

# Energy, technology and domestic quality of life

a historical outlook

# The first innovation that changed quality of life

L'ABRI PRIMITIF:

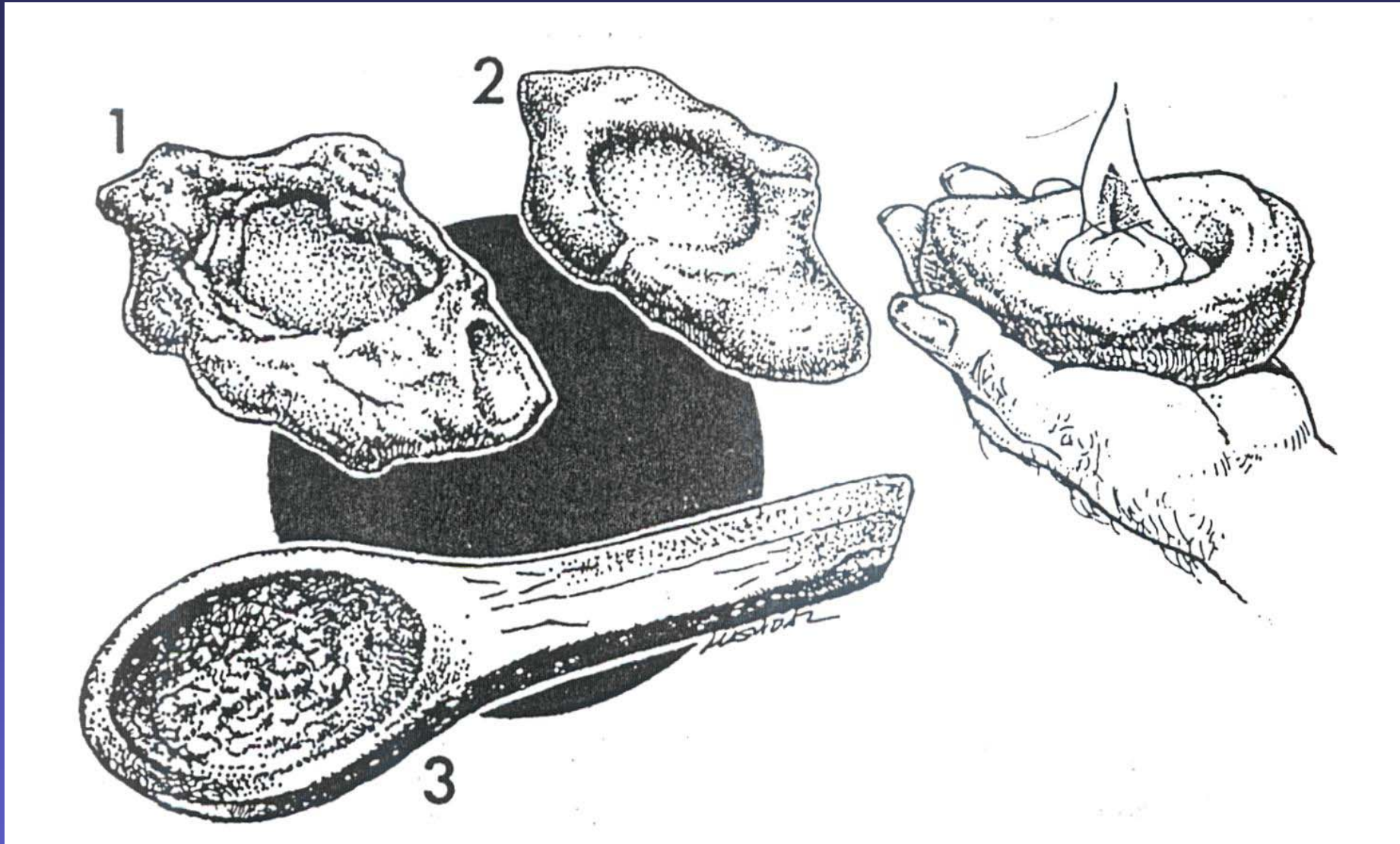
TOIT + FEU

toit + feu

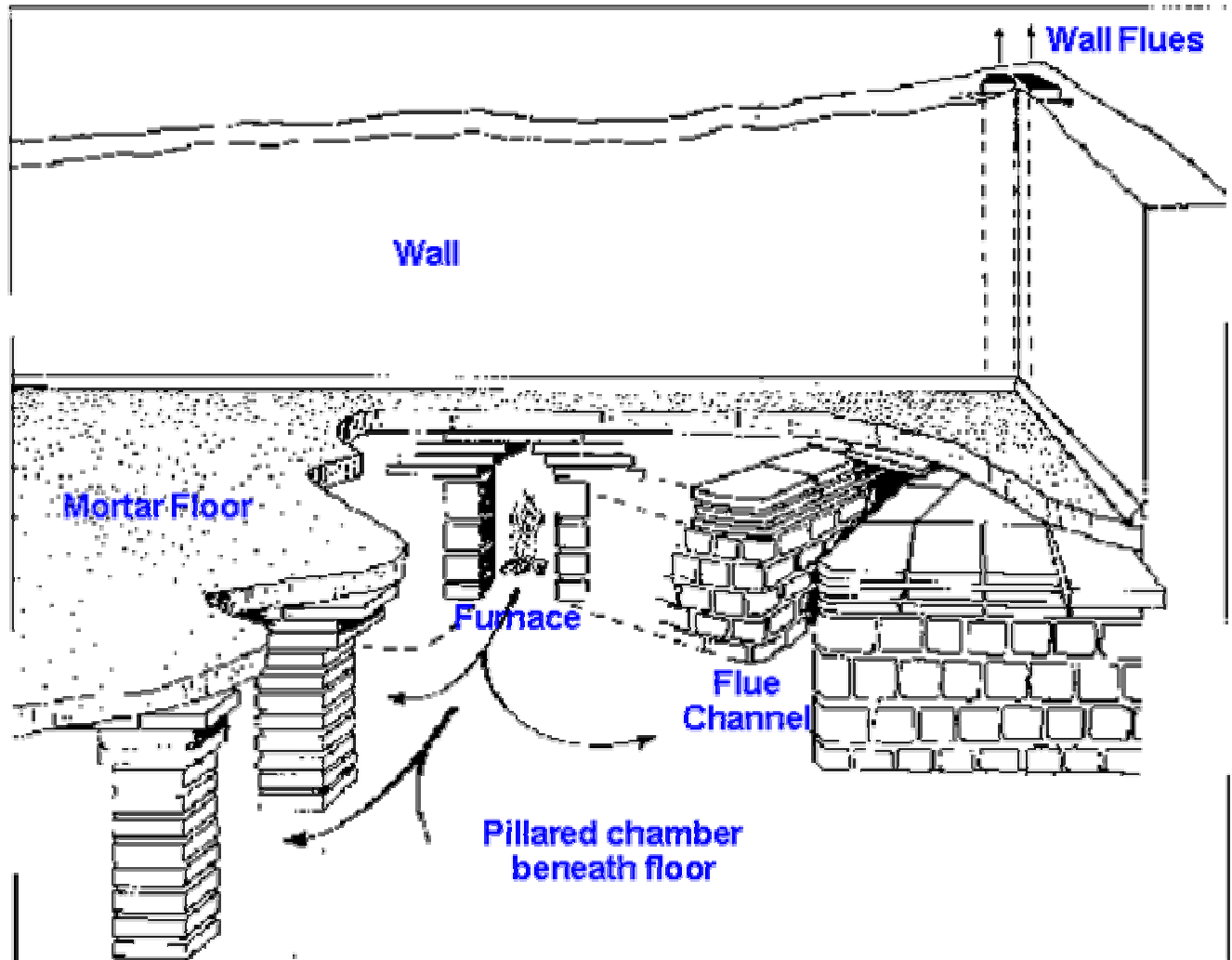
extérieur,  
puis intérieur

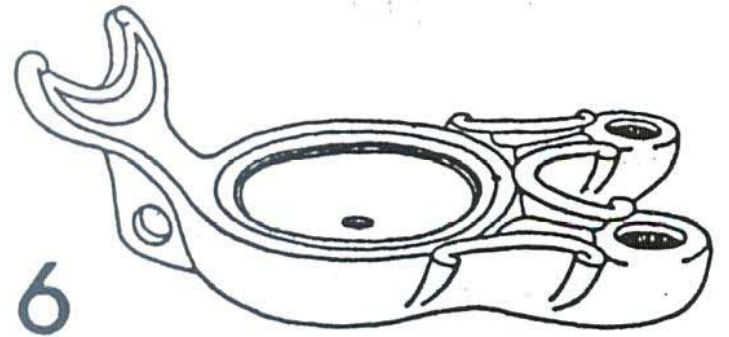
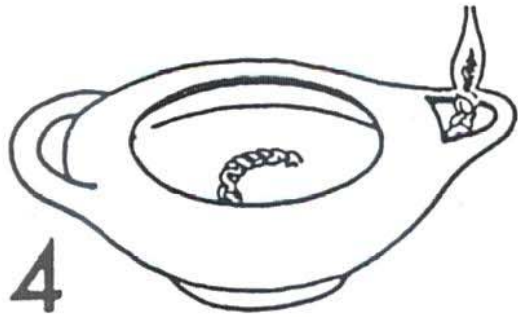
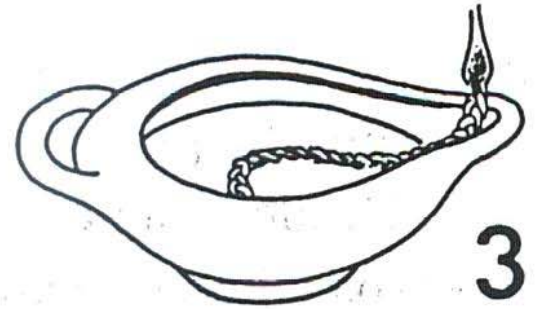
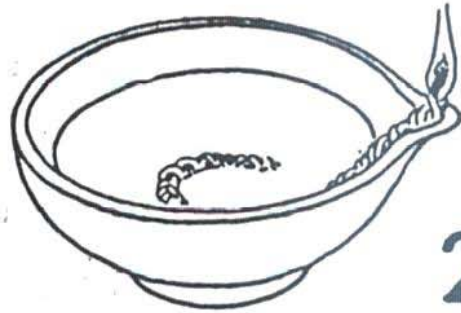
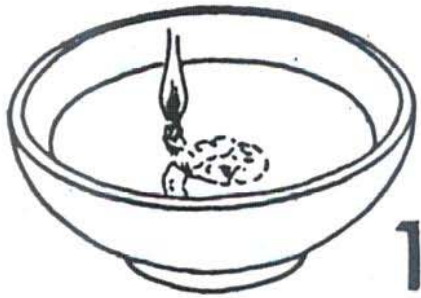


Cooking, heating, lighting  
(and smoke)

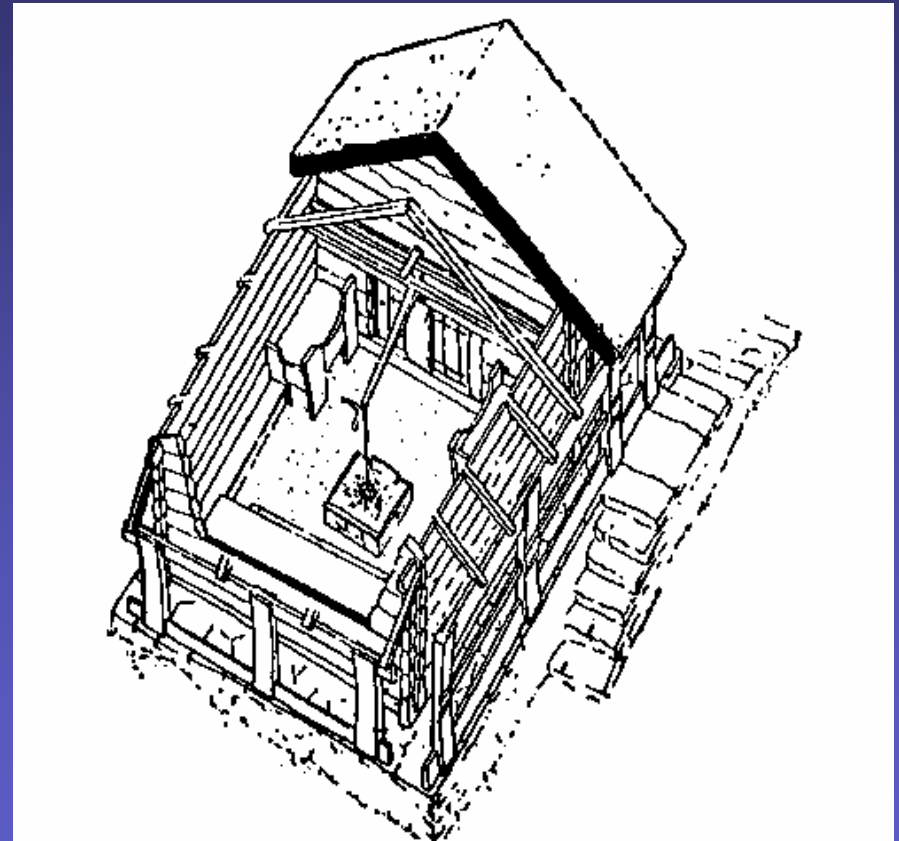
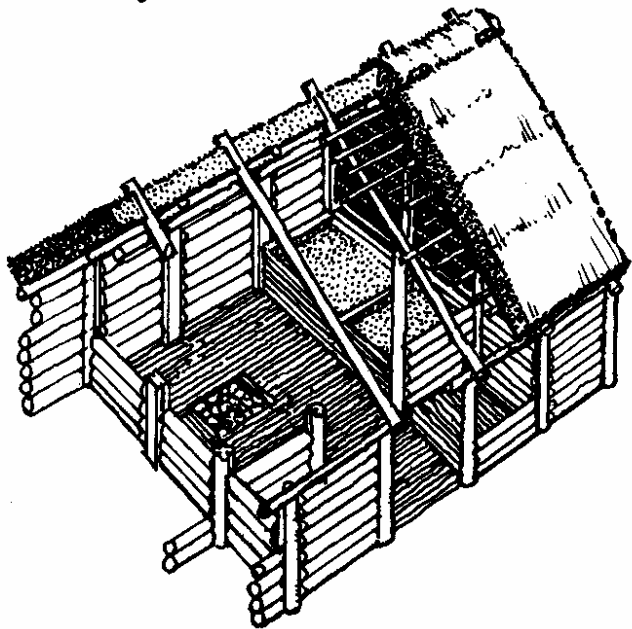
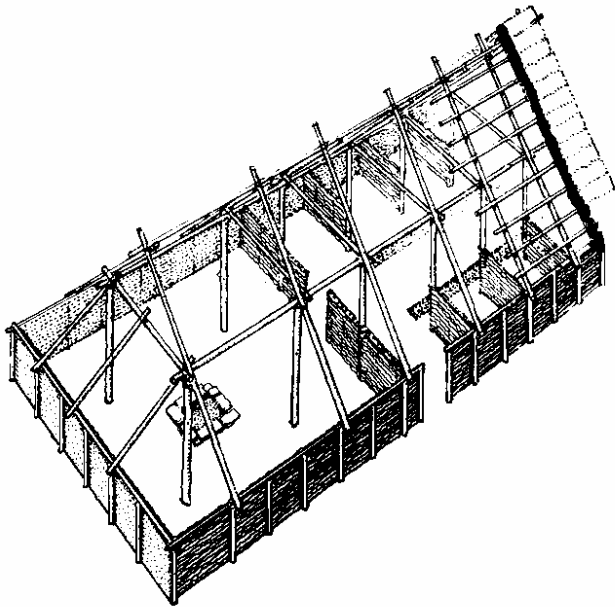


The oil lamp: the second innovation that changed quality of life





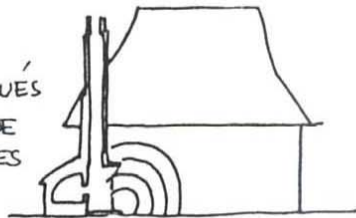
*Tria sunt damna domus:  
imbris, mala femina et fumus*



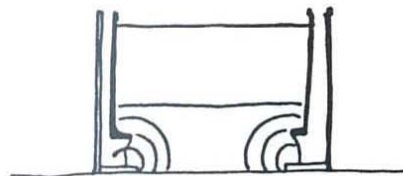
Medieval peasant houses in central-northern Europe

# The fireplace: the third innovation that changed quality of life (but not so much, at the beginning)

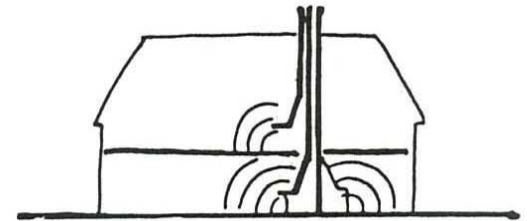
MODELES PLUS ÉVOLUÉS  
DE CHEMINÉES ET DE  
CELLULES HABITABLES



maison du Massif Central  
à cheminée partiellement engagée  
dans le toit et four à pain.



maison à cheminées  
en pignon



maison à cheminées multiples  
groupées







Medieval kitchen



Window glass: the  
fourth innovation that  
changed quality of life





Fig. 1.



