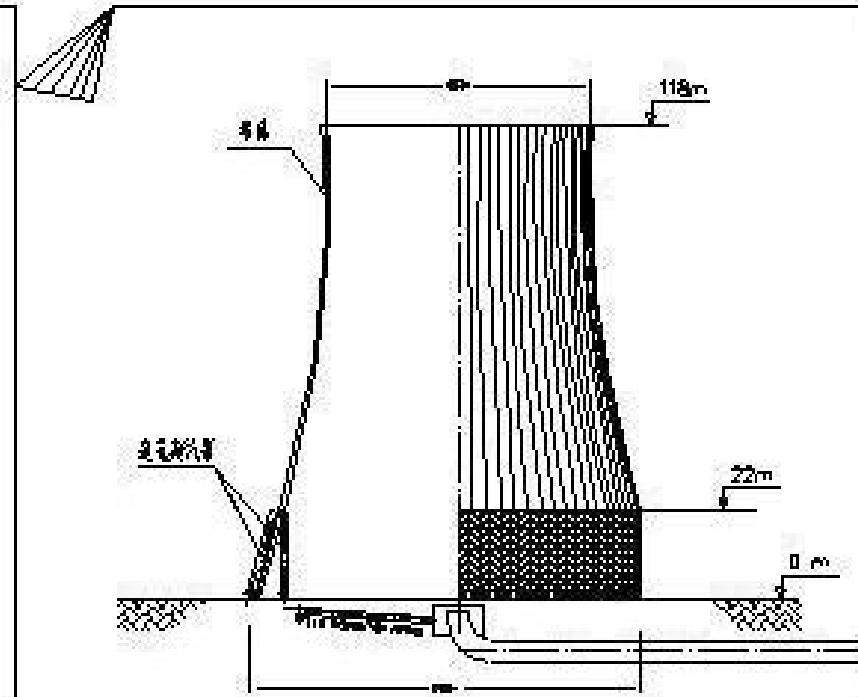
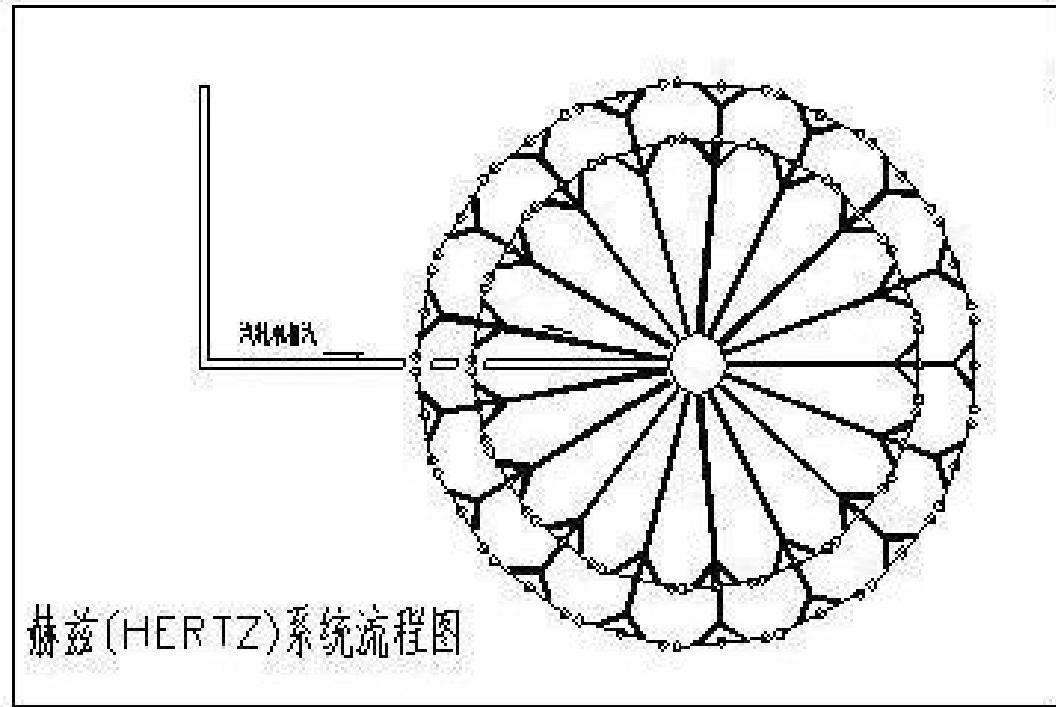


