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DESIGN OF PORTABLE STEAM OPERATED SUSTAINABLE HANGING IRON

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ABSTRACT

With the Development of new generation, development of irons is also necessary. We have been noticing new generations of iron for so long since 1882. As the latest update of ironing of clothes, Thomas Sears came up with an idea of steam iron which is classified as the best iron for clothes nowadays. Most of the people in current century use steam iron in their daily use. To develop further versions of steam iron we came up with the idea in which instead of doing iron by hands we just have to hang clothes to iron them.

This saves a lot of time in this busy life and is easy to use and conserves a lot of water usage wasted in a normal steam iron. With this idea we are introducing our product, also we have surveyed about our product and found it useful for people.

Keywords: Steam iron, Steam iron hanger, Portable iron, Emergency iron, Time saving iron

INTRODUCTION

A clothes iron (also flatiron, smoothing iron, or simply iron) is a small appliance that, when heated, is used to press clothes to remove creases. Domestic irons generally range in operating temperature from between 121 °C (250 °F) to 182 °C (360 °F). It is named for the metal (iron) of which the device was historically made, and the use of it is generally called ironing, the final step in the process of laundering clothes.

Ironing works by loosening the ties between the long chains of molecules that exist in polymer fiber materials. With the heat and the weight of the ironing plate, the fibers are stretched and the fabric maintains its actual shape when cool. Some materials, such as cotton, require the use of water to loosen the intermolecular bonds.

As we know nowadays steam press is widely used for laundering clothes. This is because of the good heat absorbing characteristics. As we know when the steam is formed, it absorbs much amount of heat in form of latent heat of steam. we used these clothes.

HISTORY AND DEVELOPMENT

Before the introduction of electricity, irons were heated by combustion, either in a fire or with some internal arrangement. An "electric flatiron" was invented by American Henry W. Seeley and patented on June 6, 1882.[1] It weighed almost 15 pounds (6.8 kg) and took a long time to heat. The UK Electricity Association is reported to have said that an electric iron with a carbon arc appeared in France in 1880, but this is considered doubtful.[2]

Two of the oldest sorts of iron were either containers filled with a burning substance, or solid lumps of metal which could be heated directly.

Metal pans filled with hot coals were used for smoothing fabrics in China in the 1st century BC.[3] A later design consisted of an iron box which could be filled with hot coals, which had to be periodically aerated by attaching a bellows. In the late nineteenth and early twentieth centuries, there were many irons in use that were heated by fuels such as kerosene, ethanol, whale oil, natural gas, carbide gas (acetylene, as with carbide lamps), or even gasoline. Some houses were equipped with a system of pipes for distributing natural gas or carbide gas to different rooms in order to operate appliances such as irons, in addition to lights. Despite the risk of fire, liquid-fuel irons were sold in U.S. rural areas up through World War II. In Kerala in India, burning coconut shells were used instead of charcoal, as they have a similar heating capacity. This method is still in use as a backup device, since power outages are frequent. Other box irons had heated metal inserts instead of hot coals.

From the 17th century, sadirons or sad irons (from Middle English "sad", meaning "solid", used in English through the 1800s [4]) began to be used. They were thick slabs of cast iron, triangular and with a handle, heated in a fire or on a stove. These were also called flat irons. A laundry worker would employ a cluster of solid irons that were heated from a single source: As the iron currently in use cooled down, it could be quickly replaced by a hot one.

In the industrialized world, these designs have been superseded by the electric iron, which uses resistive heating from an electric current. The hot plate, called the sole plate, is made of aluminium or stainless steel polished to be as smooth as possible; it is sometimes coated with a low-friction heat-resistant plastic to reduce friction below that of the metal plate. The heating element is controlled by a thermostat that switches the current on and off to maintain the selected temperature. The invention of the resistively heated electric iron is credited to Henry W. Seeley of New York City in 1882. In the same year an iron heated by a carbon arc was introduced in France, but was too dangerous to be successful. The early electric irons had no easy way to control their temperature, and the first thermostatically controlled electric iron appeared in the 1920s. Later, steam was used to iron clothing. Credit for the invention of the steam iron goes to Thomas Sears. The first commercially available electric steam iron was introduced in 1926 by a New York drying and cleaning company, Eldec, but was not a commercial success. The patent for an electric steam iron and dampener was issued to Max Skolnik of Chicago in 1934. In 1938, Skolnik granted the Steam-O-Matic Corporation of New York the exclusive right to manufacture steam-electric irons. This was the first steam iron to achieve any degree of popularity, and led the way to more widespread use of the electric steam iron during the 1940s and 1950s.