Fig. 2.

Raetz Del.

Bernard Recl.

Verrerie en bois,  
 L'opération de former la Noix à la Bosse et de la souffler sur le Crénio.

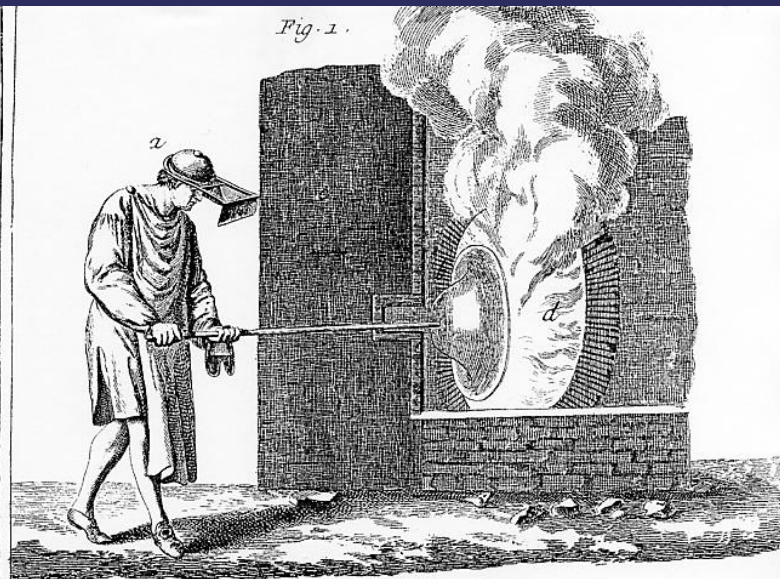


Fig. 1.

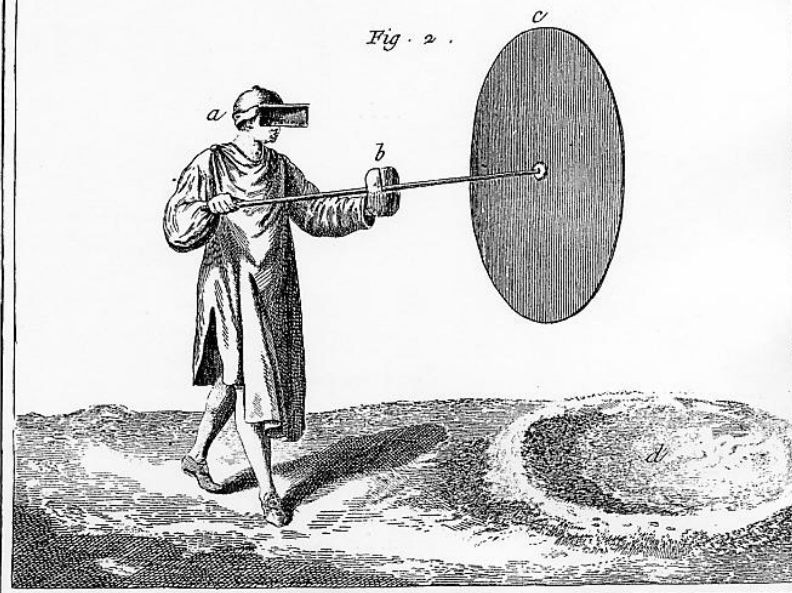


Fig. 2.

Raetz Del.

Bernard Recl.

Verrerie en bois, l'opération de chauffer la  
 Bosse pour l'ouvrir et en faire le Plat et le porter à la plotte.

P

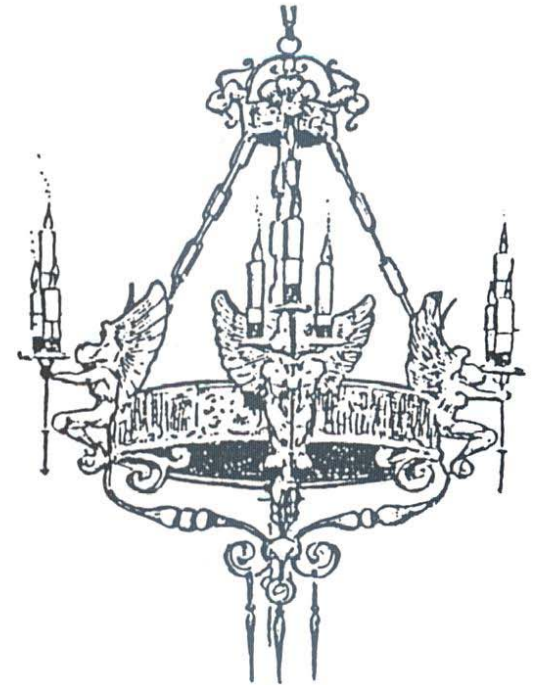
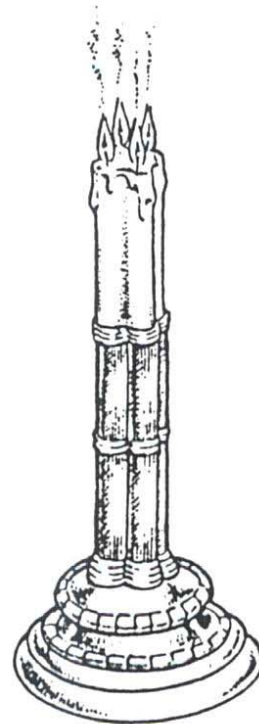
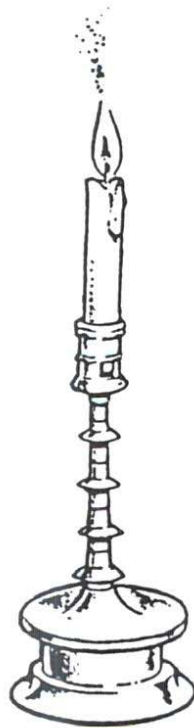
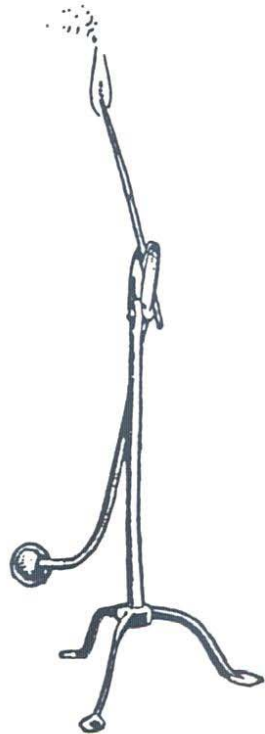
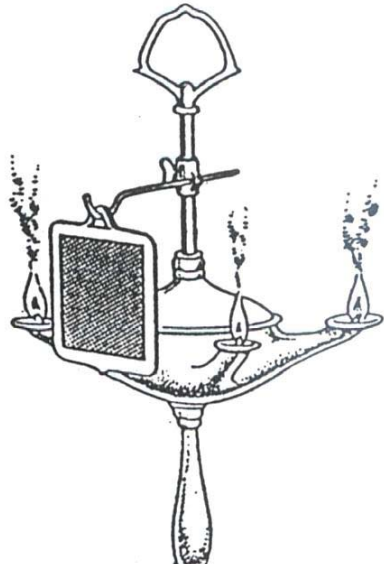
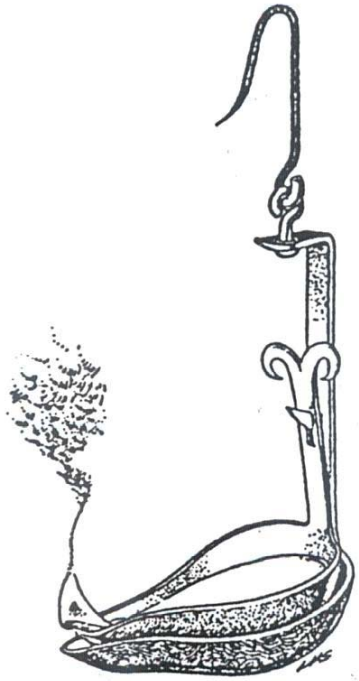
The stove: the fifth innovation that changed quality of life



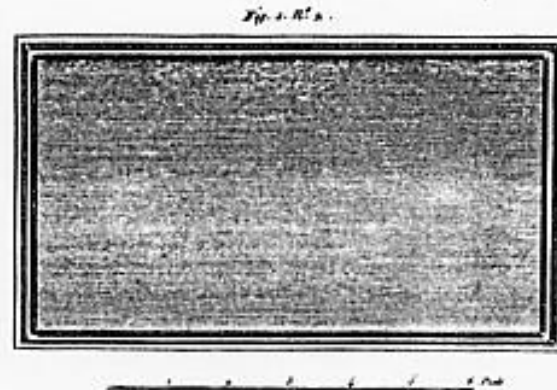
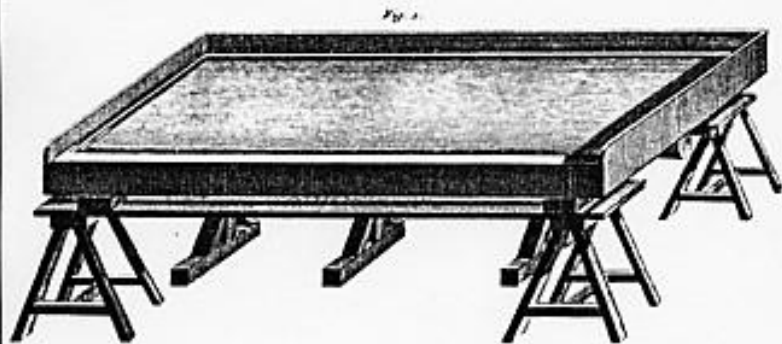
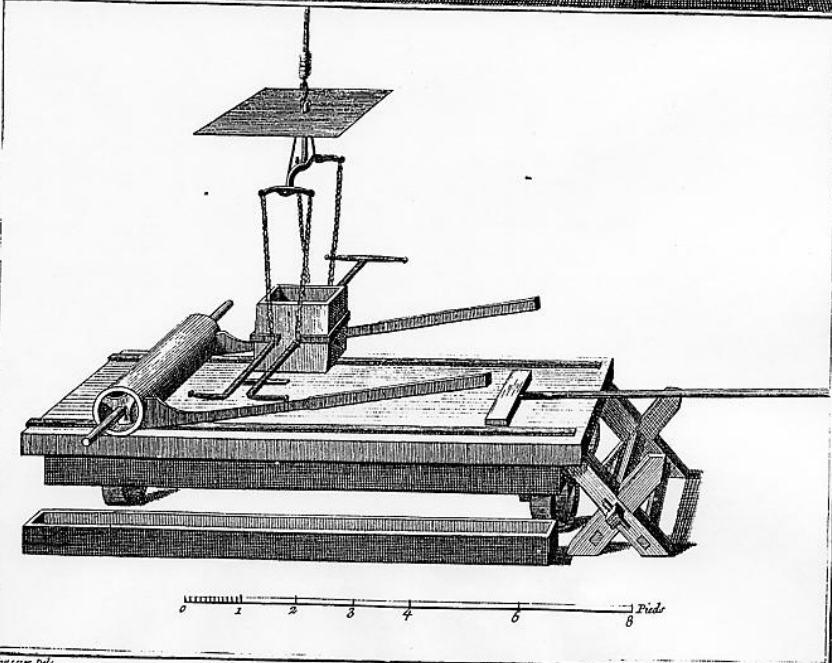
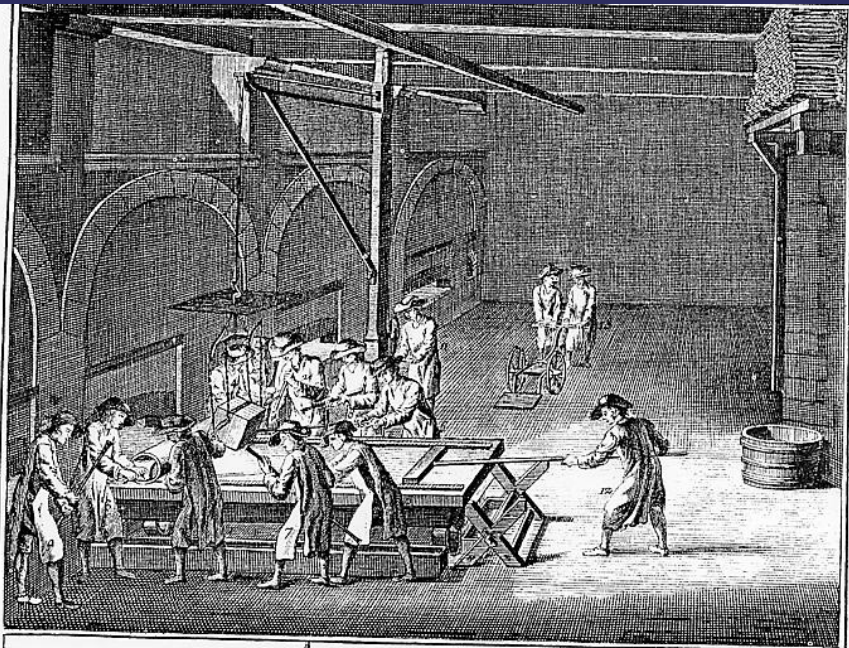


