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(54) EMERGENCY ELEVATOR SYSTEM

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B66B 11/04 (2006.01)
B66B 1/34 (2006.01)

(52) **U.S. Cl.** **187/314**; 187/250; 187/252; 187/404; 187/411

(58) **Field of Classification Search** 187/250–252, 187/314, 404, 411
See application file for complete search history.

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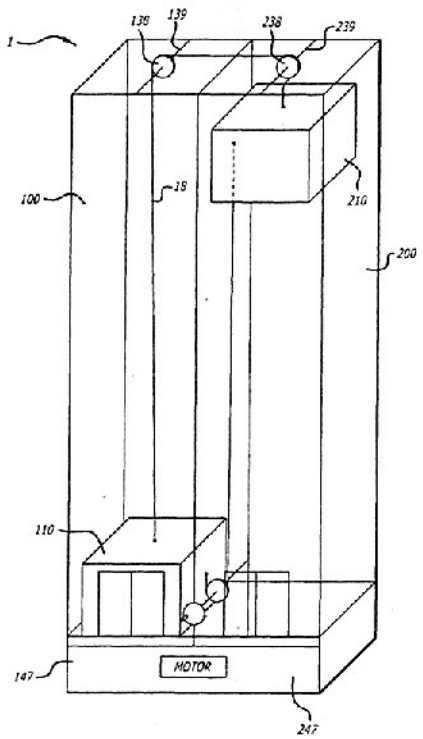
(57) **ABSTRACT**

The present invention relates to an elevator system for use during an emergency. The elevator system comprises two elevator shafts constructed adjacent to each other. Each elevator shaft houses an elevator car. The elevator system operates without the use of a building's power source by incorporating a primary pulley system to move the elevator cars. Generally, the elevator cars work in tandem such that as one elevator car goes up its respective elevator shaft, the other elevator car will go down its respective elevator shaft. Moreover, a secondary pulley system and a gear system are employed to also facilitate movement of the elevator cars without using the building's power supply.

