O. ALLEN.

CONCRETE REINFORCING METAL UNIT FOR THE WALLS, FLOORS, AND CEILINGS OF BUILDINGS AND FOR OTHER CONCRETE CONSTRUCTION WORK.

APPLICATION FILED MAY 22, 1920.

1,390,073.

Patented Sept. 6, 1921.

2 SHEETS—SHEET 1.

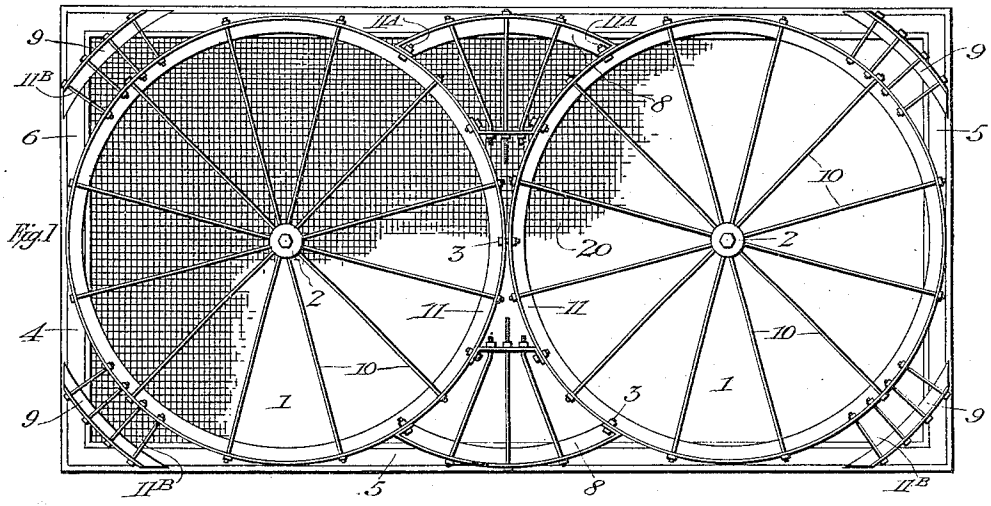


Fig. 1

Fig. 2.

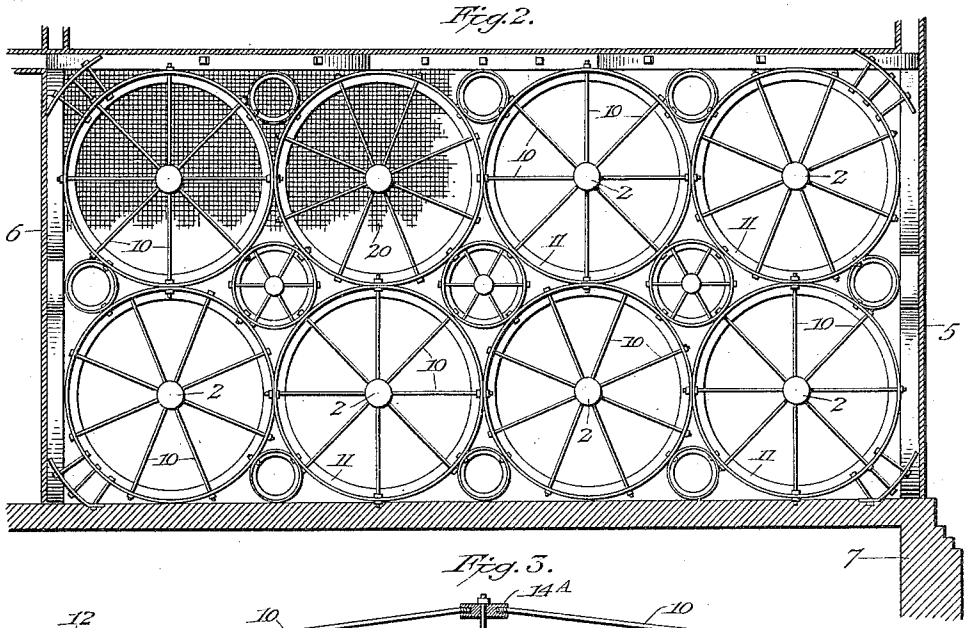


Fig. 3.