# XVIII century

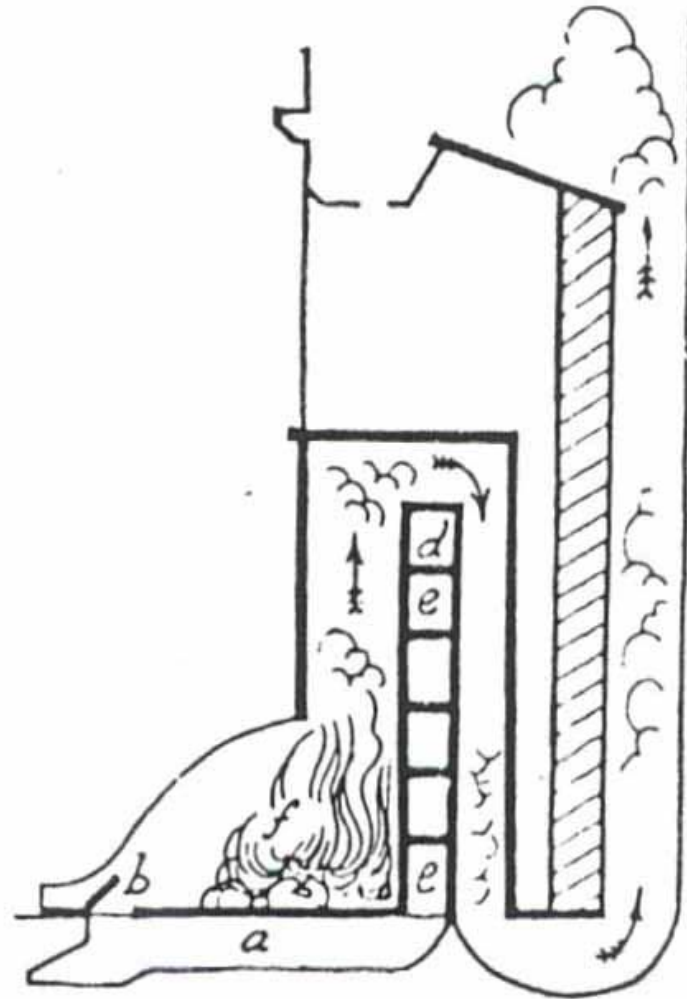
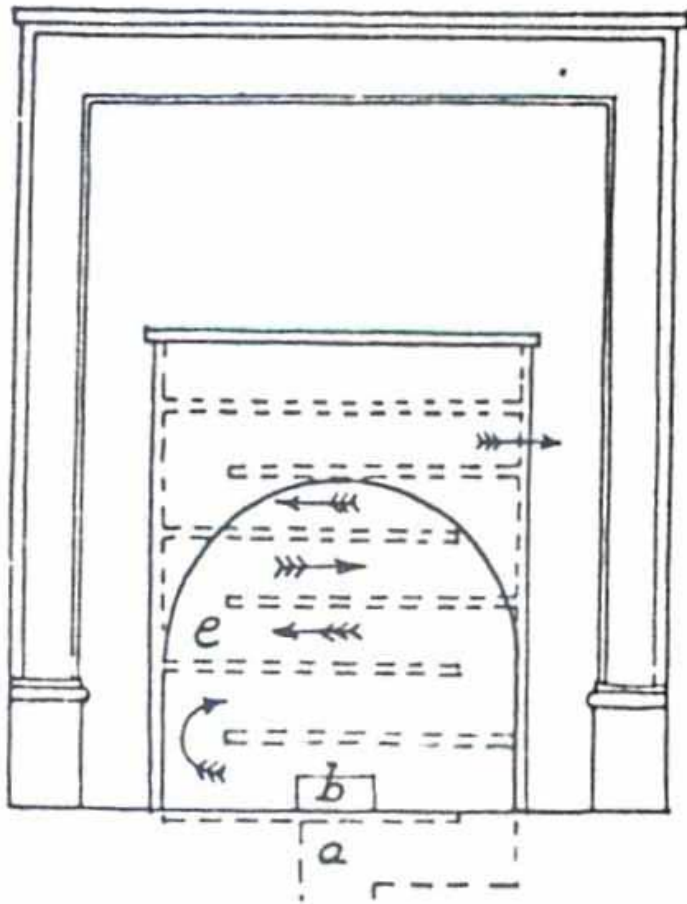
Improvements in glass making, lighting and heating







*Glaces, l'opération de Verser et de Rouler.*

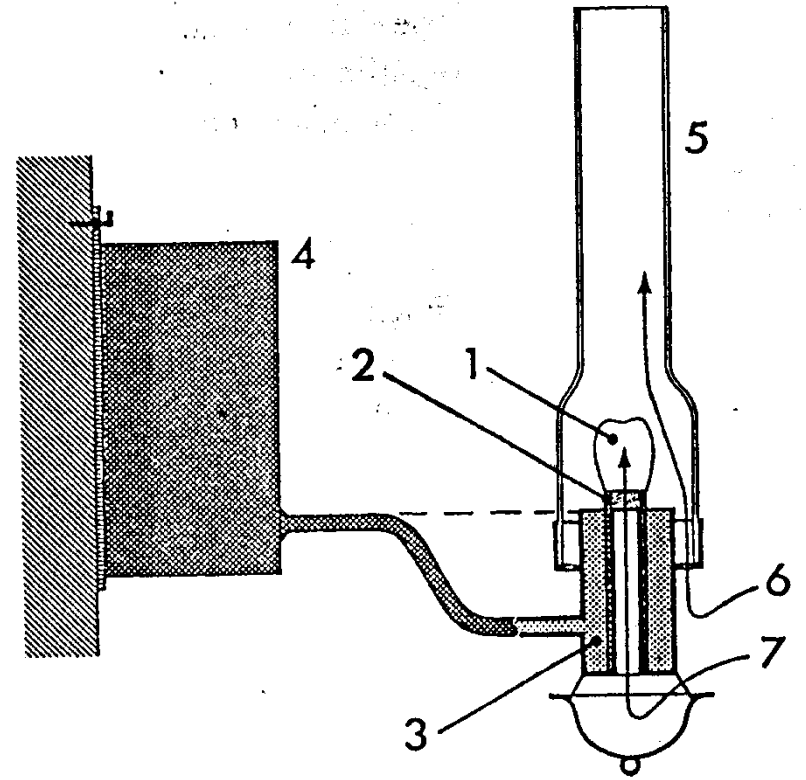


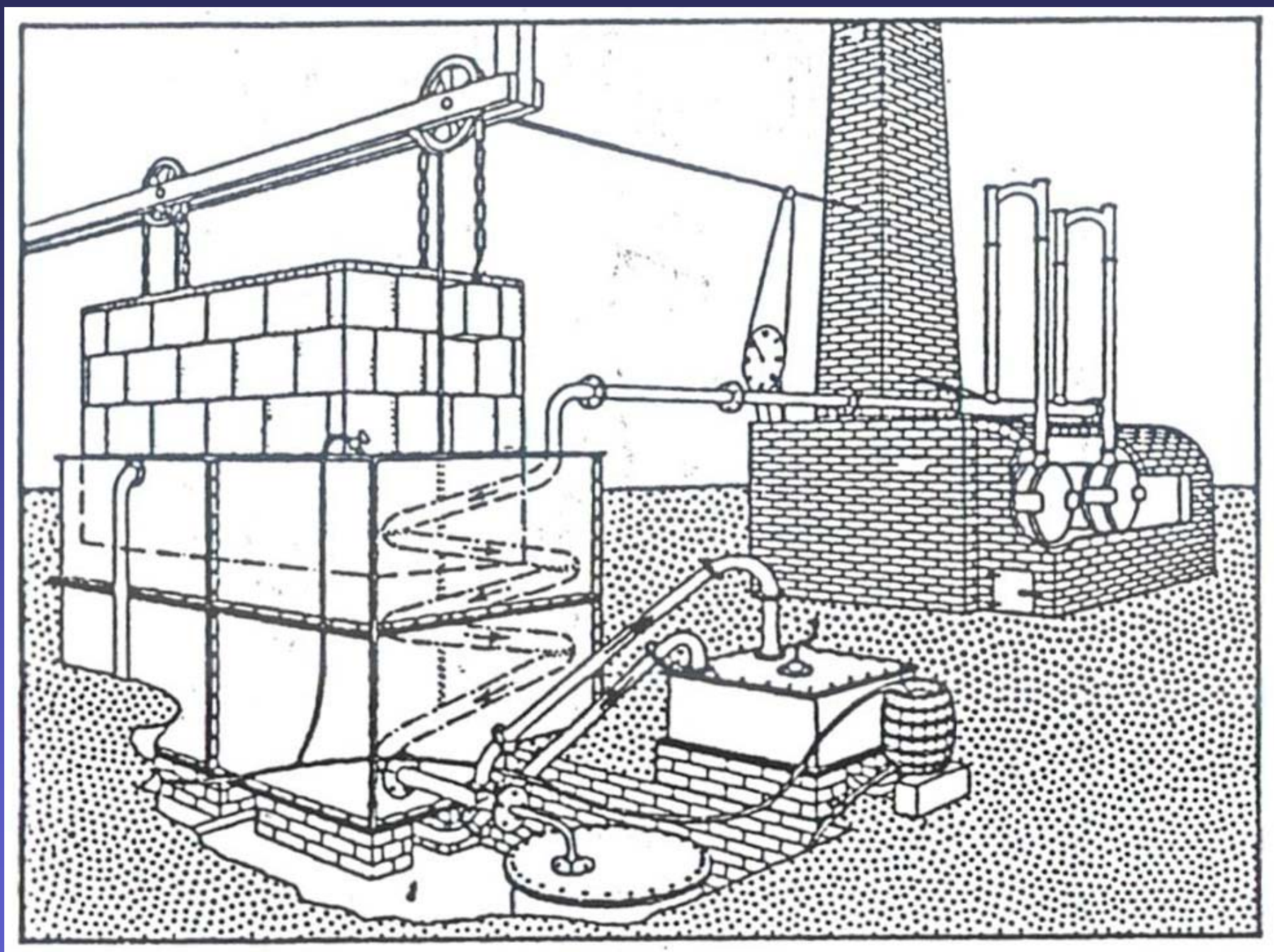
Improvements: the Franklin stove

# XIX century

Innovation takes command









1



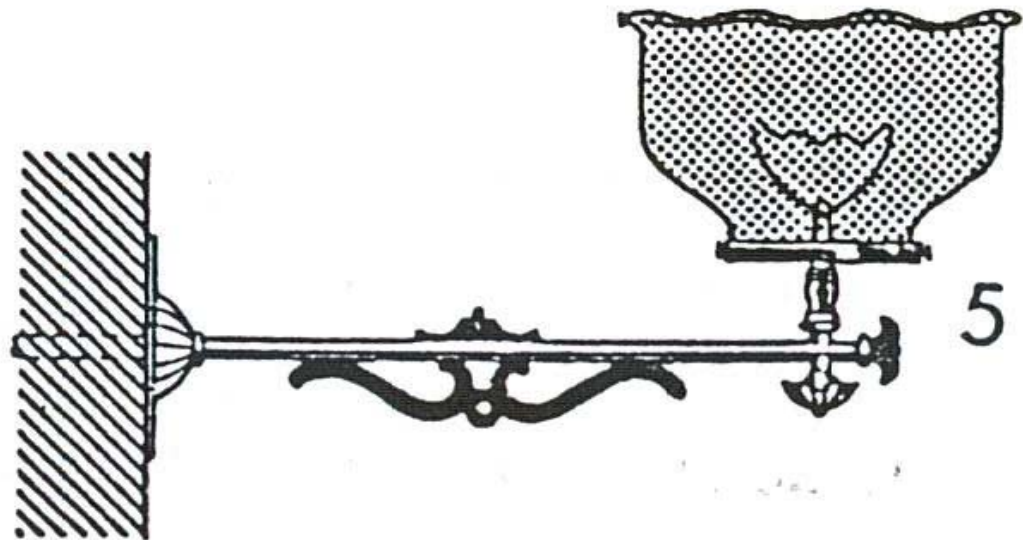
2



3



4



5

# The Mosley Improved Water Heater No. 3.

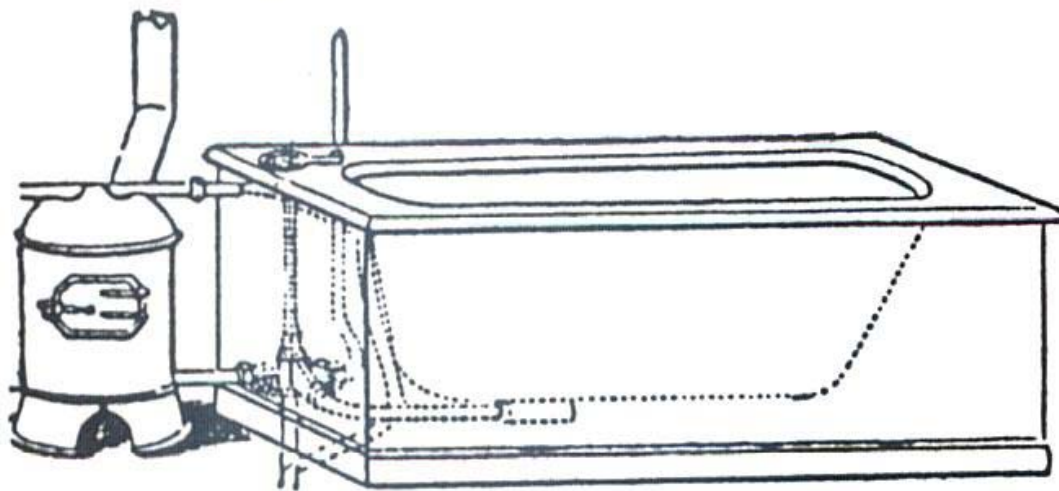
WITH GAS OR GASOLINE BURNER.