23 Claims, 6 Drawing Sheets



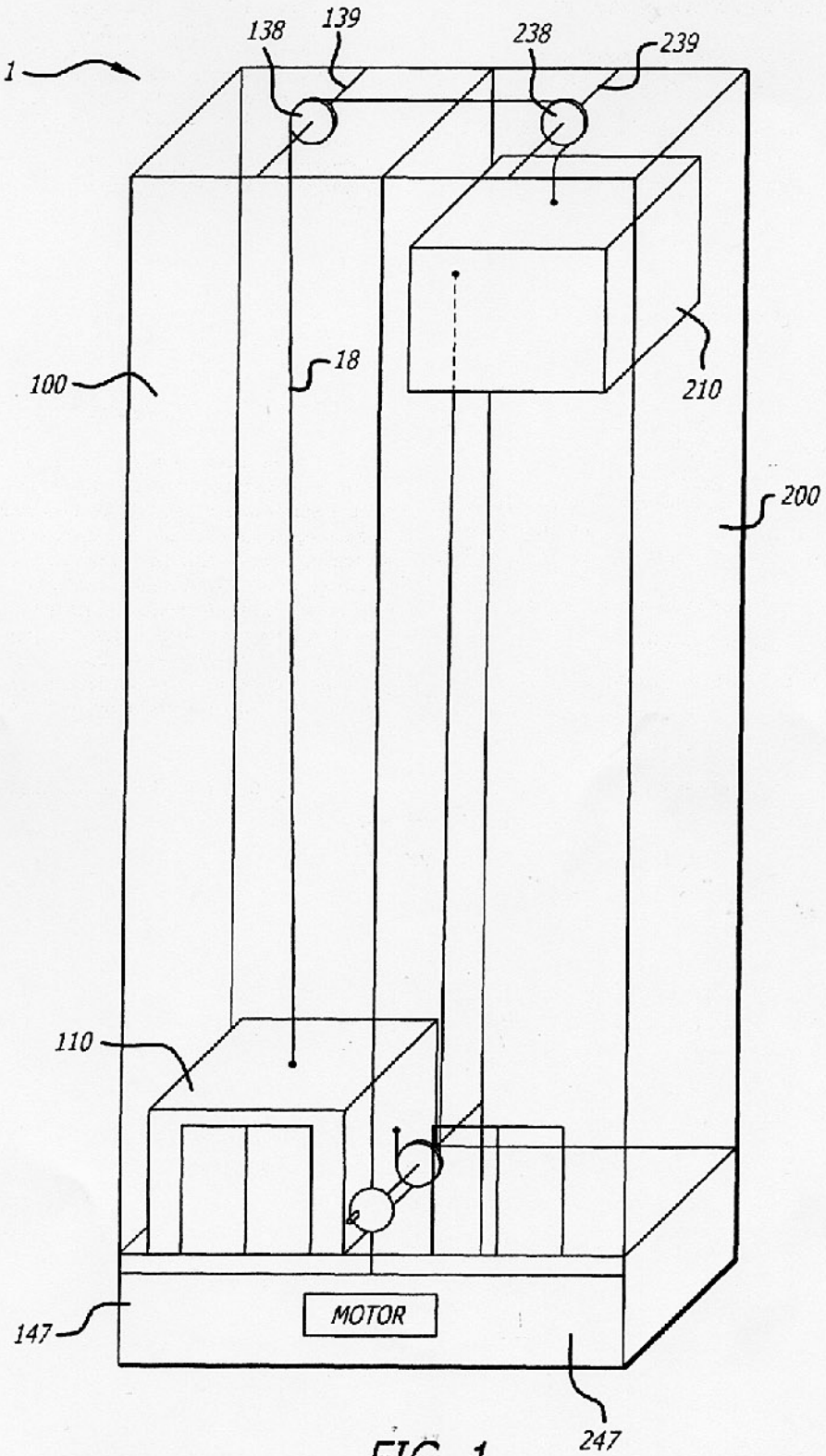


FIG. 1

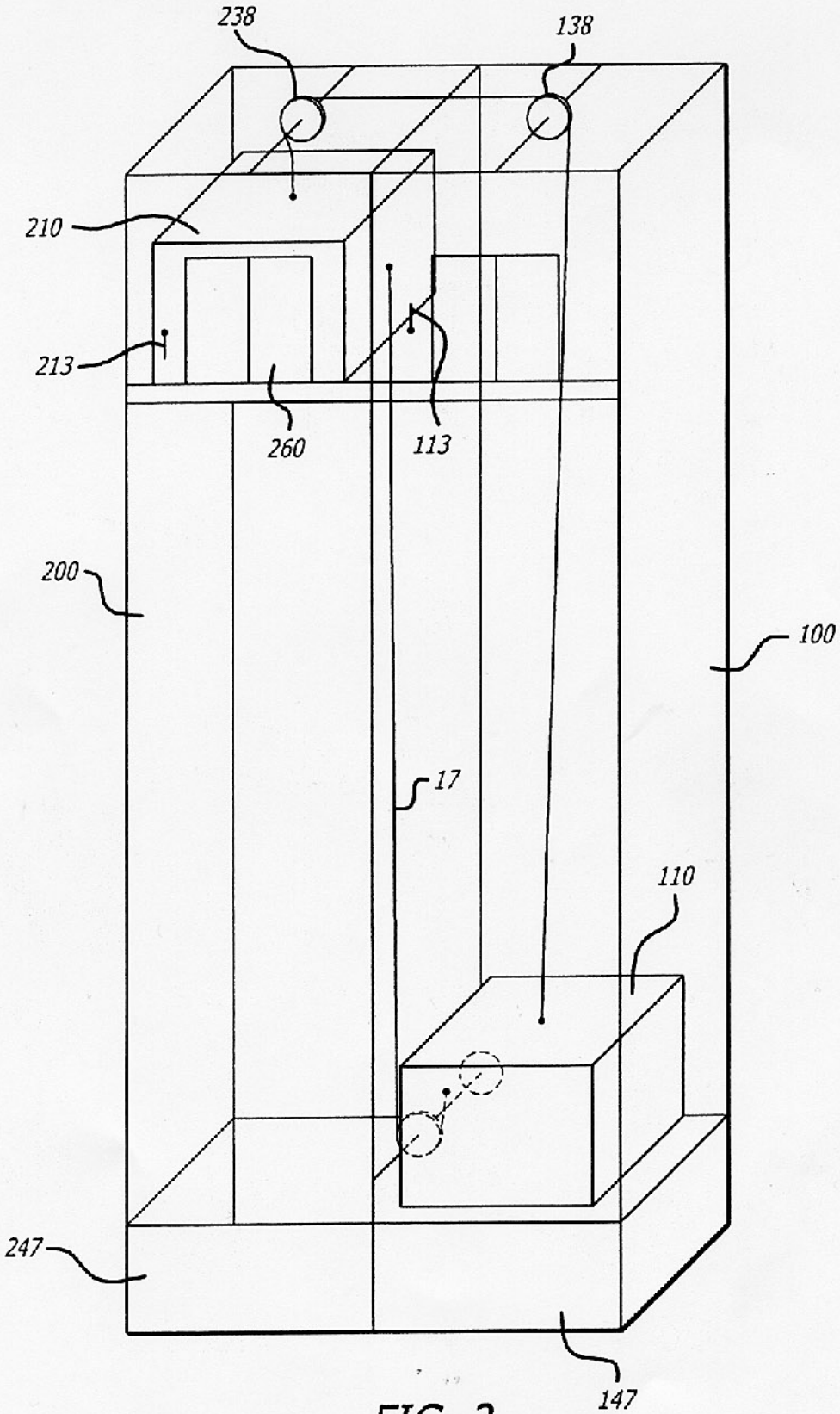


FIG. 2

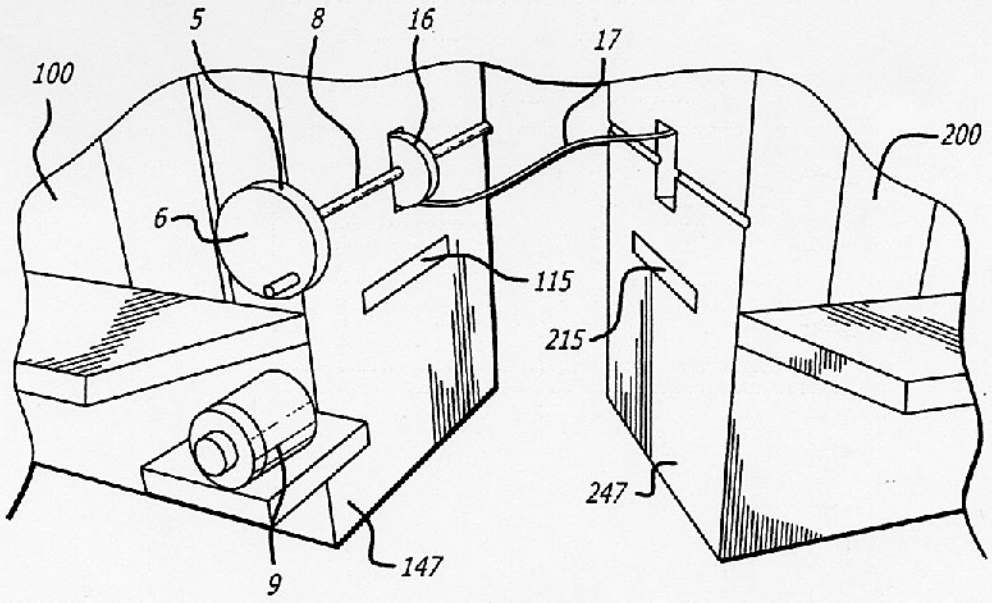


FIG. 3

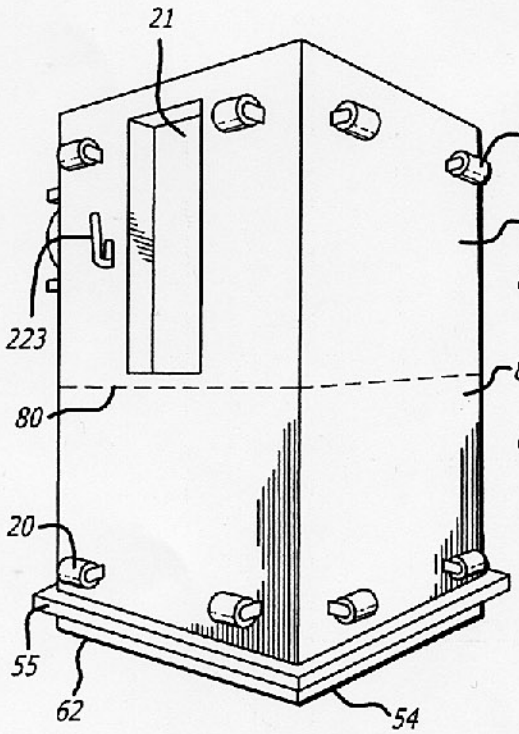