Types and names - Historically, irons have had several variations and have thus been called by many names:

Flatiron (American English), flat iron (British English) or smoothing iron

The general name for a hand-held iron consisting simply of a handle and a solid, flat, metal base, and named for the flat ironing face used to smooth clothes.

Sad iron or sadiron [3]

Mentioned above, meaning "solid" or heavy iron, where the base is a solid block of metal, sometimes used to refer to irons with heavier bases than a typical "flatiron".

Box iron, ironing box, charcoal iron, ox-tongue iron or slug iron [3]

Mentioned above; the base is a container, into which hot coals or a metal brick or slug can be inserted to keep the iron heated. The ox-tongue iron is named for the particular shape of the insert, referred to as an ox-tongue slug.

Goose, tailor's goose or, in Scottish, gusing iron [3] [what language is this?]

A type of flat iron or sad iron named for the goose-like curve in its neck, and (in the case of "tailor's goose") its usage by tailors.

Goffering iron

This type of iron, now obsolete, consists of a metal cylinder oriented horizontally on a stand. It was used to iron ruffs and collars.

METHODOLOGY

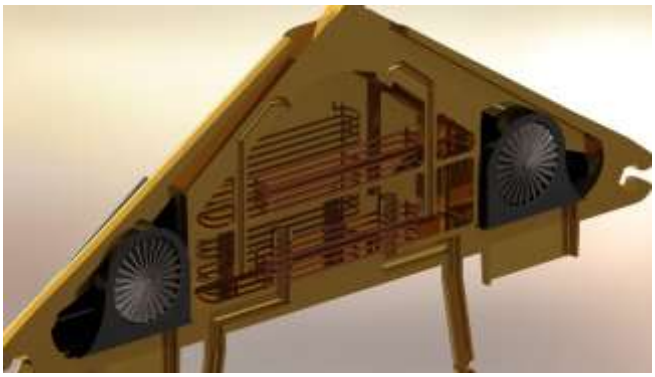
Nowadays we are using steam vacuumpress of steam iron which uses heavy machinery to produce vacuum and steam. These irons work between 121 degree (250° F) to 182 degree (360° F) these machineries are expensive and large in size that is why they are only compatible for industrial use.

Thus, here our innovation comes into play, we have designed a light weight, economic, no time consuming, automatic steam iron which irons the cloth just by hanging them on a hanger. Our iron

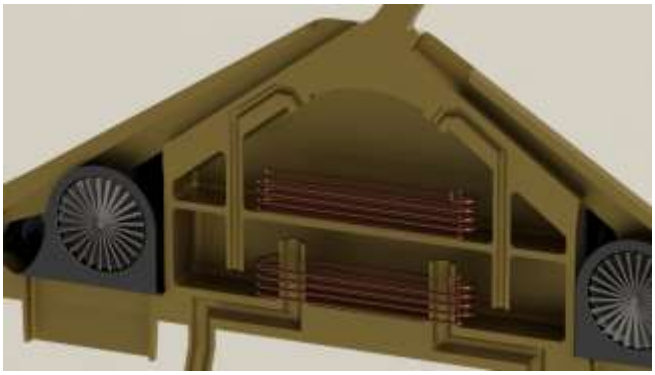
also uses the heat of the steam for loosening the ties between the long chain molecules that exist in polymer fiber materials. With the heat of the steam and the weight of the hanging cloth, the fibers of material are stretched and the fabric maintain its new shape when cooled via fans. Our steam iron is also suitable for materials such as cotton and khadi which uses water to loosen the inter molecular bond in common heat iron press. Our iron can be also called as emergency iron because it is an automatic iron and does not consume your valuable time for ironing the cloth.

DESIGN

Front view



Section view



Zoomed chamber's view

Side view

WORKING

Our iron is designed in such a way that it has two chambers connected to each other via pipes and heating coil fitted in both the chambers which produces steam. The whole mechanism is fitted inside a cloth hanger.