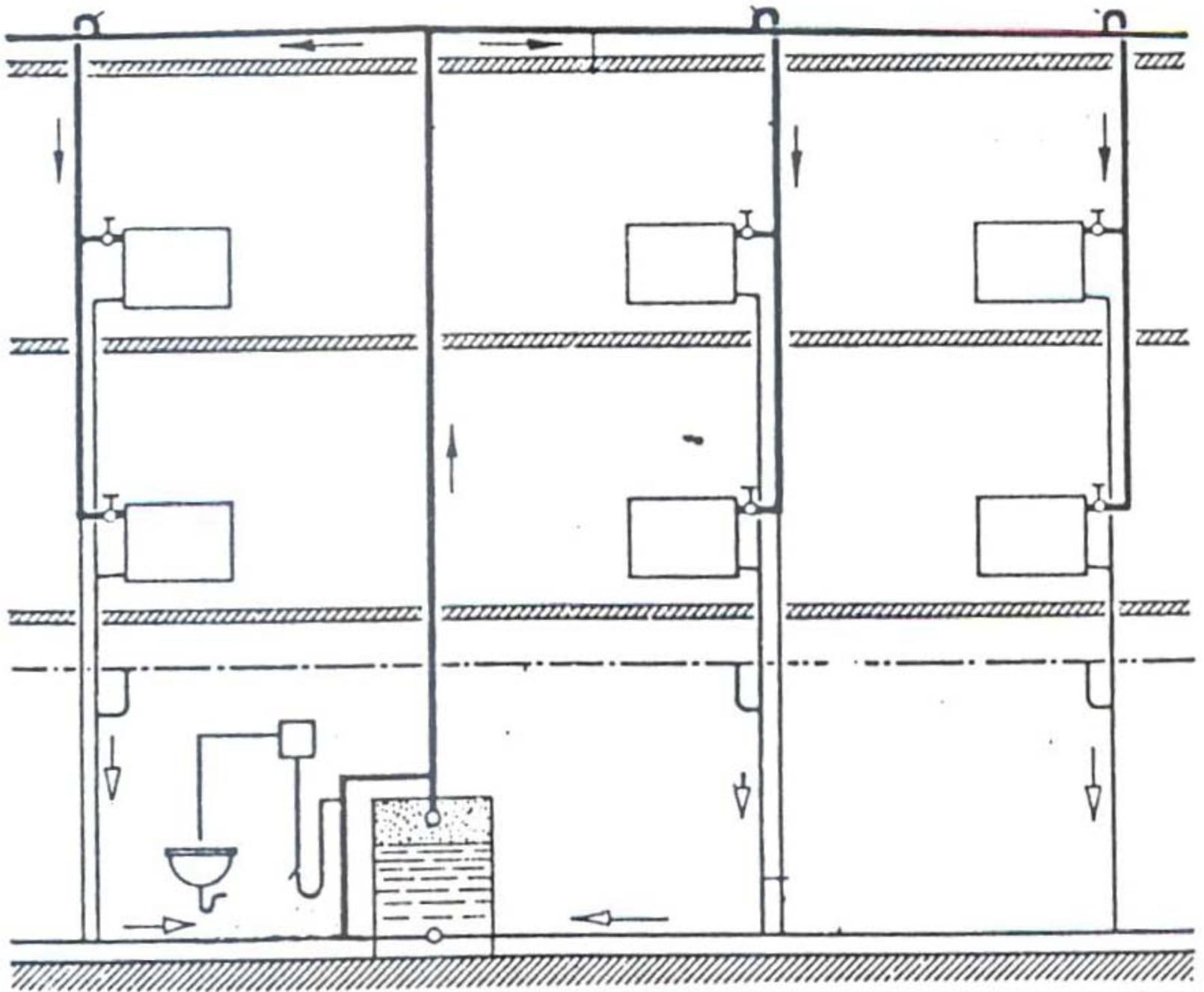
Especially adapted for use with stationary baths, giving the advantage of QUICK AND INDEPENDENT HEATING, also for KITCHENS, LAUNDRIES, BARBER SHOPS, etc., with minimum fuel cost. PERFECT COMBUSTION. NO SMOKE. All parts clean at all times; may be used in connection with water service or otherwise. No ventilating flue required. Water tank is constructed with lid, so as to fill with bucket. Also has opening for supply pipe connecting with cut-off valve. NOT USED UNDER WATER OR STEAM PRESSURE.

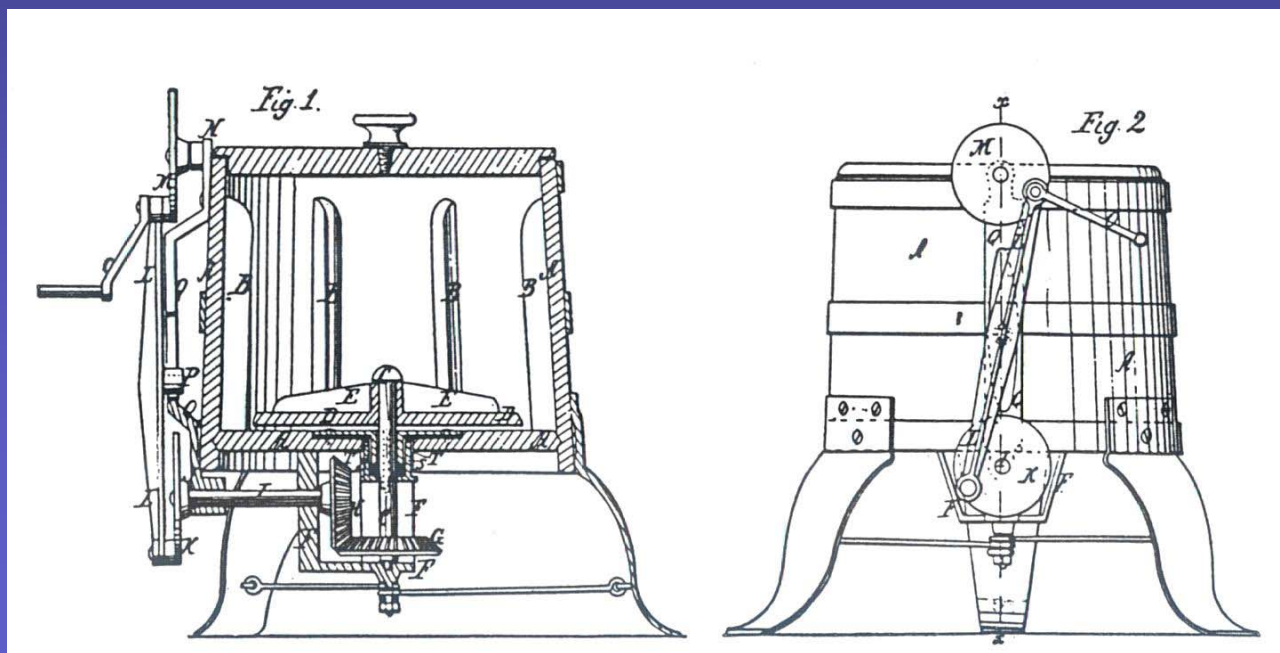
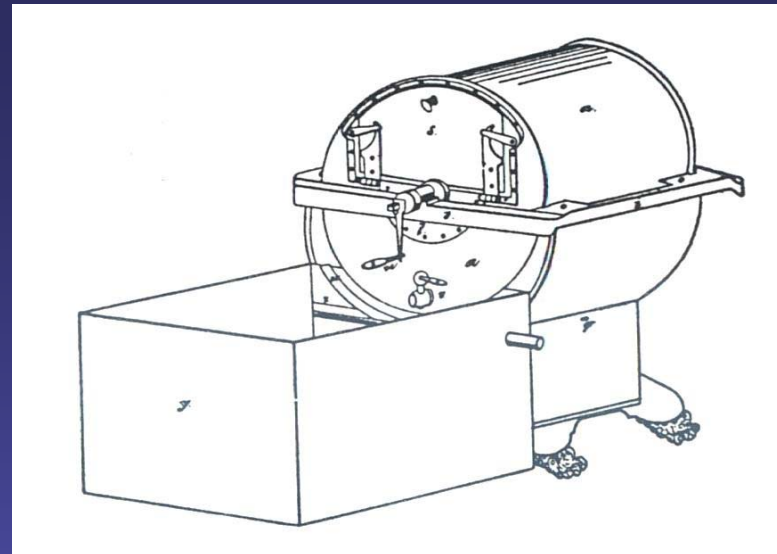
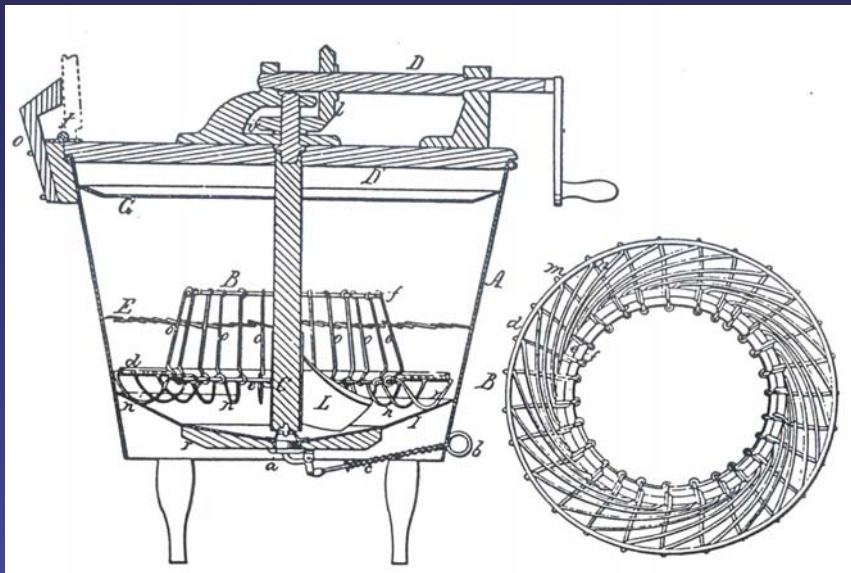
Gasoline Burner.

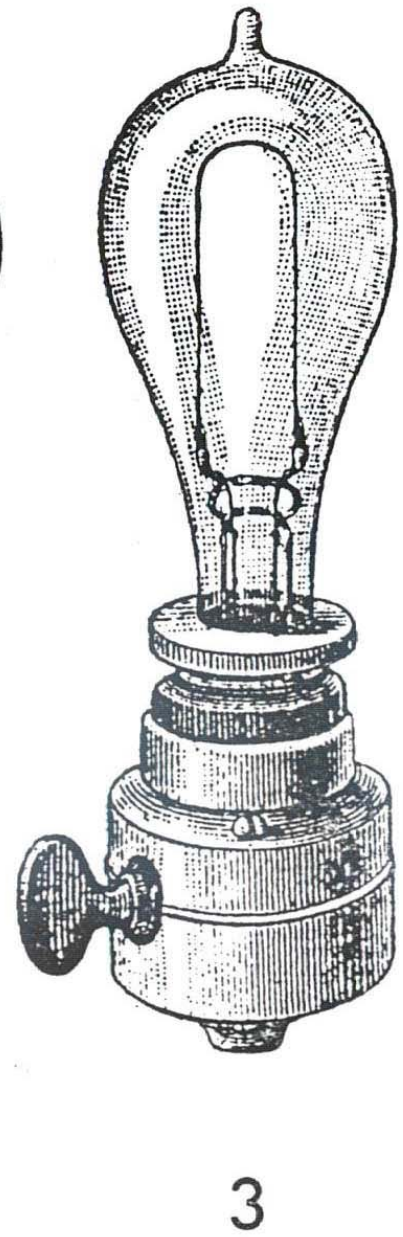
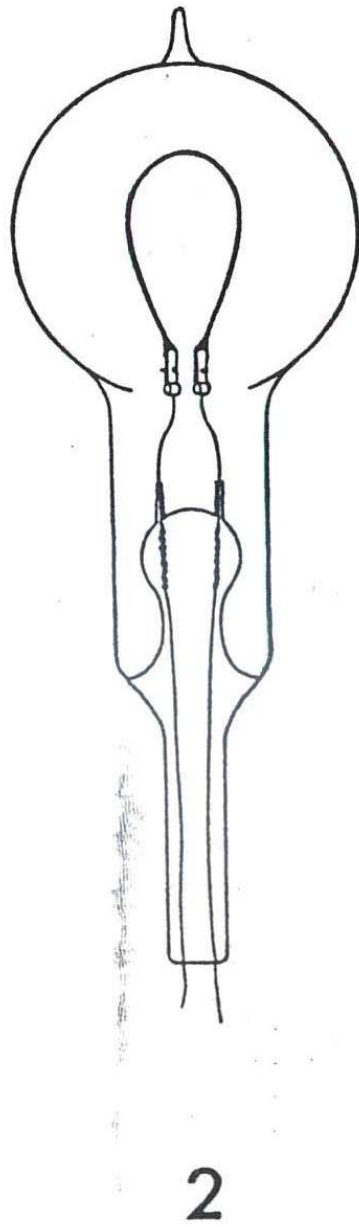
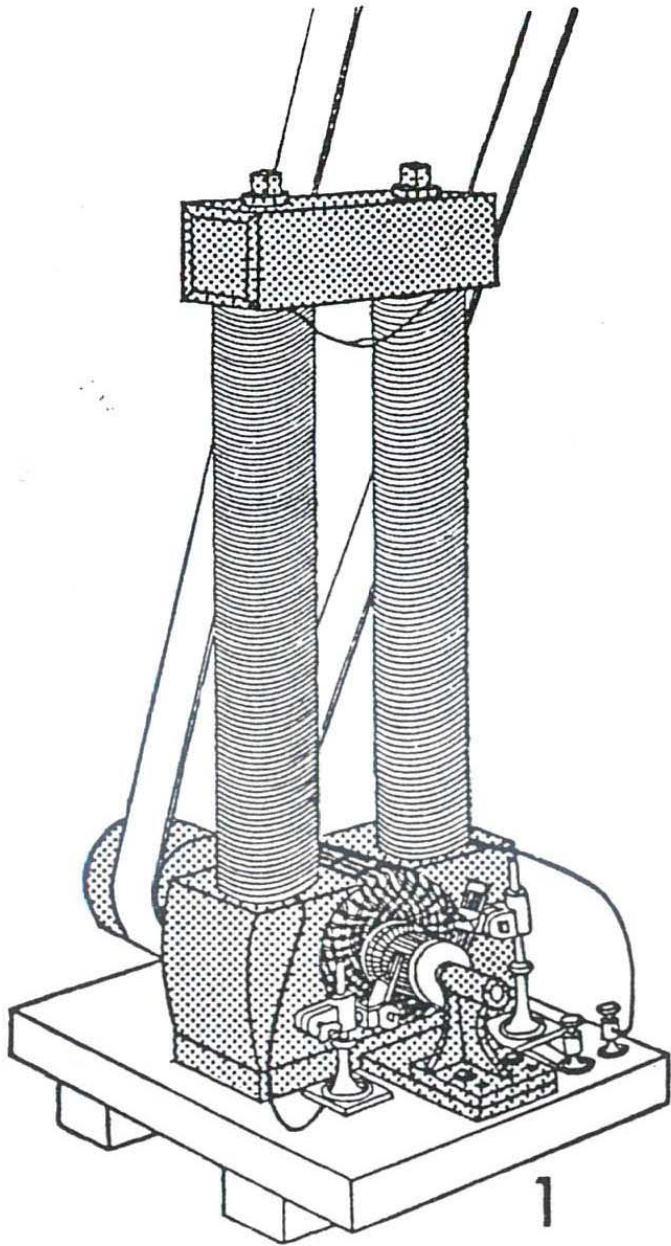
43895 A. Enameled galvanized iron heaters, with bracket.....\$15.00