FIG. 4

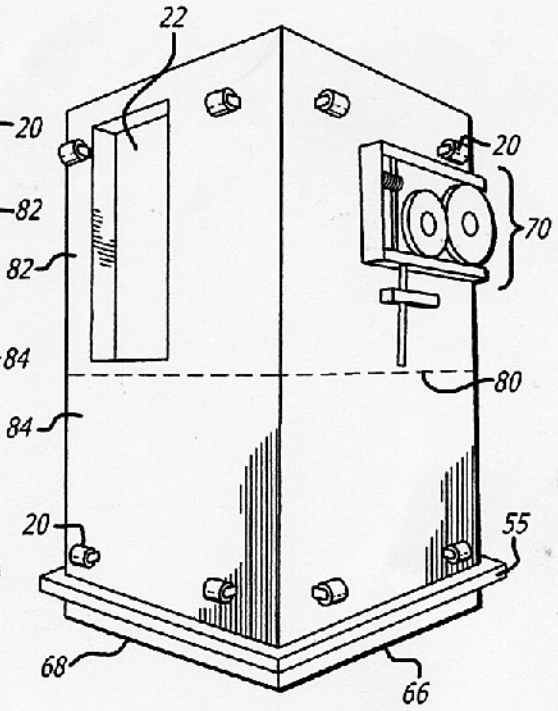


FIG. 5

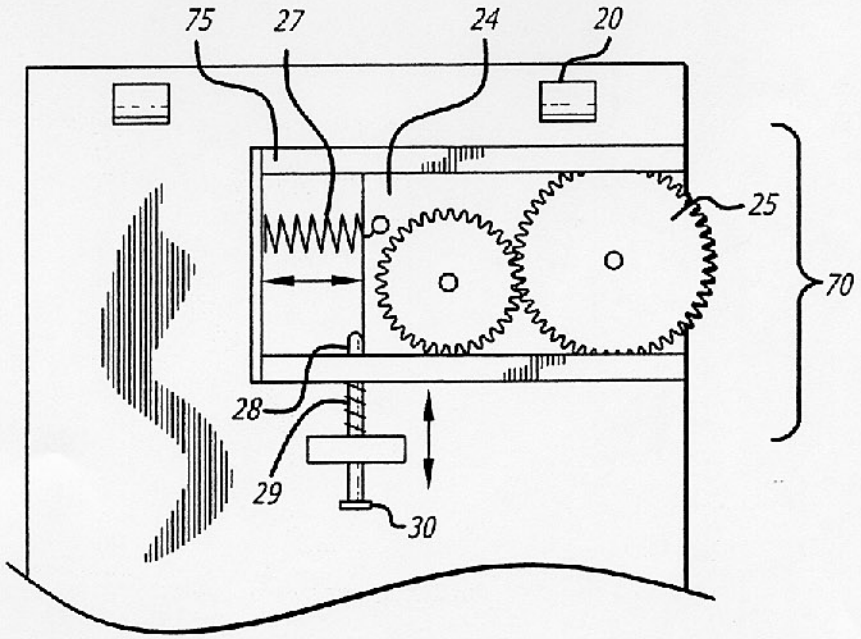


FIG. 6

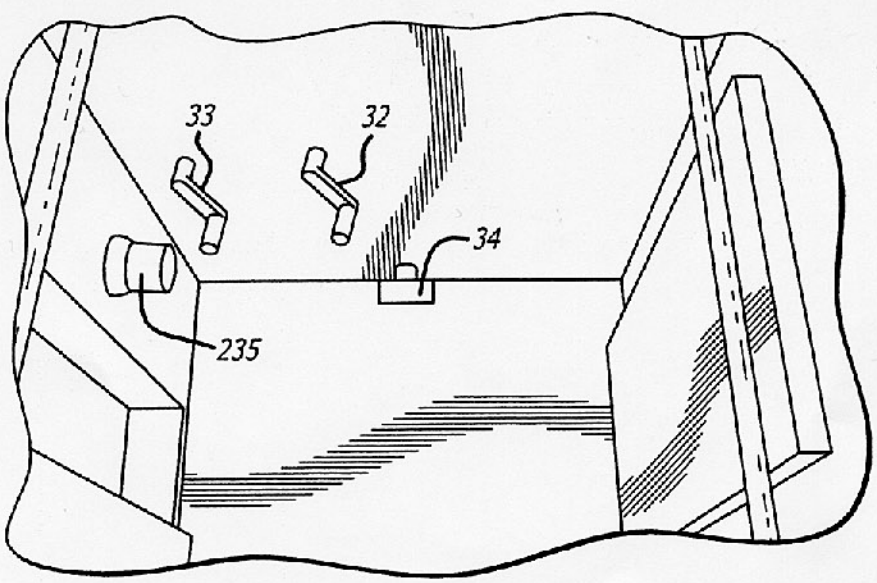
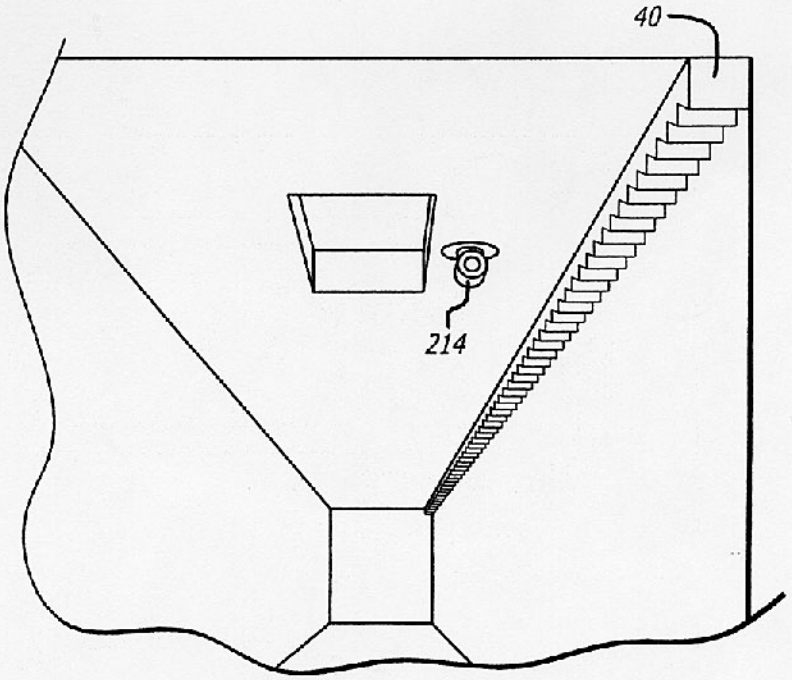