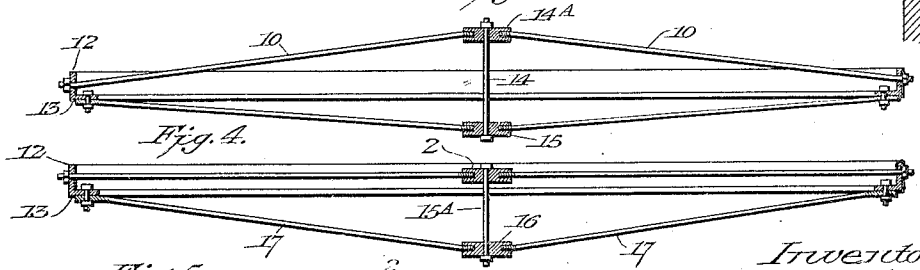


Fig. 4.

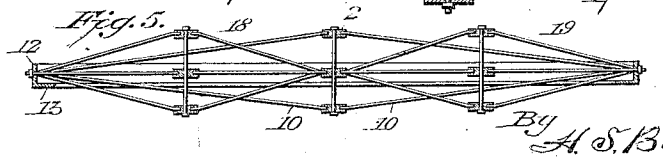


Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 9.

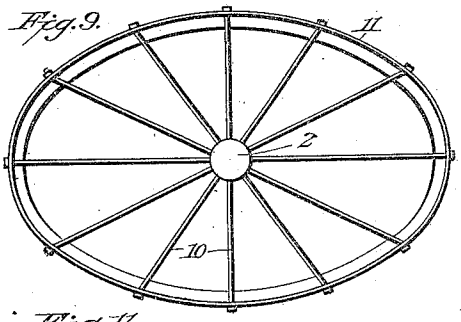


Fig. 10.

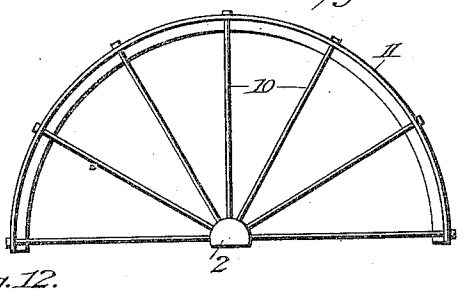


Fig. 11.

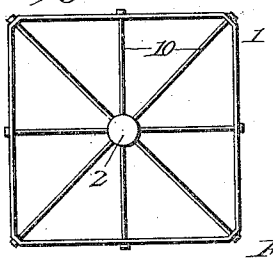


Fig. 12.

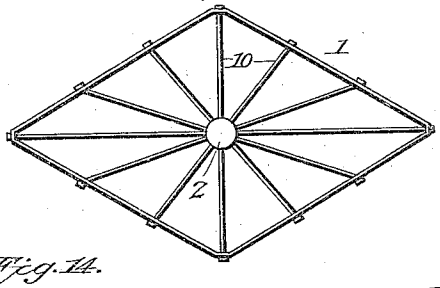


Fig. 13.

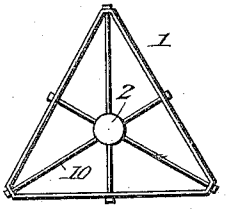


Fig. 14.

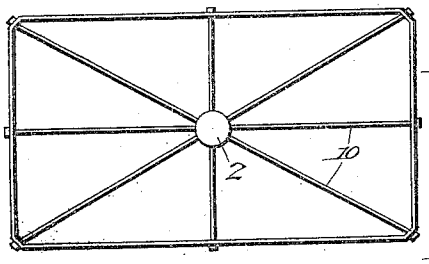


Fig. 15.