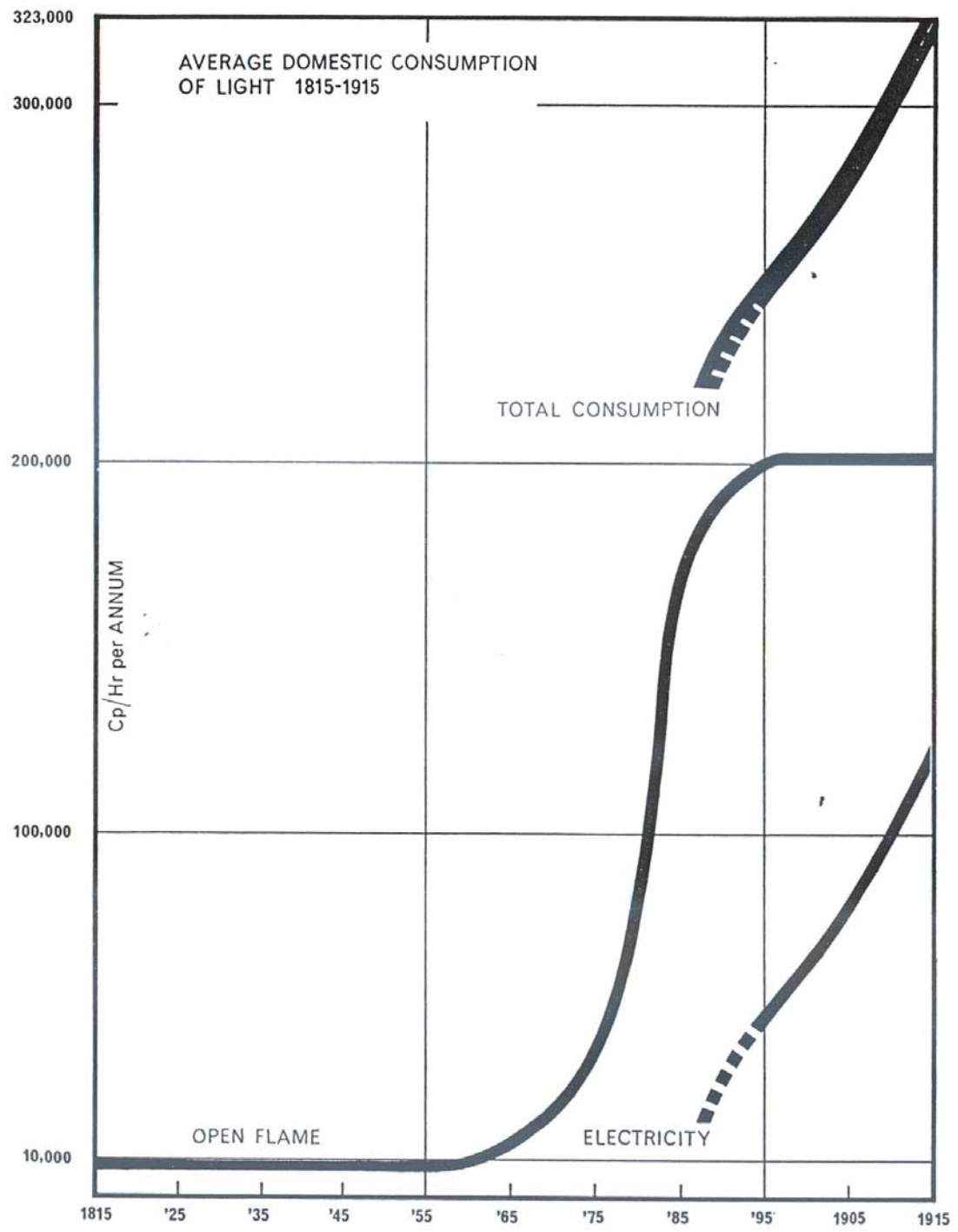




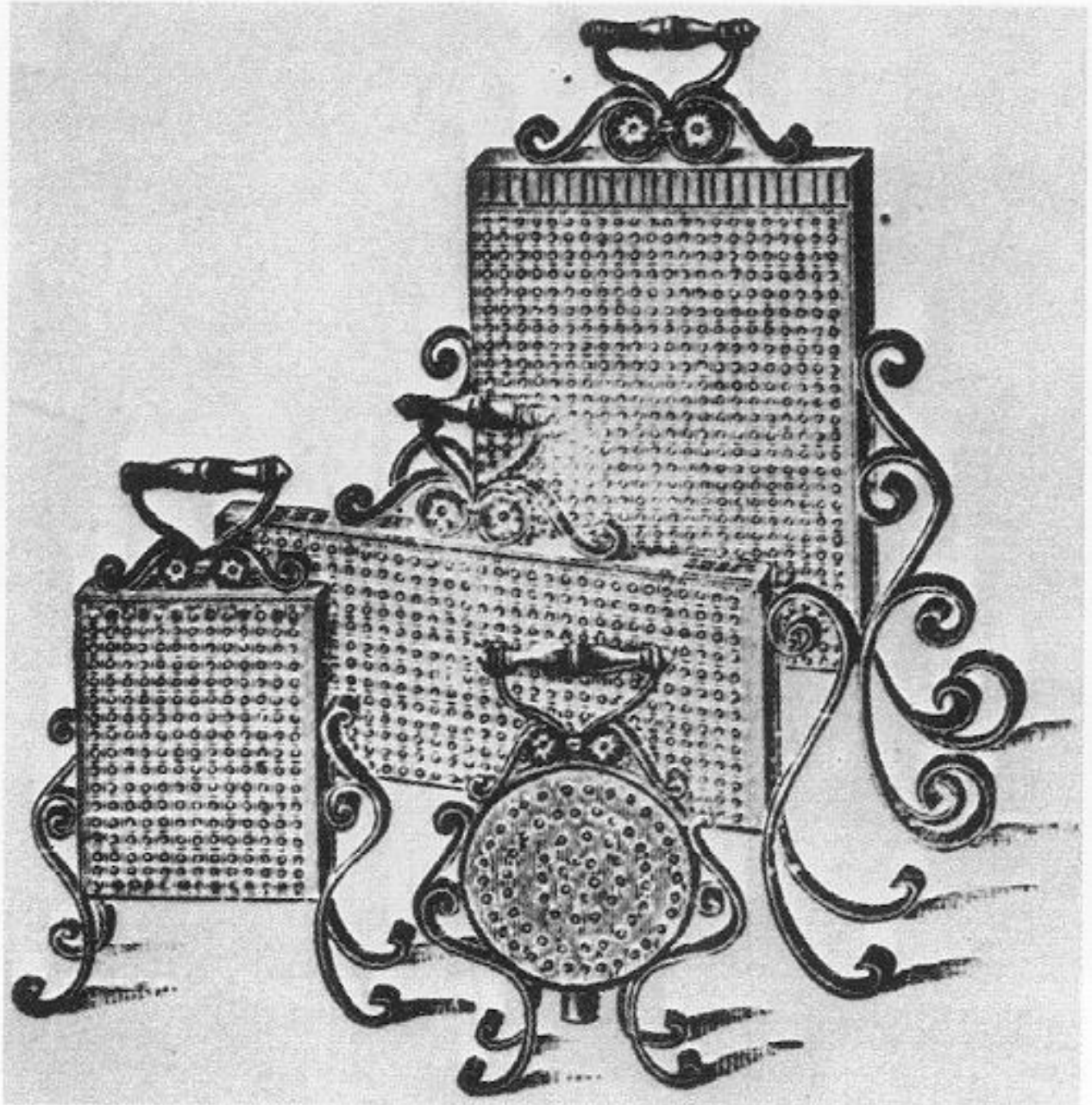




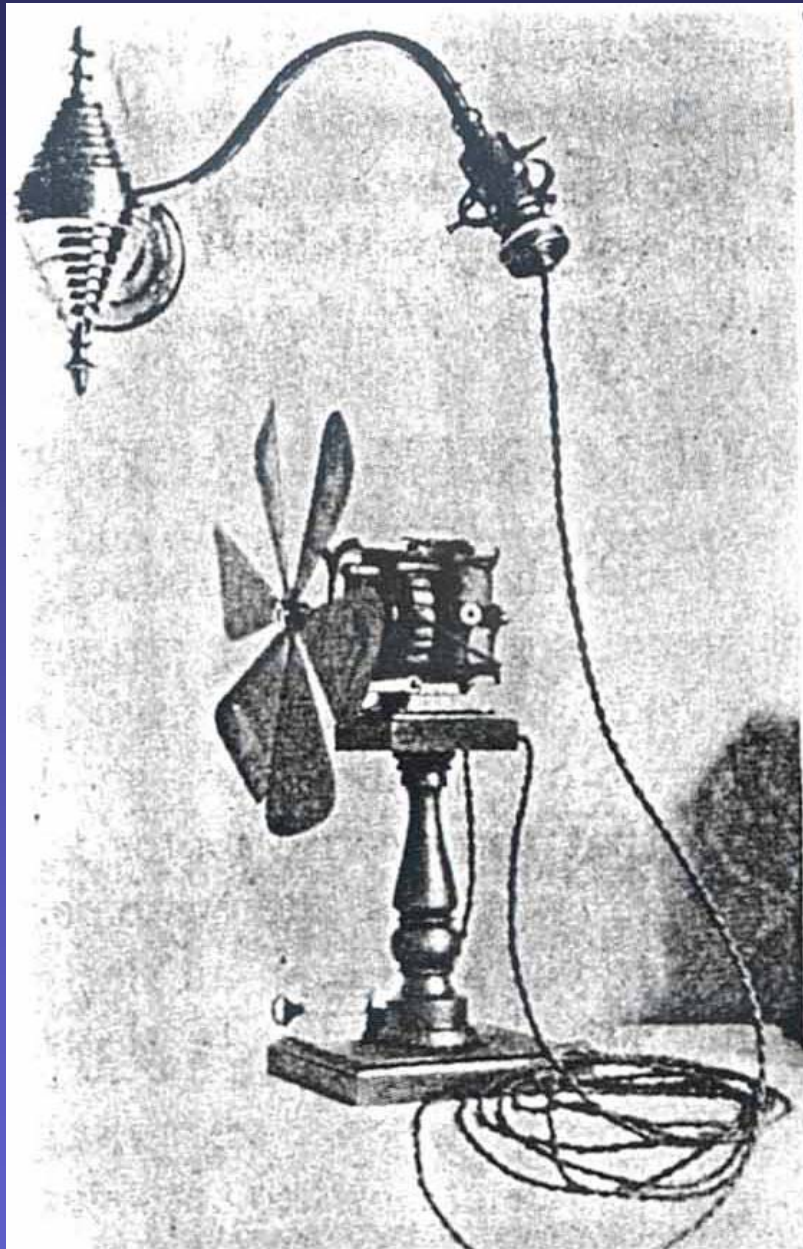




# Electric radiant heater



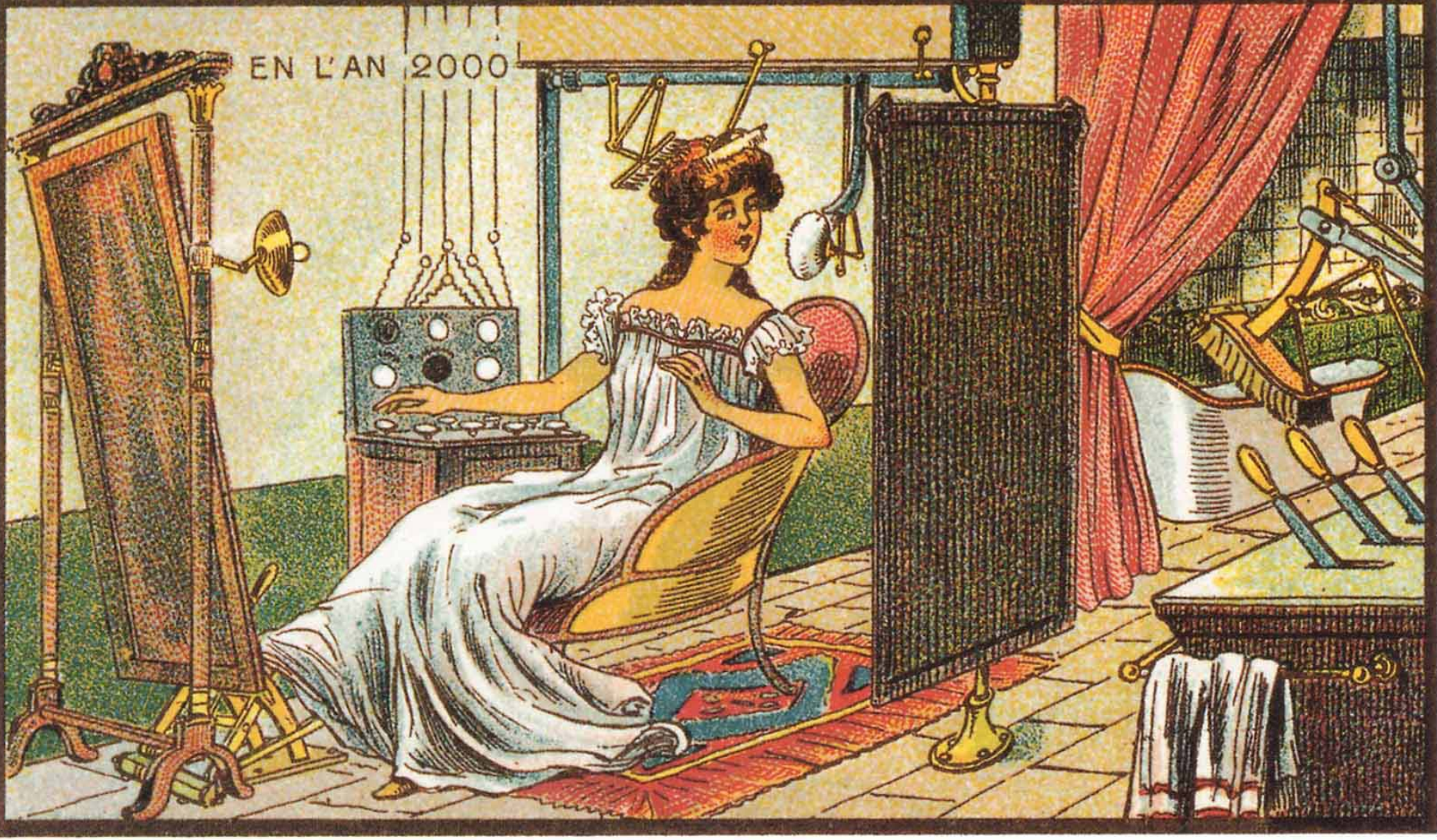
(1893)



THE WEATHER IS ALWAYS  
PLEASANT IN WESTINGHOUSE  
FANLAND. CURRENT FROM  
LIGHTING CIRCUIT FOR THIS FAN  
COSTS ONLY 1/4¢ AN HOUR.



EN L'AN 2000



# XX century

The electric energy companies push.  
Energy consumption takes off





## Put a Stove in Your Office

and build a good rousing fire in it. It will give you some idea of the heat your wife has to endure every time she irons.



You think it's hot, do you? Then, what does your wife think while ironing to the accompaniment of a hot stove?

Why not kick that stove out and get her a Westinghouse Electric Iron? Don't you think she would be grateful for it? If you have any doubt about it, you can have an iron on free trial.