FIG. 7

FIG. 8



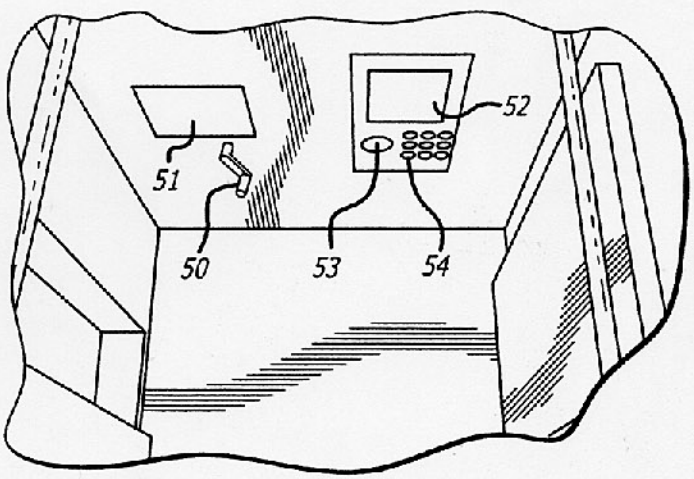


FIG. 9

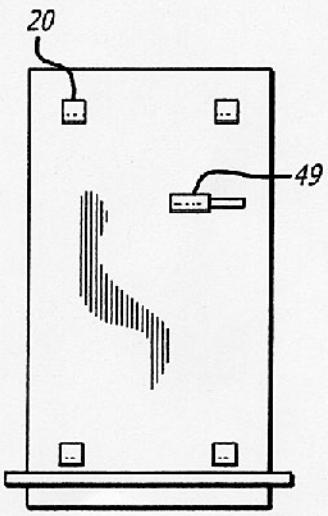


FIG. 10

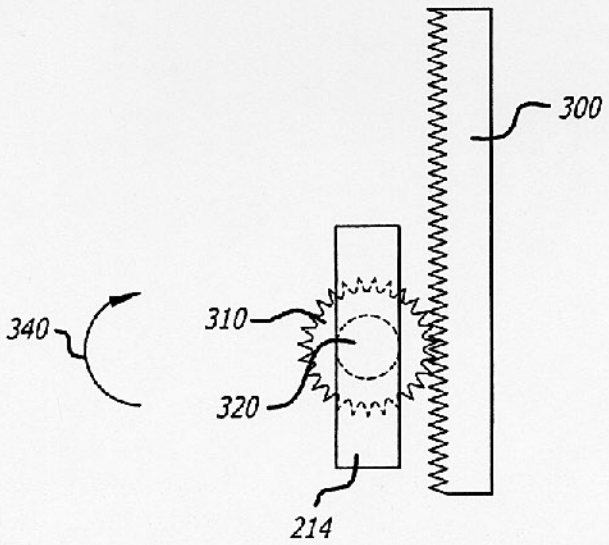


FIG. 11

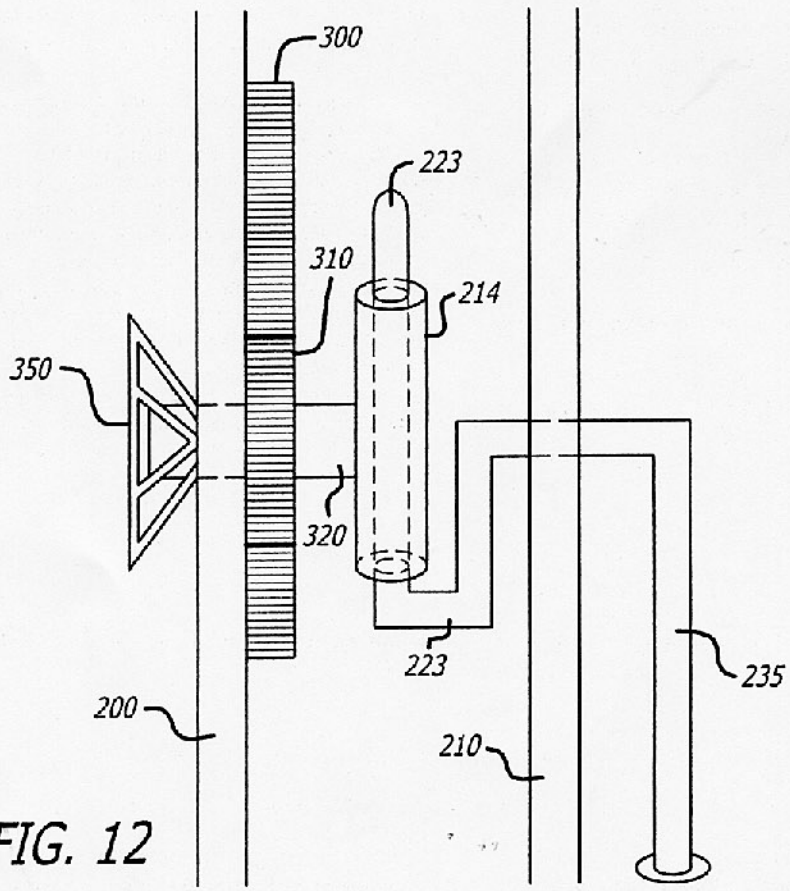


FIG. 12

EMERGENCY ELEVATOR SYSTEM

FIELD OF THE INVENTION

The present invention relates to passenger elevator systems, and more particularly, to an elevator system for use during an emergency.

BACKGROUND OF THE INVENTION

Generally, elevators provide a method of transportation for moving persons or objects between floors of a building. These elevators include cars which travel within an elevator shaft. The cars are connected to a counterweight by hoist cables, all of which are oriented vertically within the shaft. Movement to a desired floor is achieved by electrically powered motors. These motors rely upon the building's power source and are controlled by electrical systems within the building.

During an emergency situation, such as an earthquake, fire or terrorist attack, the power within the building is often disrupted. Therefore, the conventional elevator system becomes unreliable. As a result, travel between floors during the emergency is reduced to the use of stairs, ladders or articulated arms. If the floor involved is relatively high (e.g. 50-100 floors), or if there are floors above a fire, ladders and articulated arms may not be able to reach the desired floor from the exterior of the building. Accordingly, the stairs may be used for persons to evacuate the building. However, considering that the evacuating persons will start from a relatively high floor, it will be hard-pressed and time consuming for the persons to walk down the stairs to safety.

Moreover, in the absence of conventional elevator service, emergency workers such as firefighters must hand carry any firefighting equipment to the affected area. This drastically reduces the amount of equipment than can be carried and the speed with which it can be deployed.

Therefore, there is a need for an elevator system which provides a reliable independent means to transport persons and objects between floors of a building during an emergency.

SUMMARY OF THE INVENTION

The present invention is directed to an elevator system for use during an emergency.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the present invention is embodied in an elevator system for use during an emergency, the system comprising a first elevator shaft for housing a first elevator car, a second elevator shaft for housing a second elevator car, a primary pulley system operatively connecting the first elevator car to the second elevator car and facilitating one elevator car to descend its respective elevator shaft while the other elevator car ascends its respective elevator shaft, a secondary pulley system operatively connecting the first elevator car to the second elevator car and facilitating one elevator car to descend its respective elevator shaft while the other elevator car ascends its respective elevator shaft, a first gear system formed on an outer wall of the first elevator car and capable of engaging a rack formed on an inner portion of the first elevator shaft to facilitate movement of the first elevator car along the first elevator shaft when the first gear system is controlled from the inside of the first elevator car, and a second gear system formed on an outer wall of the second elevator car and capable of engaging a rack formed on an inner portion of the second elevator shaft to facilitate movement of the second elevator car along the second elevator shaft when the second gear system is controlled from the inside of the second elevator car.

The primary pulley system comprises a first pulley shaft formed on an upper portion of the first elevator shaft, a first pulley operatively engaged around the first pulley shaft, a second pulley shaft formed on an upper portion of the second elevator shaft, a second pulley operatively engaged around the second pulley shaft, and a cable engaging the first pulley and the second pulley, wherein a first end of the cable is connected to the first elevator car and a second end of the cable is connected to the second elevator car. Preferably, movement of one elevator along its respective elevator shaft using the primary pulley system is facilitated by the weight of persons loaded in the elevator car.

The secondary pulley system comprises an inner pulley formed between the first elevator shaft and the second elevator shaft, an outer pulley operatively connected to the inner pulley by a lower shaft, and a cable engaging the inner pulley, wherein a first end of the cable is connected to the first elevator car and a second end of the cable is connected to the second elevator car. Preferably, movement of the elevator cars along their respective elevator shafts using the secondary pulley system is facilitated by rotating the outer pulley to rotate the inner pulley to move the cable which moves the elevator cars. Preferably, the outer pulley is rotated manually or by an motor.

The first gear system and the second gear system comprise a big gear for engaging the rack formed on the inner portion of the elevator shaft, a small gear operatively engaged to the big gear, a gear plate for mounting the big gear and the small gear, and a gear plate mounting for mounting the gear plate onto the elevator car and allowing horizontal movement of the gear plate. Preferably, the elevator system further comprises a gear plate spring connecting the gear plate to the gear plate mounting and facilitating a retracted position of the gear plate, and a gear plate stopper for securing an engaged position of the gear plate.