Fig. 12 Flow Diagram of Hertz System

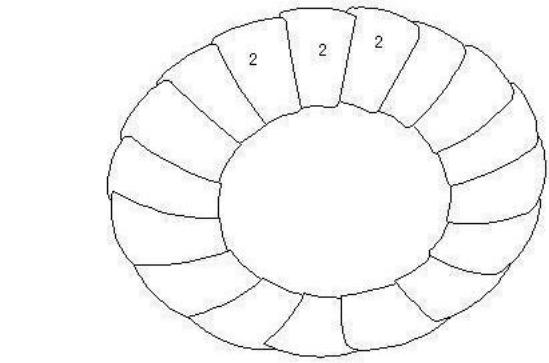
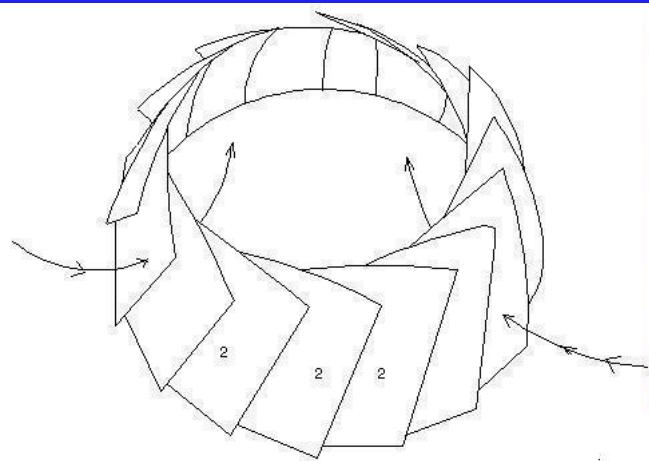
(Yang hu-zhou>>>Hu-zhou YANG>>>>>>
>>>Hz YANG >>> Hertz Yang >>> Yang Hertz)

WB: What would be do?

设想了什么？

- Hertz system substitutes all new Scal system.
- 用Hertz系统替代全部新建的Scal系统。
- Enlarge ACC by LC.
- 采用莲花凝汽器为空冷凝汽器扩容。
- Natural draft with induce fan assistance.
- 用引风扇协助自然通风。





**There are beautiful flowers,
That is the youth vomit balminess,
steel bony bursts metal flowers,
The dropping blood dyed it red.**

世上有朵美丽的,那是青春吐芳华,铮铮硬骨绽花开,滴滴鲜血染红它。

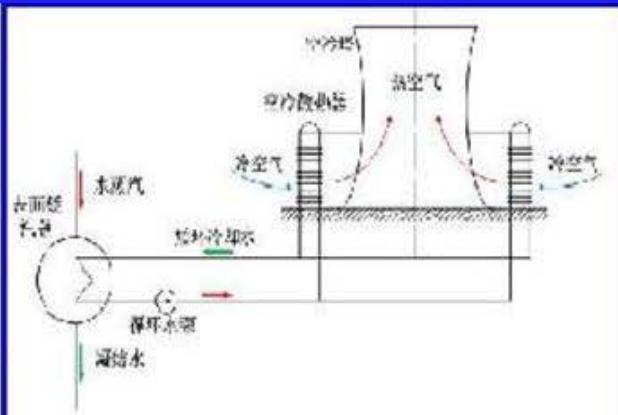




Prof. Dr. László Heller
Hertz 系统发明人



Prof. Dr. László Forgó
全铝水-空气换热器的发明人



Lei Pinghe and ect.
Scal 系统发明人

1950

2007

2015



Yang Huzhou
Hertz 系统发明人



TO BE CONTINUE/待续