# Elektrische Heiz- und Kochapparate.

Praktischste Festgeschenke



MITTEILUNGEN DER  
BERLINER ELEKTRICITÄTS-  
WERKE

JAHRGANG 6 NUMMER 7



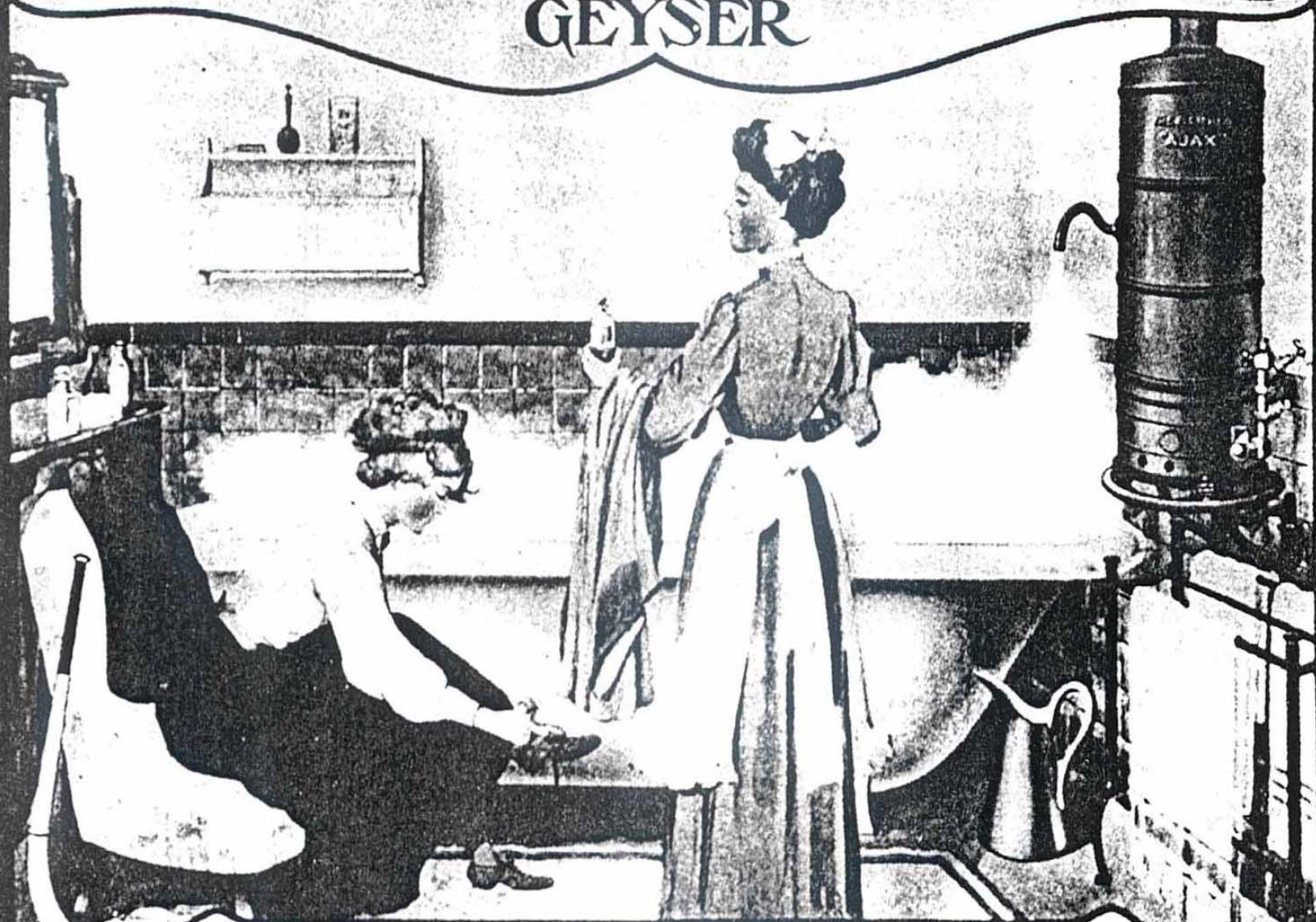
JULI

1910



Elektrische  
Vakuumreinigung

# THE LUXURY OF THE GEYSER

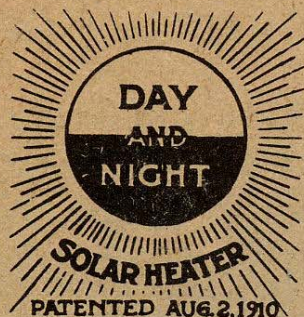


A HOT BATH AT ANY MOMENT. A GREAT  
BOON TO ALL AFTER RECREATION.

**“What so Rare as a Cloudy Day  
in Arizona”**

**HOT WATER**

Summer  
Winter  
Spring  
Fall  
without  
Gas Bills



**FOR THE**

Bungalow  
Garage  
Residence  
Apartment  
Hotel  
Business Block

**SUNSHINE**

**Like Salvation is Free!**

and

Every Arizona home should take advantage of it by installing a

**“Day and Night” Solar Heater**

because

It can't stop working, while the sun shines  
It can't get out of fix, explode, or start a fire.  
It not only heats your water,  
It **KEEPS IT HOT** in a storage boiler.

Will it really work?

Thousands of satisfied users think so.  
Let us give you prices and full information.

Write

**Southwestern Solar Heater Co.**

219 Nat'l Bank of Ariz. Bldg. P. O. Box 1298  
PHOENIX, ARIZONA.

**DAY  
AND  
NIGHT**

**SOLAR  
Water Heater**

*let the SUN give you plenty of  
Hot Water DAY and NIGHT*

Family is the  
backbone of  
the american  
way of life



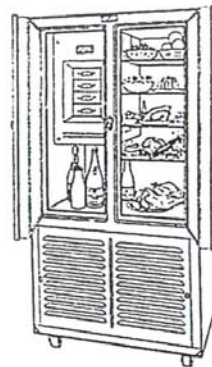
## Here they come

**L**ITTLE hands clamouring for the delicacies, eyes eager with anticipation. All the evening they have been whispering about the frozen desserts hidden in the Frigidaire. And lo! "Here they come." Better and more delicious than their wildest dreams of iced joys.

And when it's all over, and the little feet have toddled through, the hall, you realise that the Frigidaire so providentially installed has been the making of the children's party.

Frigidaire is an automatic electric refrigerator, available to every electrically wired home. Frigidaire maintains a constant, crisp, dry cold—preventing food decay and the development of harmful bacteria. Frigidaire provides for you at any time sparkling cubes of ice (made from pure drinking water) and makes possible at little expense many frozen luxuries. No ice is needed, and the cost to run it is less than the ice you used to buy.

There is a model to suit every requirement, from £64 upwards. Call at our showrooms and see Frigidaire in operation, or write for illustrated catalogue No. 179. Frigidaire can also be supplied on a most favourable easy purchase plan.



# Frigidaire

Automatic & Electrical Refrigeration

DELCO-LIGHT COMPANY

London Branch:

717-723, FULHAM ROAD, LONDON, S.W. 6



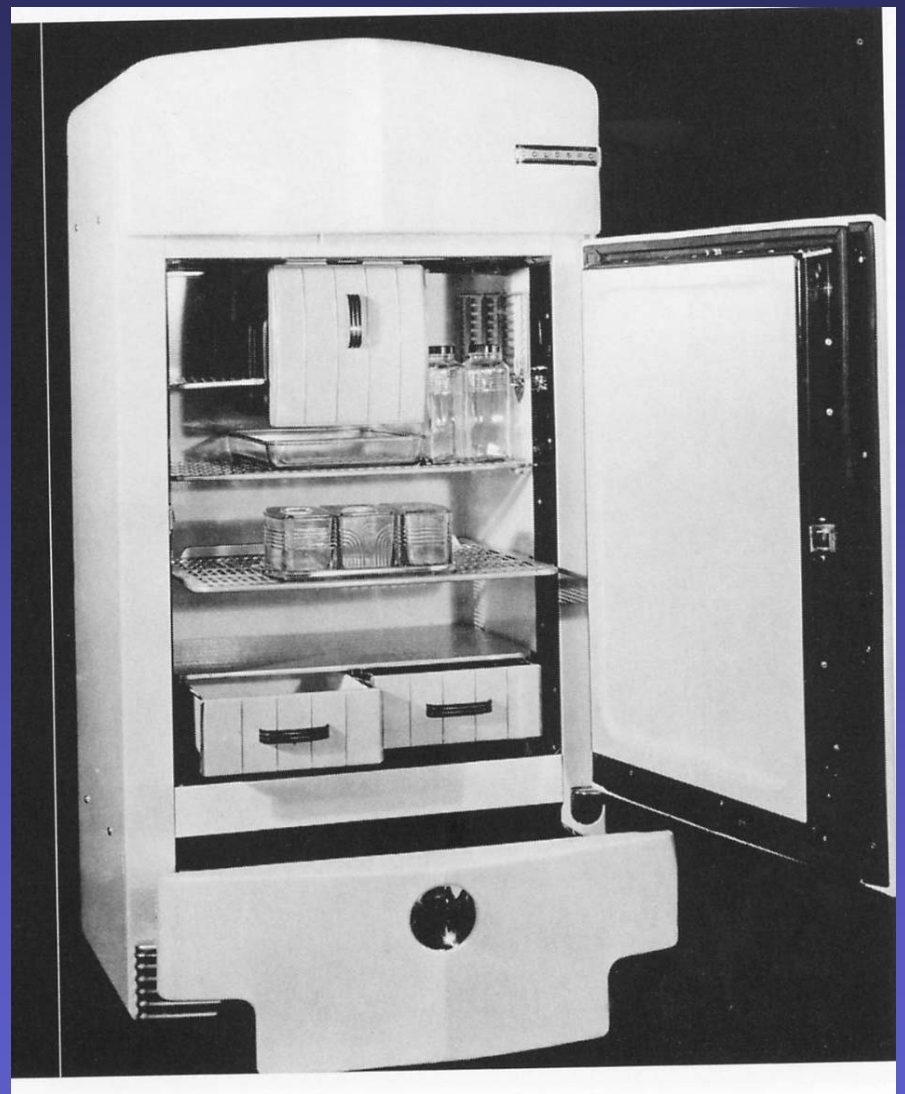
*Colder than ice - and never melts!*



Make use of our Service Department - See page 212.



1932



1937

# MOTHER



You will find these letters on many tools by which electricity works. They are on great generators used by electric light and power companies. They are on electric lamps and on tiny motors that make hard housework easy. By such tools electricity dispels the dark and lifts heavy burdens off human shoulders. Hence the letters G-E are more than a trade mark. They are an emblem of service.



**T**HIS is the test of a successful mother—she puts first things first. She does not give to sweeping the time that belongs to her children.

An electric motor runs a vacuum cleaner for less than 2 cents an hour.

She does not give to washing the time that belongs to her children.

An electric motor runs a washing machine for 3 cents an hour.

She does not rob the evening hours of their comfort because her home is dark.

To light a room splendidly, according to modern standards, costs less than 5 cents an hour.

Men are judged success-

ful according to their power to delegate work. Similarly the wise woman delegates to electricity all that electricity can do.

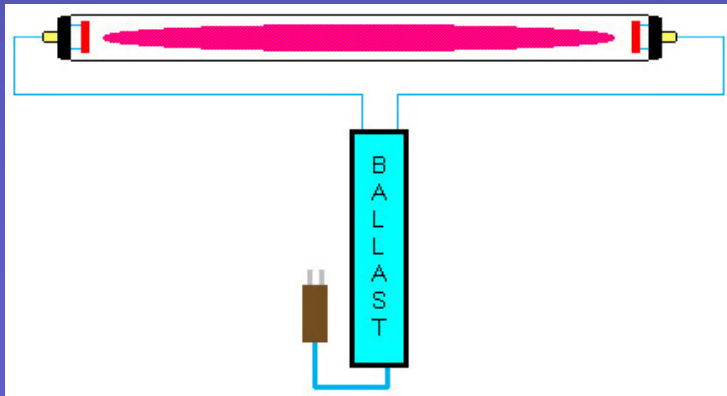
She cannot delegate the one task most important. Human lives are in her keeping; their future is molded by her hands and heart. No lesser duties should interfere with the supreme duty of having plenty of time with the children.

Certainly no household drudgery should distract her, for this can be done by electricity at a cost of a few cents an hour.

# GENERAL ELECTRIC

More Family.  
Electricity feeds  
feeling of guilt

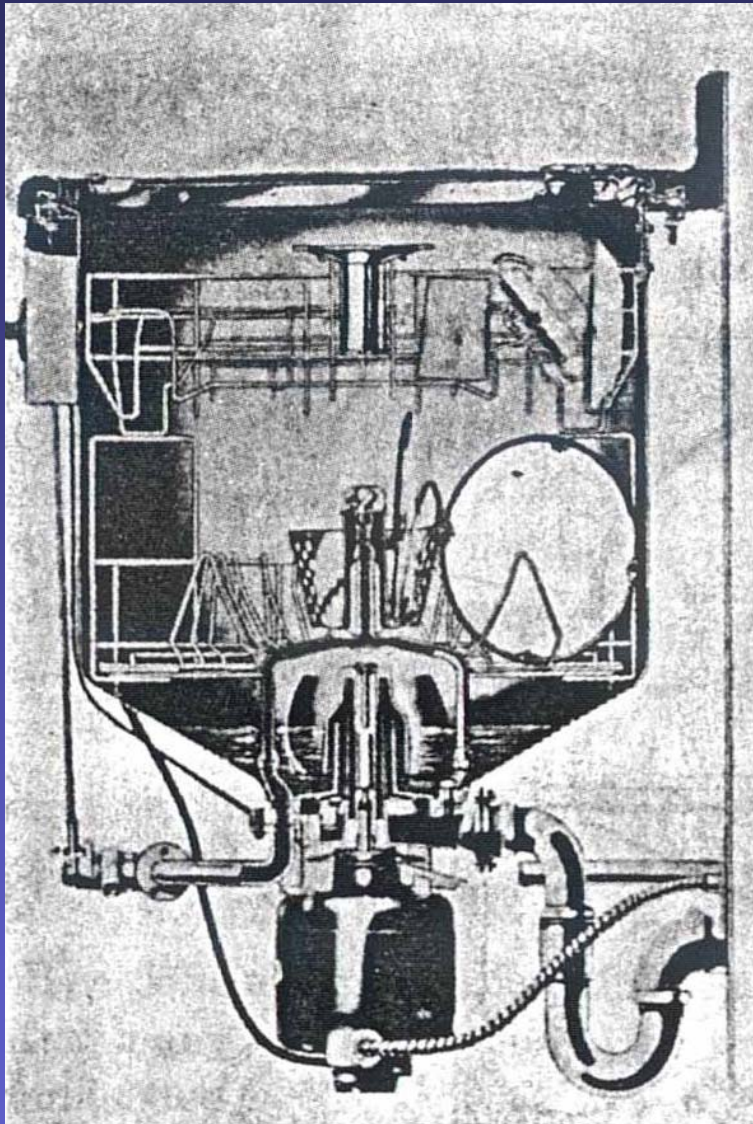
A tough fight  
against electricity  
industry



(1938)

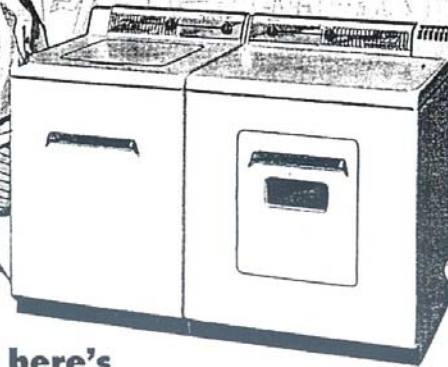
Fluorescent Lighting





1946

**Lots of ways  
to get clothes  
dirty...**



**but here's  
the way to keep 'em clean!**

**NEW** *Companion Piece*  
AUTOMATIC HOME LAUNDRY

**Hamilton**

WASHERS AND DRYERS

Comes washday, and it's you against the whole family! How to stay on top? It's easy with a Companion Piece laundry, Hamilton's exciting new Automatic Washer and new 1954 Dryer. Watch them working at your Hamilton Dealer's now. Careful, though! If you're shopping for easier washdays, don't settle for less than Hamilton!