In one aspect of the invention, the first gear system and second gear system are controlled by a control system formed on the inside of the elevator car. The control system comprises a big gear handle operatively connected to the big gear, a small gear handle operatively connected to the small gear, and a pedal operatively connected to the gear plate stopper.

Preferably, movement of one elevator car along its respective elevator shaft using its respective gear system is facilitated by horizontally moving the gear plate to an engaged position on the outside of the elevator car by horizontally moving the big gear handle and the small gear handle from the inside of the elevator, securing the engaged position of the gear plate by stepping on the pedal to activate the gear plate stopper to prevent the gear plate from moving to a retracted position, and turning the big gear handle or the small gear handle from the inside of the elevator car causing the gear teeth of the big gear to move along the rack, which causes the elevator car to move along the elevator shaft.

In another aspect of the invention, the first elevator car and the second elevator car comprise a rotatable hook formed on the outside of the first elevator car and the second elevator car, respectively, wherein the rotatable hook engages a hook hole

formed on the inside of the first elevator shaft and the second elevator shaft, respectively, for securing non-movement of the elevator cars.

In a further aspect of the invention, each elevator shaft comprises a liquid reservoir for softening an impact of an elevator car descending to the bottom of a respective elevator shaft. Each elevator shaft comprises a liquid connecting hole for connected the respective liquid reservoirs.

Preferably, the outer pulley is detachably coupled to the lower shaft by a pulley pin.

In another aspect of the invention, the first elevator car and the second elevator car comprise a first wall, a second wall, a third wall and a fourth wall, wherein the first wall comprises an entrance door and a rotatable hook for locking the elevator car in a set position, the third wall comprises the gear system for facilitating movement of the elevator car, the fourth wall comprises an exit door, and all four walls comprise rollers for helping move the elevator car along the elevator shaft and an edge formed at a lower portion of the walls for slowing the descent of the elevator cars submerged in a respective liquid reservoir.

Preferably, the first elevator car and the second elevator car comprise a communication system for allowing persons in the elevator car to transmit and receive information, wherein the communication system is powered by a rechargeable battery. The rechargeable battery is charged by a generator mounted on the outside of the elevator car, wherein the generator generates electricity by rubbing and turning on the elevator shaft as the elevator car moves and manually turning a generator handle formed on the inside of the elevator car.

Preferably, the first elevator shaft and the second elevator shaft comprise an automatic locking system formed on an inner portion of the first elevator shaft and the second elevator shaft, respectively, wherein a rotatable hook formed on the outside of the first elevator car and the second elevator car, respectively, is capable of engaging the respective automatic locking systems for automatically securing non-movement of the first elevator car and the second elevator car.

Preferably, the automatic locking system comprises a hook hole for receiving the rotatable hook, a gear operatively fixed to the hook hole via a hook hole shaft, and a rack formed on an inner portion of the elevator shaft and operatively engaged with the gear, wherein when the gear rotates, the gear moves along a length of the rack causing the hook hole and the rotatable hook inserted in the hook hole to rotate in the direction of the gear rotation.

Preferably, the automatic locking system further comprises an outer handle formed on the outside of the elevator shaft and operatively connected to the gear and the hook hole, wherein the outer handle may be manually rotated to rotate the hook hole and the rotatable hook inserted in the hook hole.

It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention. Features, elements, and aspects of the invention that are referenced by the same numerals in different figures represent the same, equivalent, or similar features, elements, or aspects in accordance with one or more embodiments.

FIG. **1** illustrates a front view of an elevator system in accordance with one embodiment of the present invention.

FIG. **2** illustrates a rear view of an elevator system in accordance with one embodiment of the present invention.

FIG. **3** illustrates an elevator system wherein two elevator shafts are separated to depict inner elements of a lower portion of the elevator system in accordance with one embodiment of the present invention.

FIG. **4** illustrates a first and second wall of an elevator car in accordance with one embodiment of the present invention.

FIG. **5** illustrates a third and fourth wall of an elevator car in accordance with one embodiment of the present invention.

FIG. **6** illustrates a gear system in accordance with one embodiment of the present invention.

FIG. **7** illustrates a control system mounted inside an elevator car in accordance with one embodiment of the present invention.

FIG. **8** illustrates a top view of an elevator shaft in accordance with one embodiment of the present invention.

FIG. **9** illustrates a communication system and a rechargeable battery mounted inside an elevator car in accordance with one embodiment of the present invention.

FIG. **10** illustrates a generator mounted outside an elevator car in accordance with one embodiment of the present invention.

FIG. **11** illustrates a front view of an automatic locking system in accordance with one embodiment of the present invention.

FIG. **12** illustrates a side view of an automatic locking system engaged with rotatable hook in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to an elevator system for use during an emergency. As shown in the figures, the elevator system allows persons and objects to be moved between floors of a building independent of the building's power source.

Referring to FIG. **1**, in one embodiment of the present invention, an elevator system **1** comprises two elevator shafts **100** and **200** constructed adjacent to each other. Each elevator shaft **100** and **200** houses elevator cars **110** and **210**, respectively. The elevator system **1** operates without the use of a building's power source by incorporating a primary pulley system to move the elevator cars **110** and **210**. Generally, the elevator cars **110** and **210** work in tandem such that as one elevator car goes up its respective elevator shaft, the other elevator car will go down its respective elevator shaft.

Referring to FIG. **1**, the primary pulley system of the present invention will be explained. A pulley shaft **139** is constructed at an upper portion of the elevator shaft **100**. Operatively engaged around the pulley shaft **139** is a pulley **138**. Similarly, a pulley shaft **239** is constructed at an upper portion of the elevator shaft **200**, wherein a pulley **238** is operatively engaged around the pulley shaft **239**. One end of a cable **18** is coupled to the top of the elevator car **110**. The cable **18** engages the pulley **138**, stretches across to the elevator shaft **200** and engages the pulley **238**, wherein the other end of the cable **18** is coupled to the top of the elevator car **210**. Preferably, the length of the cable **18** is such that when the elevator car **110** is at a bottom portion of the elevator shaft **100**, the elevator car **210** is allowed to be at an upper portion of the elevator shaft **200**, and vice versa.

As shown in FIG. **2**, a lever **213** is in a downward position. This position signifies that the elevator car **210** is locked in place and will not move downward until the lever **213** is moved to an upward position such as the lever **113**. In more detail, the lever **213** is operatively connected to a hook hole **214** (as shown in FIG. **8**) formed on the inside of the elevator shaft **200**. Thus, when the lever **213** is rotated, the hook hole **214** also rotates. The hook hole **214** accepts a rotatable hook **223** (as shown in FIG. **4**) formed on the outside of the elevator car **210**. Previously, when the elevator car **210** is not yet at an upper portion of the elevator shaft **200**, the rotatable hook **223** is in an upward position. As the elevator car **210** ascends to the upper portion of the elevator shaft **200**, the rotatable hook **223** engages the hook hole **214**. Once engaged, the rotatable hook **223** may be turned to a downward position by rotating the lever **213** on the outside of the elevator shaft **200**, or by rotating a hook handle **235** (as shown in FIG. **7**) operatively connected to the rotatable hook **223** and found on the inside of the elevator car **210**. Once the rotatable hook **223** is engaged to the hook hole **214** and moved to the downward position, the elevator car **210** is locked in place and will not move down the elevator shaft **200** until the hook **223** is moved to the upward position.

