

Portable Mobile Charging Using Electromagnetic Principle and Design Related Calculations are Also Specified

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Abstract: This paper gives a crisp detail of clean energy i.e electrical energy from sound energy by means of external revamp circuit this modified circuit will operate on the principal of electromagnetic induction. This circuit will convert vibrations produced by human speech into desirable amount of electrical energy. An application is introduced for the same, in which a speaker and a setup made of electrical and mechanical equipments are used to transform sound vibration into electrical signals, further this resulting electrical energy can be used for charging a mobile phone without any external supply. The resulted idea scrutinize into a clean, easy and economical form of energy for mobile charging while talking.

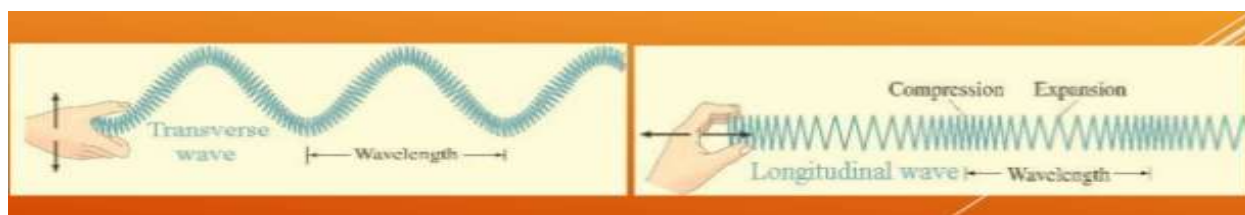
Keywords: emf, sound energy, chopper, rectifier, energy conversion, portable chargers

1. Introductions

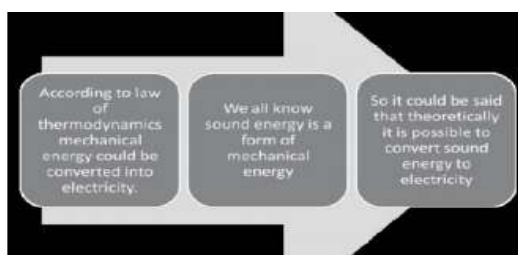
Sound energy

We know that sound energy is a mechanical energy which travels in the form of wave, mechanical wave needs a medium to travel i.e. it could not travel through vacuum. Sound is transmitted as longitudinal wave through liquid and gas state where in solid it could transmit as both longitudinal

wave and transverse wave. Longitudinal waves are those waves which are of alternating pressure deviation from the equilibrium pressure, produces local region of compression and rarefaction whereas transverse wave are waves of alternating shear and stress at right angle to the direction of propagation in solid. Fig1



Sound energy can be converted into electrical energy as mechanical energy could be converted into electricity by the law of thermodynamics. Sound energy can easily converted into heat energy which can be easily converted into electrical energy but it is not efficient as lot of energy is lost during conversion as compared to this, the other method used for converting sound energy to electrical energy by electromagnetic induction. The resulting electrical energy produced is used for charging a mobile while talking with a revamp transducer



Mobile charging

Mobile phone is charged by giving a constant dc supply to a battery. The charger has simple rectification circuit. This circuit transforms the 220 ac supply into 5v dc which feeds

the battery. Battery ratings are depends upon the mobile phone specification

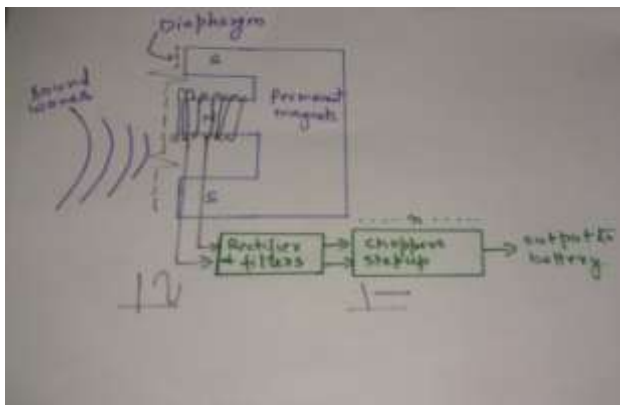
Technical method

A transducer based on mechanical and electrical principles is used to transform sound energy into electrical energy, this transducer is based on the principle of electromagnetic induction. To charge mobile phone directly from vibrations produced by human speech we need an extra mic, transducer, and a battery indeed. As we know there is a mic present in mobile phone that convert our speech into electrical signal which is used for communication purpose. We will add an extra mic in the mobile phone and a transducer, which converts the sound energy into electrical energy and that resulting energy will be fed to the mobile battery, whenever a person is talking on the phone the extra mic in mobile which connected to other transducer circuit will convert the sound signals into electrical energy.

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2. Working and Mathematical Analysis

The dynamic moving coil sound transducer works on principal of electromagnetic induction as in figure there is diaphragm that is very sensitive to sound vibrations as the diaphragm vibrates the coil vibrates with same frequency of vibration of diaphragm it results into flux change in the coil which inturn results into induced voltage as in alternating further after applying full wave rectifier and filters the wave is rectified into direct current then to adjust the magnitude of voltage of rectifier manifolds of step up chopper can be applied to adjust the voltage levels that is 5V for the charging voltage of cell battery.

Now sound intensity on avg emitted by normal speech is=60Db

As the time period of vibration of diaphragm =1/0.5mA

As frequency mechanical vibration =1kHz

Induced emf = $2\pi \times \text{frequency} \times \text{no. of turns} \times \text{max flux density} \times \text{area of coil}$

$$E = 2\pi \times f \times n \times B \times A$$

$$E = 2 \times 3.14 \times 0.5 \times (.005/2)^2 \times \pi \times 100 \times 1000$$

Assuming turns=100

$$B = .5 \text{ wb/m}^2$$

$$\text{Dia of coil} = .005 \text{ m}$$

$$\text{Freq} = 1 \text{ kHz}$$

E nearly equals 1to 30mv

Asuming avg value of ac and dc waves as same

Chopper source voltage 30mv

Now $V_1 = v_2 \times a / 1 - a$ where a is duty cycle or ratio of ton/t and v2=chopper source voltage and v1=chopper output voltage

Fpr step up a[0.5,1]

Taking a=.8

$V_1 = 120 \text{ mv}$ so appling series of chopper nearly 3to 4 we get output of 5v ...

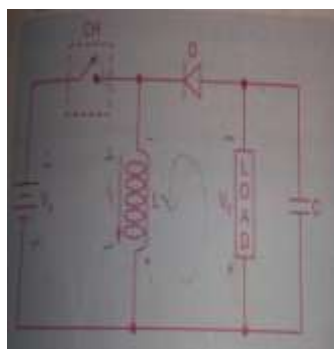


Figure shows chopper that can be used

3. Conclusion

The potable charging system is introduced in this paper using mechanical sound energy while talking using electronic technology and calculations related to above energy conversions are also specified

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