*Free Home Laundry Handbook - write for your copy now!*

**RESULTS  
ASSURED**

Laundry efficiency laboratory-proven by nuclear scientists! Only Hamilton offers this proof. Let your Hamilton Dealer show you how clothes come clean in a Hamilton!

**Hamilton Automatic Washer  
with Soil-Seeking Water Action**

Gentle, thorough agitator washing action. The new Hamilton is fully automatic, yet you can control the cycle. Handles the heaviest hard-work loads or sudas precious, delicate things... at your finger-touch. Test it and see why Hamilton's the biggest automatic washer value in town!



**Hamilton Automatic Dryer  
the first, the fastest, the finest!**

Only Hamilton, the original automatic clothes dryer, gives you these *first-start* features! Quick, gentle Carrier-Current drying... sunshining freshness with the Sun-E-Day Lamp... amazing Fabri-Dial temperature control. Make sure you get them all - get a Hamilton!

*the folks who made automatic washdays possible*

HAMILTON MANUFACTURING COMPANY • TWO RIVERS 10, WISCONSIN

1950

# Air Conditioning



Factories

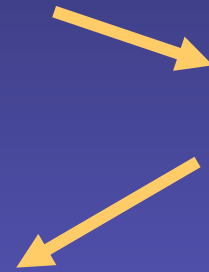
Theatres/Cinemas

Stores

Hospitals

Offices

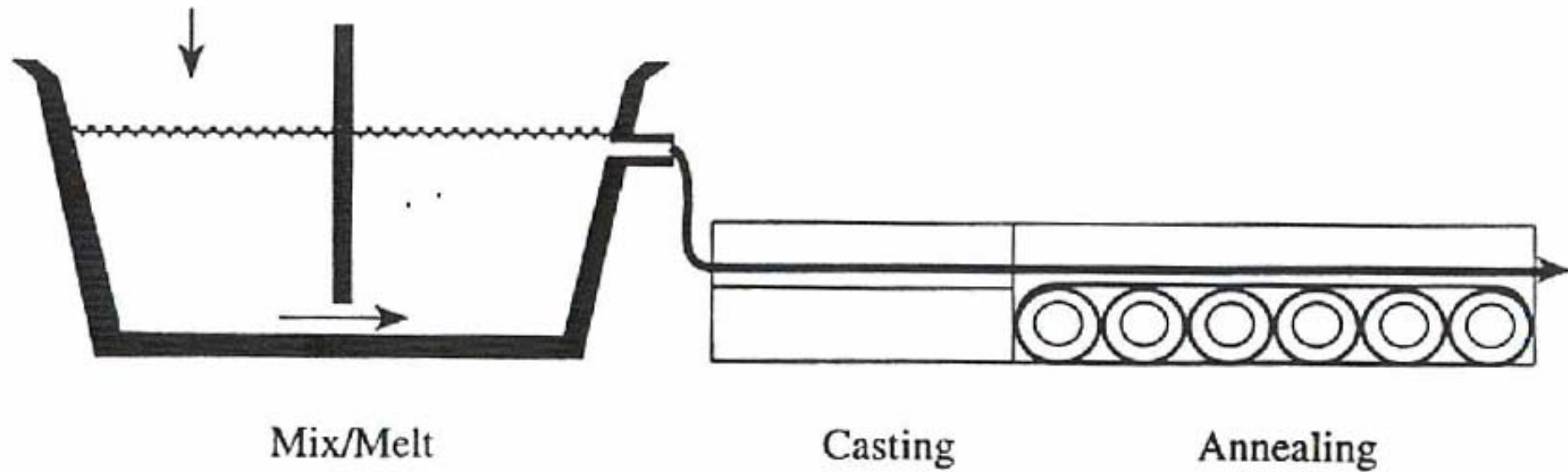
Dwellings



This architecture would  
have not been possible  
without **fluorescent  
lamps and air  
conditioning**

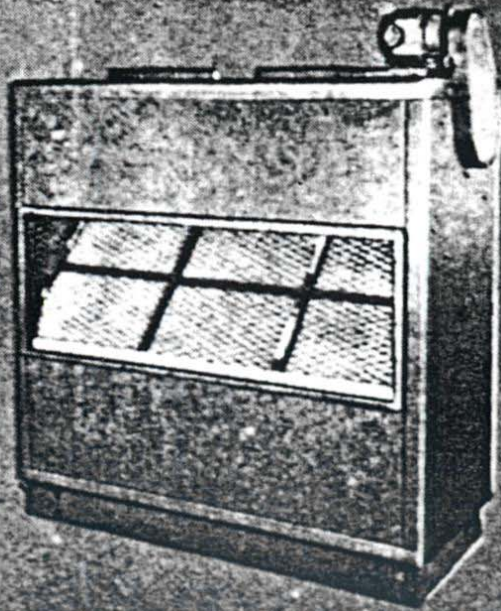


## The Float Glass Process



*Note:* Not to scale. Each element of this process is very long. The furnace tank is typically about 80 meters, and the annealing kiln about 400 meters.

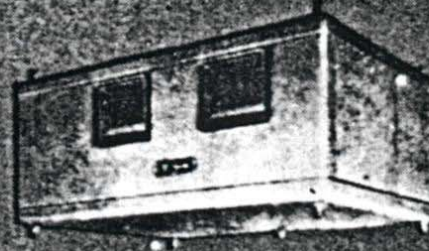
# AIR CONDITIONERS



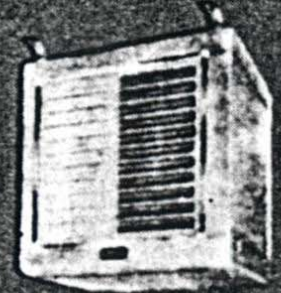
**AIR CONDITIONER YEAR 'ROUND**  
(Floor Model)



**AIR CONDITIONER**



**AIR CONDITIONER YEAR 'ROUND**  
(Suspended Model)



**COMFORT COOLER**

From low cost comfort coolers to dual purpose year 'round air conditioners McQuay emphasizes efficiency—durability. Designed for quiet, dependable operation, McQuay air conditioners offer the benefits of controlled air comfort for small shop and factory alike. Air conditioning

units cool or heat, humidify or de-humidify, filter and circulate air for all-season use.

Available for water or direct expansion cooling, steam or water heating, McQuay has a big selection of models and capacities to meet your needs.



1961

# Standby

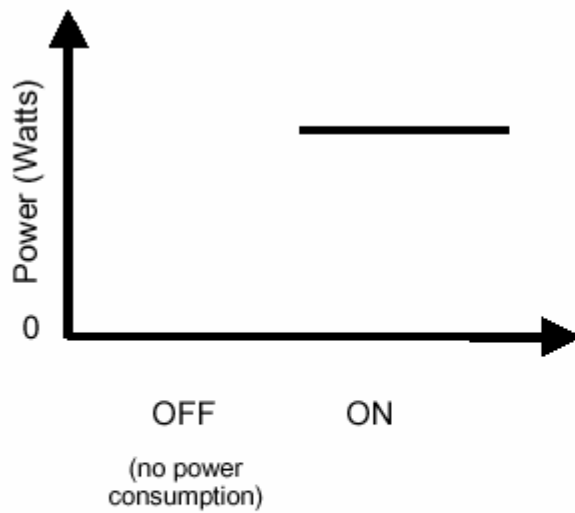


Figure 1:  
Conditions of products with  
no standby power consumption

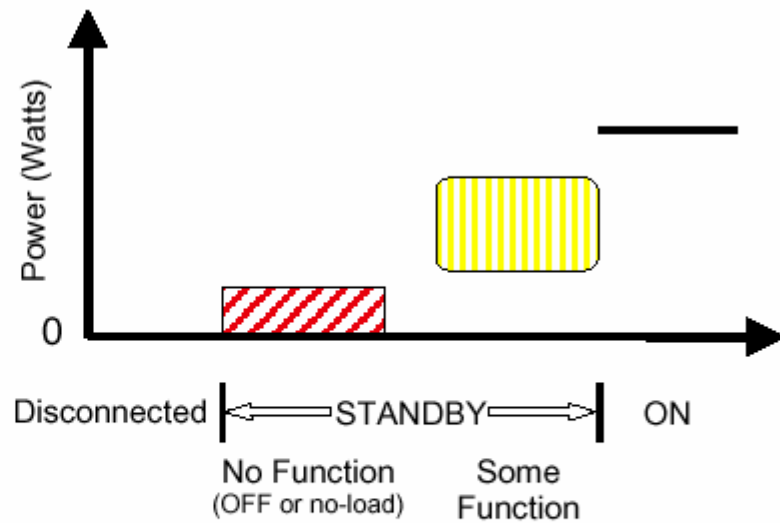
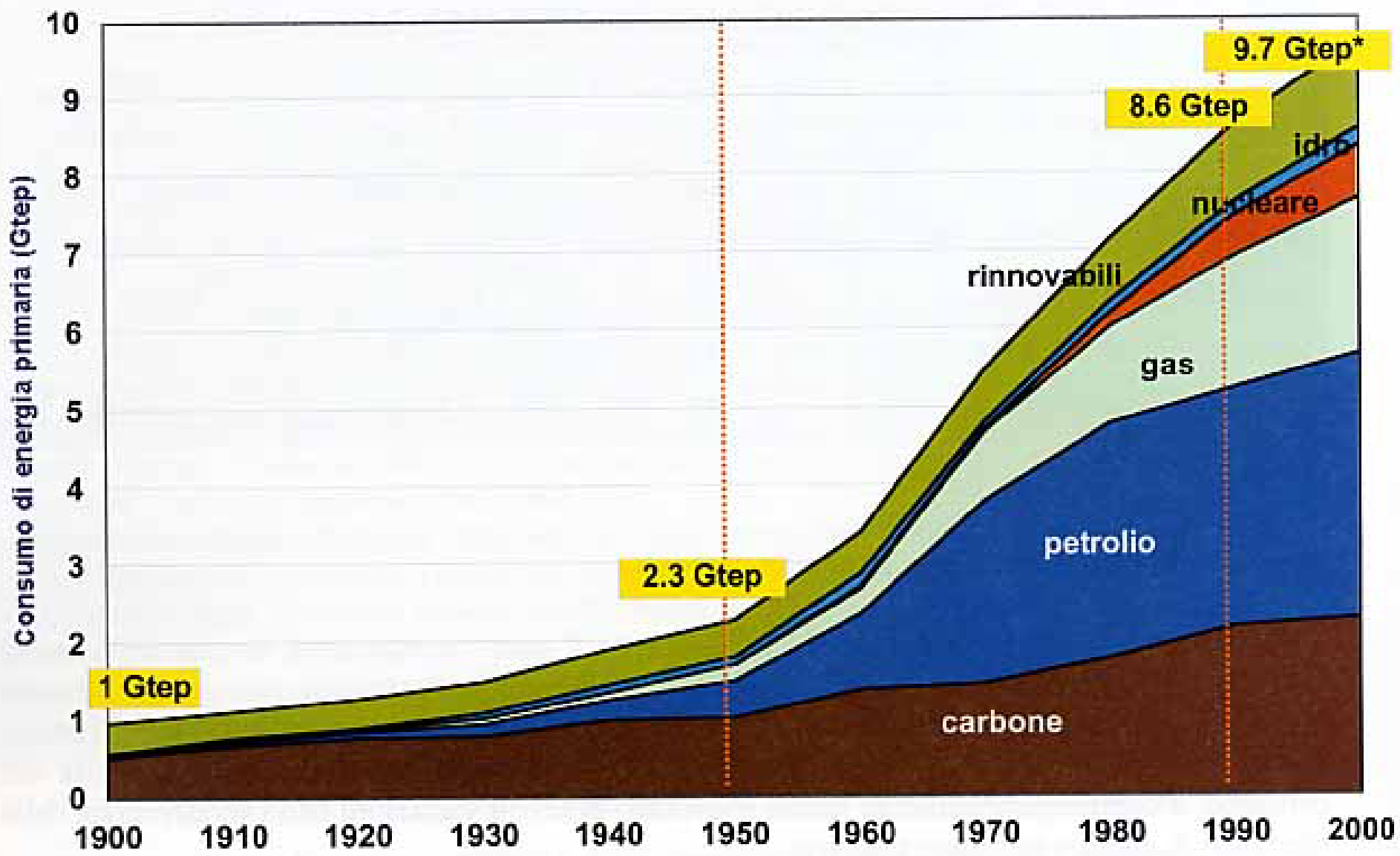


Figure 2:  
Relationship between standby  
and other product conditions



Country	Average residential standby power use (watts)	Annual electricity use (kWh/yr)	Fraction of total residential electricity use	Source and type of estimate	Notes
Australia	86.8	760	11.6%	(Marker T., AGO & Harrington L. 2001)	Field survey of 64 households.
France	27	235	7%	(Sidler O., Enertech 2000)	Based on field measurements in 178 homes. Some appliances with standby modes may have been overlooked.
Germany	44	389	10%	(Rath U., M. Hartmann et al. 1997) Bottom-up	May include standby losses from storage water heaters.
Japan	46	398	9.4%	(Matsunaga, T. ECCJ 2001)	Based on field measurements in 51 homes.
Netherlands	37	330	10%	(Siderius, H.P. 1995) Bottom-up	Based on typical standby power use of major appliances. It does not include less common appliances, so the actual value may be higher.
New Zealand	100	880	11%	(EECA 1999)	Based on a field study of 29 homes. It includes a few heated towel rails and malfunctioning appliances.
Switzerland	19	170	3%	(Meyer & Schaltegger AG 1999) Bottom-up	Only includes TVs, VCRs, satellite receivers, stereos, some re-chargeable appliances, cordless telephones and PCs.
United Kingdom	32	277	8%	(Vowles J., ECI Oxford 2001)	Field estimate for 32 households.
United States	50	440	5%	(Rainer L., A. Meier and S. Greenberg 1996) Bottom-up	Based on measurements of individual appliances and then adjusted for the number of each appliance in an average home.