In accordance with one embodiment of the present invention, when persons wish to use the elevator system, the persons enter into the elevator car **210** through doors **260** at the upper portion of the elevator shaft **200**. Upon closing the doors **260**, the persons inside the elevator car **210** may unlock the elevator car by rotating the hook handle **235** to move the rotatable hook **223** to the downward position. Alternatively, persons present outside the elevator shaft **200** may unlock the elevator car **210** by rotating the lever **213** to move the rotatable hook **223** to the downward position. Once the elevator car **210** is unlocked, the weight of the persons inside the car will cause the car **210** to descend down the elevator shaft **200**.

By means of the aforementioned primary pulley system, as the elevator car **210** descends down the elevator shaft **200**, one end of the cable **18** coupled to the top of the elevator car **210** will also descend down the shaft **200**. Because the other end of the cable **18** is coupled to the top of the elevator car **110** via the pulleys **238** and **138**, and by way of the cable **18** being an appropriate length, the elevator car **110** will ascend to the upper portion of the elevator shaft **100** as the elevator car **210** descends down the elevator shaft **200**. Once the elevator car **110** reaches the upper portion of the elevator shaft **100**, the car **110** may be locked in place by a rotatable hook and hook hole mechanism similar to that of the elevator car **210** and the elevator shaft **200**. When locked in place, the elevator car **110** is ready to accommodate more persons wishing to use the elevator system.

In one aspect of the invention, it is contemplated that as either one of the elevator cars **210** or **110** descends down their respective shafts, an impact will occur upon the elevator car reaching the bottom of the elevator shaft. Accordingly, liquid reservoirs **147** and **247** are respectively provided at the bottom of the elevator shafts **100** and **200** to cushion the possibly severe impact.

Preferably, one elevator shaft's liquid reservoir is filled with liquid, such as water or oil, up to a level of a liquid connecting hole while the other elevator shaft has an elevator car on the ground. For example, as shown in FIGS. **1** and **3**, while the elevator car **110** is on the ground floor of the elevator shaft **100**, the liquid reservoir **247** of the elevator shaft **200** is filled with liquid up to a level of the liquid connecting hole **215** (as shown in FIG. **3**). When the elevator **110** goes up, the elevator **210** will come down to make contact with the liquid in the liquid reservoir **247**. As the elevator **210** settles at the bottom of the shaft **200**, the weight of the elevator car **210** and any persons aboard the car, will cause the liquid to evacuate out of the liquid reservoir **247** through the liquid connecting hole **215** and reside in the liquid reservoir **147** of the elevator shaft **100** via a liquid connecting hole **115**. As such, the liquid reservoir **147** will be sufficiently filled with liquid to cushion the impact of the elevator car **110** when it subsequently descends from the upper portion of the elevator shaft **100**.

In accordance with another embodiment of the present invention, a secondary pulley system is provided at a lower portion of the elevator system to move the elevator cars **110** and **210**. Referring to FIG. **3**, the secondary pulley system comprises an inner pulley **16**, an outer pulley **5**, a lower shaft **8** and a secondary cable **17**. The inner pulley **16** is formed in between the elevator shafts **100** and **200** and is operatively engaged around the lower shaft **8**, which is also formed in between the elevator shafts **100** and **200**. Operatively connected to the inner pulley **16** is the outer pulley **5** via the lower shaft **8**. Specifically, the outer pulley **5** is coupled to the lower shaft **8** by a pulley pin **6**. Therefore, while the pulley pin **6** is engaged, the outer pulley **5** may be rotated from the outside of the elevator shafts to rotate the lower shaft **8**, which in turn rotates the inner pulley **16**. However, the outer pulley **5** may be operatively disconnected from the lower shaft **8** and the inner pulley **16** by disengaging the pulley pin **6**.

Referring to FIGS. **1** and **3**, one end of the secondary cable **17** is coupled to the elevator car **110**. The secondary cable **17** engages the inner pulley **16** and continues to the elevator shaft **200**, wherein the other end of the secondary cable **17** is coupled to the elevator car **210**. Preferably, the length of the secondary cable **17** is such that when the elevator car **110** is at the bottom portion of the elevator shaft **100**, the elevator car **210** is allowed to be at an upper portion of the elevator shaft **200**, and vice versa.

In case a descending elevator car is having trouble moving down the elevator shaft, such as when the persons in the elevator car are not heavy enough to move the elevator car, the secondary pulley system may be utilized to move the elevator. For example, if the elevator **210** is having trouble descending the elevator shaft **200**, the outer pulley **5** may be operatively connected to the lower shaft **8** by engaging the pulley pin **6**. Once engaged, the outer pulley **5** may be rotated to effectively rotate the inner pulley **16**. Meanwhile, the secondary cable **17**, which connects the two elevator cars together, is engaged to the inner pulley **16**. Accordingly, as the inner pulley **16** is rotated, the secondary cable **17** moves, thus facilitating movement of the elevator cars. Specifically, rotating the outer pulley **5** to rotate the inner pulley **16** in the appropriate direction moves the elevator car **210** downward. Notably, movement of the elevator car **210** downward via the secondary pulley system will cause the elevator car **110** to move upward via the cable **18** and the primary pulley system.

In one aspect of the invention, a motor **9** may aid the secondary pulley system. Preferably, the motor **9** is operatively connected to the outer pulley **5** by a drive belt. When the motor **9** is turned on, the drive belt will move to cause rotation of the outer pulley **5**, which then ultimately causes the elevator cars to move. Accordingly, because manual power to rotate the outer pulley **5** is limited, the motor **9** is preferable because it provides greater power to operate the secondary pulley system. Use of the motor **9** is further preferable when objects or persons, such as a rescue team, are to be transported up the elevator shaft.

Referring to FIGS. **4** and **5**, an elevator car of the present invention will be explained. The elevator car generally has a box-like shape and comprises a first wall **62**, a second wall **64**, a third wall **66** and a fourth wall **68**. Rollers **20** are formed on

all walls to aid the elevator car in going up and down the elevator shaft smoothly. An edge **55** is formed at a lower portion of all walls. The edge **55** helps slow the descent of the elevator car when it is submerged in either liquid reservoir **247** or **147** when the elevator car is on the ground floor. The edge **55** also facilitates the evacuation of liquid from one elevator shaft to another as the elevator car sinks in the liquid by providing more surface on the elevator car to help the liquid expand out of the elevator shaft.

A line **80** depicts how the elevator car is separated into a usable compartment **82** and an empty space **84**. An elevator car floor (not shown) is formed on the inside of the elevator car between the usable compartment **82** and the empty space **84**. Above the line **80**, persons may load into the usable compartment **82** and stand on the elevator car floor to ride in the elevator car. Below the line **80** is the empty space **84**, which is not accessible to persons. The empty space **84** is an air tight pocket and functions to put space between the persons riding in the elevator car and the liquid reservoir when the elevator car is at the bottom of the elevator shaft. Thus, the empty space **84** slows and softens the impact of the elevator car as it contacts the liquid reservoir during the elevator car's descent in the elevator shaft. Preferably, the liquid level of the liquid reservoir does not go above the height of the line **80**.