As shown in figure, the water is filled in the upper container and heated by the coils to produce steam. The produced steam is wet steam which goes into the second chamber via tubes the second chamber receives the wet steam which is now super-heated dry steam by the secondary coil in this chamber. This super-heated dry steam now travels through the steam pipes and spreads inside the whole cloth. The steam straightens the fibers of cloth and irons the cloth at its stretched position. We have used thick pipes with small pores to blow steam into the cloth as the more amount of superheated dry steam can reduce cloth life. Also, to release the dry steam out of the cloth, we have used two small fans which sucks air from outer atmosphere and blows inside the cloth to blow out the dry steam. This whole process takes around 5 minutes to complete and completely compatible for cloth life and sure ironing. As a comparison to a normal steam iron, it takes less time and no efforts. Just hang the cloth for 5 minutes and it is ready for you.

Our emergency iron also has a cut off feature which automatically switch off itself depending on the cloth condition so to protect them from excessive heat.

COMPONENTS USED

1. **2 Heating coil (1000w)**

2. **2 (2200 rpm) Turbo fan**

3. **4 Fan covers**

4. **Metal hanger**

5.

MATERIAL USED

For the fabrication of the hanger containing both the chambers, we are using **Cast iron** so to last long its life and durable to use.

Some properties of cast iron are-

- Hardness – material's resistance to abrasion and indentation.
- Toughness – material's ability to absorb energy.
- Ductility – material's ability to deform without fracture.
- Elasticity – material's ability to return to its original dimensions after it has been deformed.

RANGE OF COMPOSITIONS FOR TYPICAL UNALLOYED CAST IRONS
VALUES IN PERCENT (%)

TYPE OF IRON	CARBON	SILICON	MANGANESE	SULFUR	PHOSPHORUS
Gray	2.5 - 4.0	1.0 - 3.0	0.2 - 1.0	0.02 - 0.25	0.02 - 1.0
Ductile	3.0 - 4.0	1.8 - 2.8	0.1 - 1.0	0.01 - 0.03	0.01 - 0.1
Compacted Graphite	2.5 - 4.0	1.0 - 3.0	0.2 - 1.0	0.01 - 0.03	0.01 - 0.1
Malleable (Cast White)	2.0 - 2.9	0.9 - 1.9	0.15 - 1.2	0.02 - 0.2	0.02 - 0.2
White	1.8 - 3.6	0.5 - 1.9	0.25 - 0.8	0.06 - 0.2	0.06 - 0.2

Cast iron, an alloy of iron that contains **2 to 4 percent carbon, along with varying amounts of silicon and manganese and traces of impurities such as sulphur and phosphorus**. It is made by reducing iron ore in a blast furnace.

For the fan covers and other plastic material we are using **Bakelite** because of its high heat resistance properties.

Bakelite has a number of important properties. It **can be moulded very quickly, decreasing production time**. Mouldings are smooth, retain their shape and are resistant to heat, scratches, and destructive solvents. It is also resistant to electricity, and prized for its low conductivity.

A hard, infusible, and chemically resistant plastic, Bakelite was based on a chemical combination of **phenol and formaldehyde (phenol-formaldehyde resin)**, two compounds that were derived from coal tar and wood alcohol (methanol), respectively, at that time.

	composition (wt %)
total carbon	53.4
oxygen	11.6
hydrogen	4.0
sulfur	0.017

	composition (wt %)
fixed carbon	31.70
volatiles	47.55
moisture	3.01
ash	17.74

Conclusion

This emergency steam iron is a unique invention which will bring a revolution in laundering technology. Now no one has to spend their time in ironing the cloth, just hang the cloths and do your other work. You will get the ironed clothes within 5 min. its time saving and very easy to use. Also, its very handy and portable thus you can carry it with you wherever you go.

Acknowledgement

History of all great works is to witness that no great work has ever done without either the active or passive support of a person surrounding and once close quarters. thus, it is not hard to conclude how active assistance from our group could prohibitively impact the execution of a project I am highly thankful to our learning faculty Mr Norman Gandhi for his active guidance throughout the completion of project.

Last but not the least I would also want to extend my appreciation to those who could not be mentioned here but here well played their role to inspire the curtain.

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