Consumo di energia primaria (Gtep)

1 Gtep

2.3 Gtep

8.6 Gtep

9.7 Gtep\*

1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000

carbone

petrolio

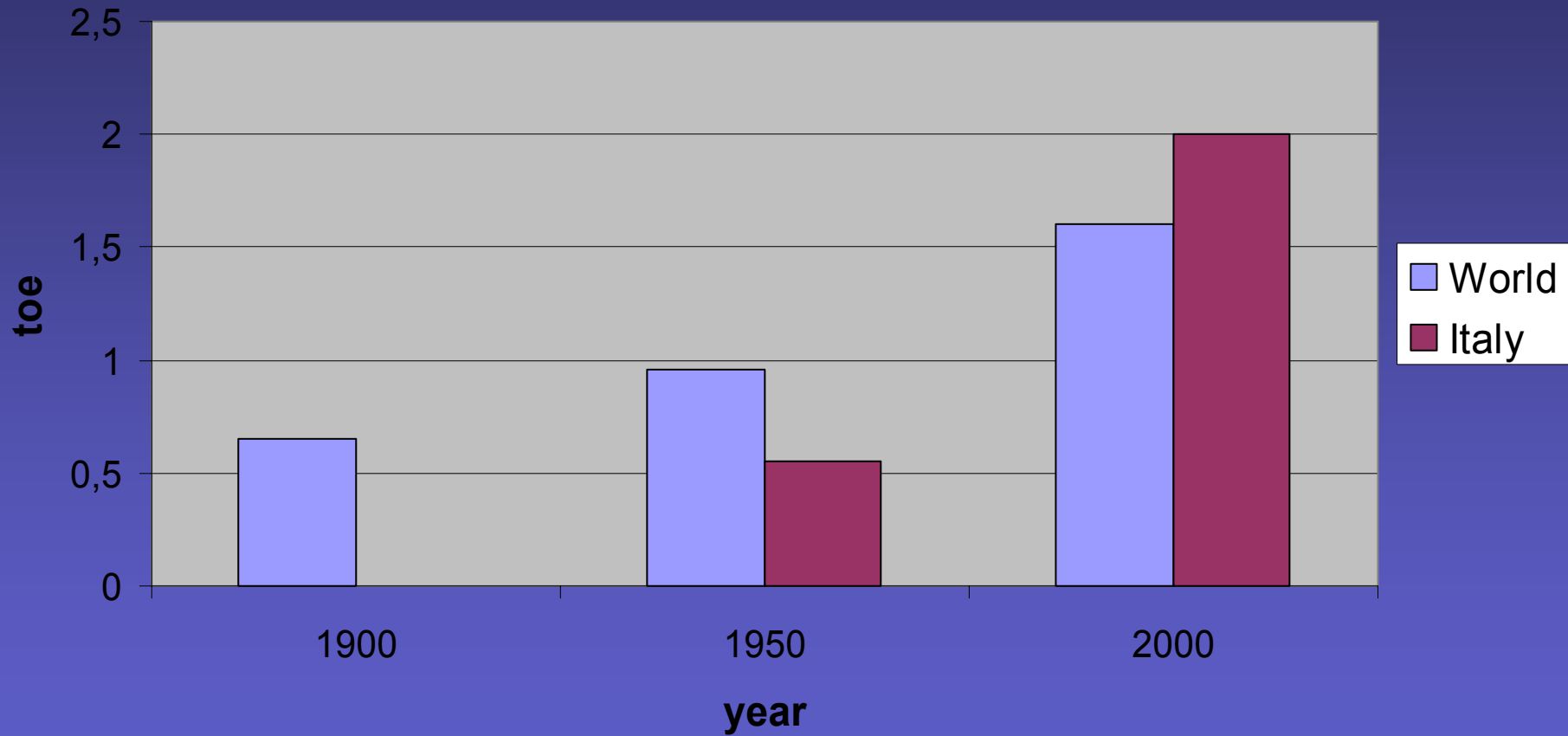
gas

rinnovabili

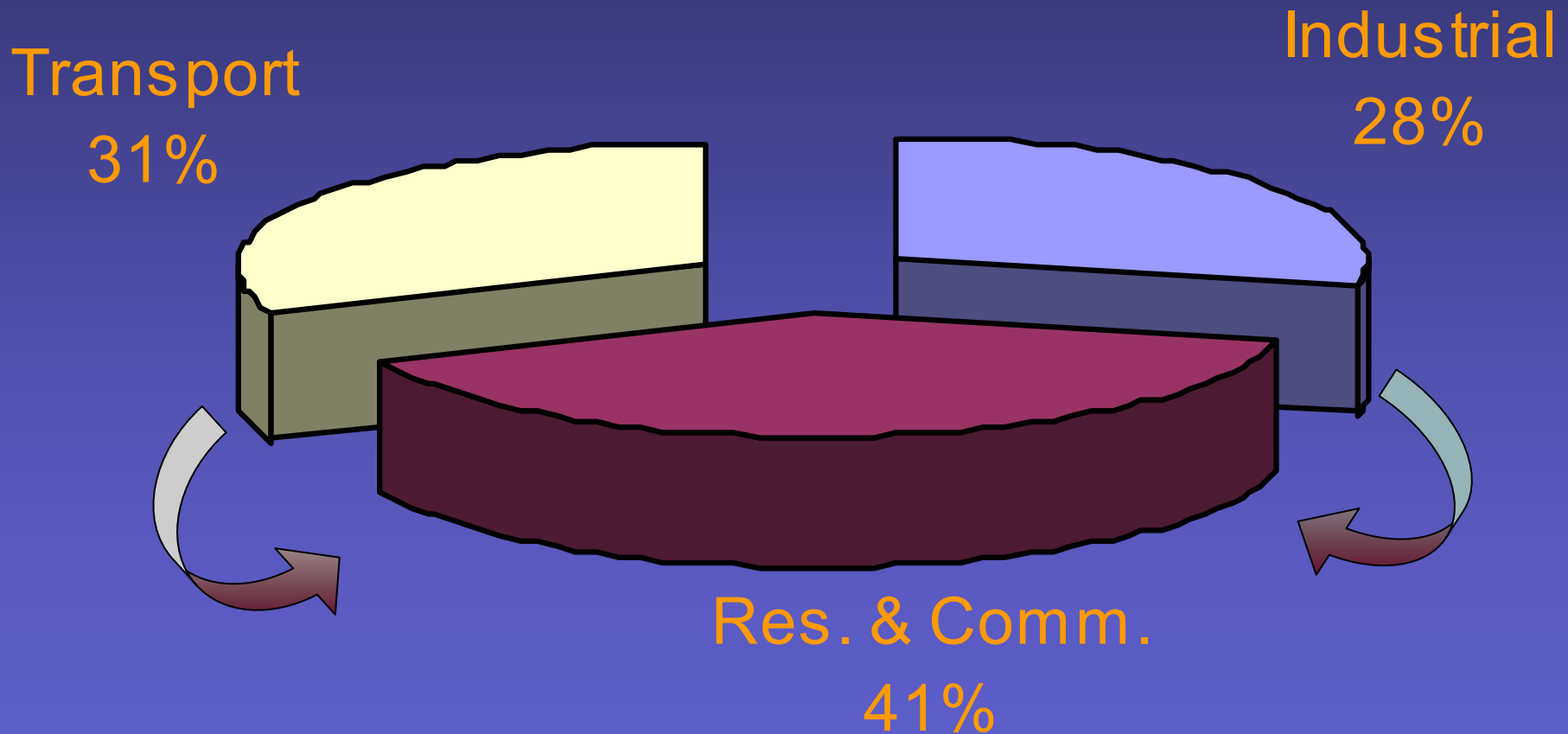
nucleare

id. e

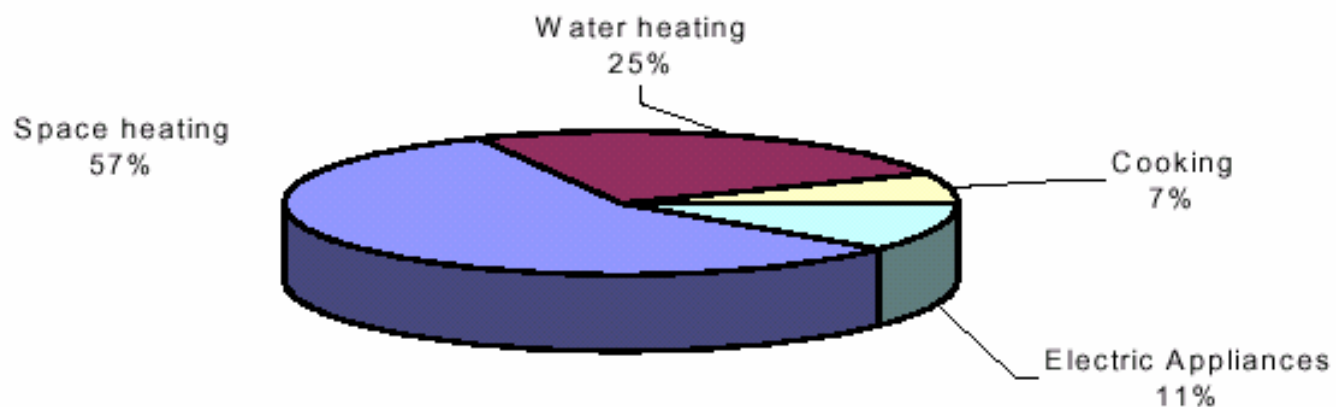
## per capita energy consumption



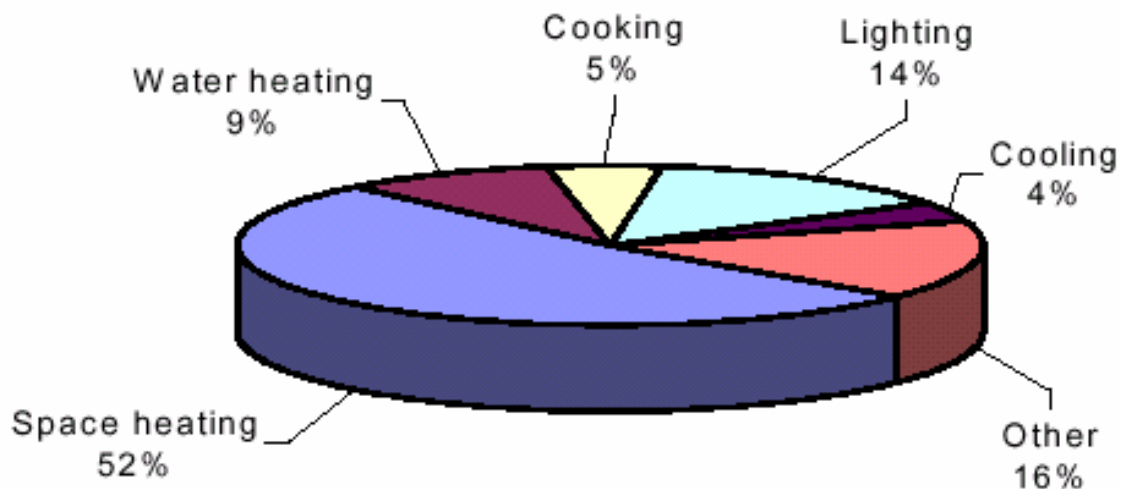
# Energy consumption by sector in European Union



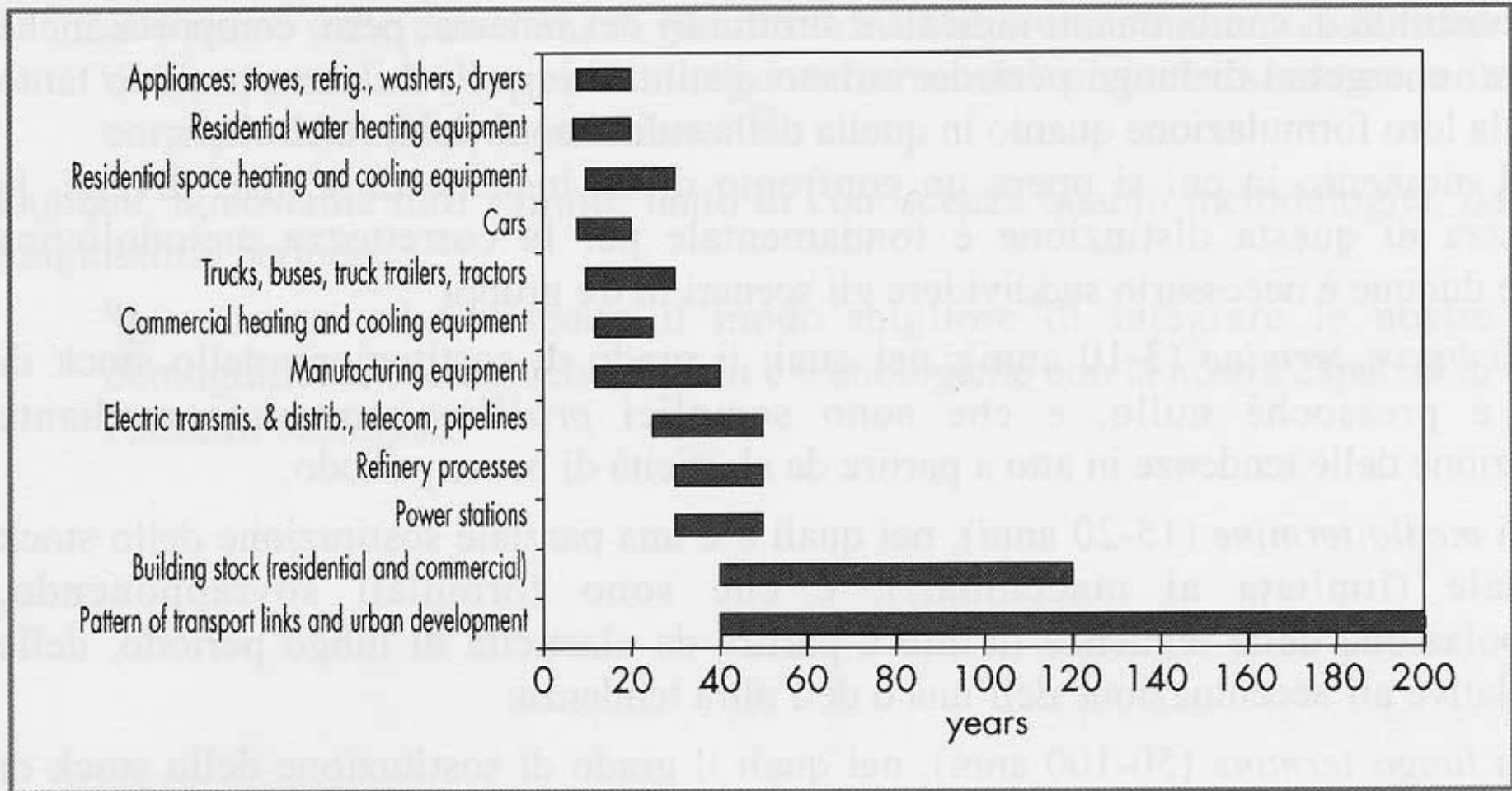
## Energy consumption by end use in EU residential buildings



## Energy consumption by end use in EU tertiary buildings



# Lifetime of components of the built environment



*The idea that architecture belongs in one place and technology in another is comparatively new in history, and its effect on architecture, which should be the most complete of the arts of mankind, has been crippling.*

*Because of failure of the architectural profession to – almost literally– keep the house in order, it fell to another body of men to assume responsibility for the maintenance of decent environmental conditions: everybody from plumbers to consulting engineers. They represented “another culture”, so alien that most architects held it beneath contempt, and still do.*

# Conclusions

Low energy architecture +

New technologies:

- Building envelope (from energy consumer to energy producer)
- Cooling
- Local comfort
- Kitchen (cooking stove, integrated domestic appliances)