The first wall **62** comprises an entrance door **21**, which is the door used by persons wishing to enter the elevator car when the elevator car is located at the upper portion of the elevator shaft. The first wall **62** also includes the hook **223**. As previously described above, the rotatable hook **223** is used for locking the elevator car in a set position. The third wall **66** comprises a gear system **70**. As will be described below, the gear system **70** is provided to move the elevator car through the elevator shaft. The fourth wall **68** comprises an exit door **22**, which is the door used to exit the elevator car when the elevator car has reached the bottom of the elevator shaft.

In accordance with another embodiment of the present invention, a gear system **70** is provided on a wall of the elevator car to move the elevator car through the elevator shaft. Referring to FIG. **6**, the gear system **70** comprises a big gear **25**, a small gear **26**, a gear plate **24**, a gear plate spring **27**, a gear plate stopper **28**, a gear stopper spring **29** and a pedal hand **30**. The big gear **25** and the small gear **26** are operatively engaged to each other and are mounted onto the gear plate **24**. The gear plate **24** is horizontally movable along a gear plate mounting **75**. When the gear system **70** is not in use, the gear plate **24** is in a retracted position in the gear plate mounting **75**. The retracted position is secured by the gear plate spring **27**, wherein one end of the spring is coupled to the gear plate **24** while the other end of the spring is coupled to a rear end of the gear plate mounting **75**.

When the gear system **70** is in use, the gear plate **24** may be horizontally moved to an engaged position. The engaged position is secured by the gear plate stopper **28**, wherein the gear plate stopper **28** is activated using the gear stopper spring **29** and the pedal hand **30** to stop rearward movement of the gear plate **24**. The gear system **70** is controlled by a control system formed directly opposite the gear system **70** on the inside of the elevator car. Referring to FIG. **7**, the control system comprises a big gear handle **33**, a small gear handle **32** and a pedal **34**. Through the elevator car wall, the big gear handle **33** is operatively connected to the big gear **25**, the small gear handle **32** is operatively connected to the small gear **26** and the pedal **34** is operatively connected to the pedal hand **30**.

In case a descending elevator car is having trouble moving down the elevator shaft, such as when persons in the elevator car are not heavy enough to move the elevator car, the gear system **70** may be utilized to move the elevator in the following manner. Initially, the gear plate **24** of the gear system **70** is in the retracted position. To move the gear plate **24** into the engaged position, a person on the inside of the elevator car must use the big gear handle **33** and small gear handle **32** to horizontally move the gear plate **24**. As such, the holes through which the gear handles are connected to the gears are designed to allow horizontal movement of the gear handles thus allowing horizontal movement of the gear plate **24**. Once the gear plate **24** is in the engaged position, the person may secure the position by stepping on the pedal **34**. When the pedal **34** is stepped on, the pedal hand **30** located on the outside of the elevator car is activated and causes the gear plate stopper **28** to move up and block the gear plate **24** from moving rearward or back to the retracted state.

When the gear plate **24** is in the engaged state, the big gear **25** engages a rack **40**, as shown in FIG. **8**, vertically formed along an inner portion of the elevator shaft. Accordingly, by turning either the big gear handle **33** or the small gear handle **32** from the inside of the elevator car, the gear teeth of the big gear **25** will move along the rack **40** causing the elevator car to move. Preferably, when the descending elevator car is having trouble moving down the elevator shaft, the gear system **70** may be utilized by persons riding inside the elevator car to help move the elevator car down. Alternatively, the gear system **70** may also be used to help move the elevator in an upward direction.

In one aspect of the invention, the elevator car may also provide a communication system for allowing persons riding the elevator to transmit or receive information. As shown in FIG. **9**, the communication system comprises a television monitor **52**, a camera or microphone **53** and a speaker **54** mounted onto a wall of the elevator car. Because the elevator car operates independent of a building's power supply, the communication system uses a rechargeable battery **51** as its power supply.

Preferably, a generator **49** is mounted to an outside wall of the elevator car directly opposite the rechargeable battery **51**, as shown in FIG. **10**. The generator **49** is operatively connected to the rechargeable battery **51** and generates electricity by rubbing and turning on the elevator shaft as the elevator car goes up and down. The generator **49** then stores the generated electricity in the rechargeable battery **51**, which then powers the communication system. Notably, a generator handle **50** is also provided on the inside of the elevator car. The generator handle **50** allows a person to manually turn the generator **49** to create electricity when there is not enough stored energy in the battery **51** or when the generator **49** cannot produce electricity because there is no movement of the elevator car.

Referring to FIGS. **11** and **12**, an automatic locking system in accordance with one embodiment of the present invention is described. As shown, the automatic locking system comprises the hook hole **214** formed on the inside of the elevator shaft **200**. The hook hole **214** is fixed to a gear **310** by a hook hole shaft **320**. When the gear **310** rotates, the hook hole **214** rotates along with the gear **310** via the hook hole shaft **320**. Furthermore, the gear **310** is operatively engaged to a rack **300** formed on an inside wall of the elevator shaft **200** adjacent to where the hook hole **214** is formed. When the gear **310** rotates, the gear **310** moves along a length of the rack **300**.

When the elevator car **210** ascends to the upper portion of the elevator shaft **200**, the rotatable hook **223**, formed on the outside of the elevator car **210** and positioned in an upward direction, inserts into the hook hole **214**. Due to the momentum of the ascending elevator car **210**, the rotatable hook **223** causes an upward movement of the hook hole **214** as the rotatable hook **223** inserts into the hook hole **214**. Accord-

ingly, upward movement of the hook hole **214** causes the gear **310**, via the hook hole shaft **320**, to rotate in the direction of arrow **340** of FIG. **11**.

When the gear **310** rotates in the direction of arrow **340**, the hook hole **214** via the hook hole shaft **320** also rotates in the same direction. Accordingly, the rotatable hook **223** inserted in the hook hole **214** is caused to rotate. The rotatable hook **223** will continue to rotate until the rotatable hook **223** is positioned in a downward direction. Once the rotatable hook **223** is in the downward position, the elevator car **210** is locked in place and will not move down the elevator shaft **200** until the hook **223** is moved back to the upward position. Preferably, the hook **223** may be moved back to the upward position by manually rotating the hook handle **235**.

Furthermore, an outer handle **350** is formed on the outside of the elevator shaft **200** and is operatively connected to the gear **310** and the hook hole **214** through a wall of the elevator shaft **200**. Preferably, the outer handle **350** moves along with the gear **310** and the hook hole **214**. Therefore, in case of an unexpected situation, such as when the gear **310** does not rotate correctly, the outer handle **350** may be manually rotated from the outside of the elevator shaft **200** to rotate the hook hole **214**, thus allowing the rotatable hook **223** to be rotated in a desired direction. Although the automatic locking system has been described in relation to the elevator car **210** and the elevator shaft **200**, it is contemplated that the automatic locking system may also be used with the elevator car **110** and the elevator shaft **100**.

An advantage of the automatic locking system is that the rotatable hook does not need to be manually rotated to the downward position once the elevator car has ascended to the top of the elevator shaft. The elevator car will lock itself in place automatically. Thus, the automatic locking system prevents accidents or mistakes from happening, such as when a person forgets to manually rotate the rotatable hook **223** inserted in the hook hole **214**, therefore failing to lock the elevator car in place.

Therefore, the present invention is a reliable, simple and quick means to transport persons and objects between floors of a building during an emergency. Moreover, the present invention allows persons and objects to be moved between floors of a building independent of the building's power source.

The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. In the claims, means-plus-function clauses are intended to cover the structure described herein as performing the recited function and not only structural equivalents but also equivalent structures.

What is claimed is:

1. An elevator system for use during an emergency, the system comprising:

a first elevator shaft for housing a first elevator car;

a second elevator shaft for housing a second elevator car;

a primary pulley system operatively connecting the first elevator car to the second elevator car and facilitating one elevator car to descend its respective elevator shaft while the other elevator car ascends its respective elevator shaft;

a secondary pulley system operatively connecting the first elevator car to the second elevator car and facilitating one elevator car to descend its respective elevator shaft while the other elevator car ascends its respective elevator shaft;

a first gear system formed on an outer wall of the first elevator car and capable of engaging a rack formed on an inner portion of the first elevator shaft to facilitate movement of the first elevator car along the first elevator shaft when the first gear system is controlled from the inside of the first elevator car; and

a second gear system formed on an outer wall of the second elevator car and capable of engaging a rack formed on an inner portion of the second elevator shaft to facilitate movement of the second elevator car along the second elevator shaft when the second gear system is controlled from the inside of the second elevator car.

2. The elevator system of claim **1**, wherein the primary pulley system comprises:

a first pulley shaft formed on an upper portion of the first elevator shaft;

a first pulley operatively engaged around the first pulley shaft;

a second pulley shaft formed on an upper portion of the second elevator shaft;

a second pulley operatively engaged around the second pulley shaft; and

a cable engaging the first pulley and the second pulley, wherein a first end of the cable is connected to the first elevator car and a second end of the cable is connected to the second elevator car.

3. The elevator system of claim **1**, wherein movement of one elevator along its respective elevator shaft using the primary pulley system is facilitated by the weight of persons loaded in the elevator car.

4. The elevator system of claim **1**, wherein the secondary pulley system comprises:

an inner pulley formed between the first elevator shaft and the second elevator shaft;

an outer pulley operatively connected to the inner pulley by a lower shaft; and

a cable engaging the inner pulley, wherein a first end of the cable is connected to the first elevator car and a second end of the cable is connected to the second elevator car.

5. The elevator system of claim **4**, wherein movement of the elevator cars along their respective elevator shafts using the secondary pulley system is facilitated by rotating the outer pulley to rotate the inner pulley to move the cable which moves the elevator cars.

6. The elevator system of claim **4**, wherein the outer pulley is detachably coupled to the lower shaft by a pulley pin.

7. The elevator system of claim **5**, wherein the outer pulley is rotated manually or by a motor.

8. The elevator system of claim **1**, wherein the first gear system and the second gear system comprise:

a big gear for engaging the rack formed on the inner portion of the elevator shaft;

a small gear operatively engaged to the big gear;

a gear plate for mounting the big gear and the small gear; and

a gear plate mounting for mounting the gear plate onto the elevator car and allowing horizontal movement of the gear plate.

9. The elevator system of claim **8**, further comprising:

a gear plate spring connecting the gear plate to the gear plate mounting and facilitating a retracted position of the gear plate; and

a gear plate stopper for securing an engaged position of the gear plate.

10. The elevator system of claim 8, wherein the first gear system and second gear system are controlled by a control system formed on the inside of the elevator car.

11. The elevator system of claim 10, wherein the control system comprises:

a big gear handle operatively connected to the big gear;

a small gear handle operatively connected to the small gear; and

a pedal operatively connected to the gear plate stopper.

12. The elevator system of claim 11, wherein movement of one elevator car along its respective elevator shaft using its respective gear system is facilitated by:

horizontally moving the gear plate to an engaged position on the outside of the elevator car by horizontally moving the big gear handle and the small gear handle from the inside of the elevator;

securing the engaged position of the gear plate by stepping on the pedal to activate the gear plate stopper to prevent the gear plate from moving to a retracted position; and

turning the big gear handle or the small gear handle from the inside of the elevator car causing the gear teeth of the big gear to move along the rack, which causes the elevator car to move along the elevator shaft.

13. The elevator system of claim 1, wherein the first elevator car and the second elevator car comprise a rotatable hook formed on the outside of the first elevator car and the second elevator car, respectively, wherein the rotatable hook engages a hook hole formed on the inside of the first elevator shaft and the second elevator shaft, respectively, for securing non-movement of the elevator cars.

14. The elevator system of claim 1, wherein each elevator shaft comprises a liquid reservoir for softening an impact of an elevator car descending to the bottom of a respective elevator shaft.

15. The elevator system of claim 14, wherein each elevator shaft comprises a liquid connecting hole for connected the respective liquid reservoirs.

16. The elevator system of claim 1, wherein the first elevator car and the second elevator car comprise a first wall, a second wall, a third wall and a fourth wall, wherein:

the first wall comprises an entrance door and a rotatable hook for locking the elevator car in a set position;

the third wall comprises the gear system for facilitating movement of the elevator car;

the fourth wall comprises an exit door; and

all four walls comprise rollers for helping move the elevator car along the elevator shaft and an edge formed at a lower portion of the walls for slowing the descent of the elevator cars submerged in a respective liquid reservoir.

17. The elevator system of claim 1, wherein the first elevator car and the second elevator car comprise a communication system for allowing persons in the elevator car to transmit and receive information.

18. The elevator system of claim 17, wherein the communication system is powered by a rechargeable battery.

19. The elevator system of claim 18, wherein the rechargeable battery is charged by a generator mounted on the outside of the elevator car.

20. The elevator system of claim 19, wherein the generator generates electricity by:

rubbing and turning on the elevator shaft as the elevator car moves; and

manually turning a generator handle formed on the inside of the elevator car.

21. The elevator system of claim 1, wherein the first elevator shaft and the second elevator shaft comprise an automatic locking system formed on an inner portion of the first elevator shaft and the second elevator shaft, respectively, wherein a rotatable hook formed on the outside of the first elevator car and the second elevator car, respectively, is capable of engaging the respective automatic locking systems for automatically securing non-movement of the first elevator car and the second elevator car.

22. The elevator system of claim 21, wherein the automatic locking system comprises:

a hook hole for receiving the rotatable hook;

a gear operatively fixed to the hook hole via a hook hole shaft; and

a rack formed on an inner portion of the elevator shaft and operatively engaged with the gear;

wherein when the gear rotates, the gear moves along a length of the rack causing the hook hole and the rotatable hook inserted in the hook hole to rotate in the direction of the gear rotation.

23. The elevator system of claim 22, wherein the automatic locking system further comprises an outer handle formed on the outside of the elevator shaft and operatively connected to the gear and the hook hole, wherein the outer handle may be manually rotated to rotate the hook hole and the rotatable hook inserted in the hook hole.

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