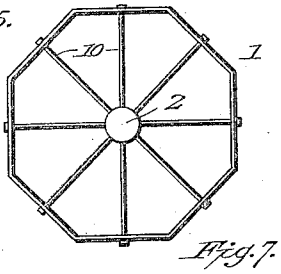


Fig. 17.

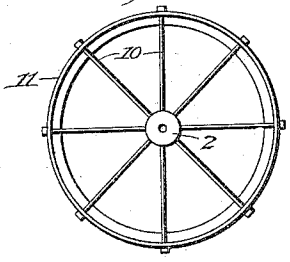


Fig. 7.

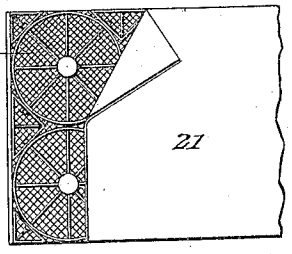


Fig. 16.

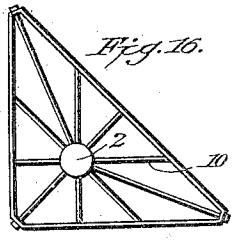


Fig. 6.

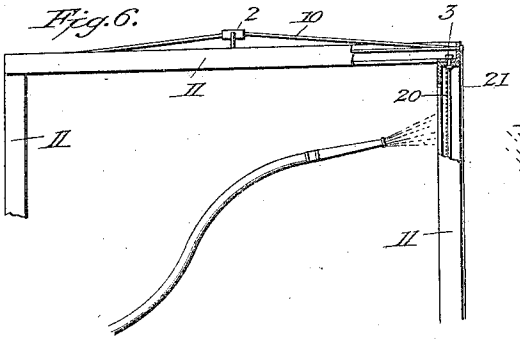
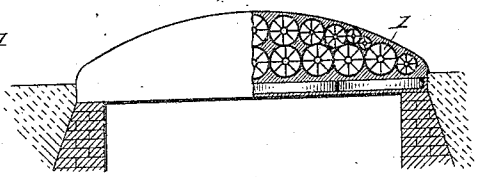


Fig. 8.



Inventor:

Orren Allen

By H. S. Bailey. Attorney.

UNITED STATES PATENT OFFICE.

ORREN ALLEN, OF DENVER, COLORADO.

CONCRETE-REINFORCING METAL UNIT FOR THE WALLS, FLOORS, AND CEILINGS OF BUILDINGS AND FOR OTHER CONCRETE CONSTRUCTION WORK.

1,390,073. Specification of Letters Patent. Patented Sept. 6, 1921.

Application filed May 22, 1920. Serial No. 383,503.

To all whom it may concern:

Be it known that I, ORREN ALLEN, a citizen of the United States of America, residing at the city and county of Denver, and State of Colorado, have invented a new and useful Concrete-Reinforcing Metal Unit for the Walls, Floors, and Ceilings of Buildings and for other Concrete Construction Work, of which the following is a specification.

My invention relates to a new concrete reinforcing metal unit for the walls, floors and ceilings of buildings and for other concrete construction work.

And the objects of my invention are:

First: To provide a concrete reinforcing unit of metal or of any other suitable material, that does not require the use of concrete pouring-into-and-receiving forms, of either the permanent or the collapsible constructions generally used in concrete construction work.

Second: To provide a concrete reinforcing unit of metal or any other suitable material that is constructed to fill a part of the space of the whole of either the entire width, or the length, or the space the concrete construction work is to fill.

Third: To provide a concrete reinforcing unit of metal, or any other suitable material, that is constructed in a made-up form ready to be erected in permanent position to receive the concrete, and to provide means for applying the concrete by pressure, preferably by an air pressure concrete discharging gun.

Fourth: To provide means by which concrete can be provided with a strong and rigid reinforcing unit metal that is adapted to receive radial tension and compressing arc strains, and that is made up into a frame or frames of any predetermined size and shape and composed of interlocking and integrally connected metal rods, bars, angles or other structural forms of iron, steel or other metals or materials, preferably arranged in circular and radial arrangement of coördinately combined and coöperating parts.

Fifth: To provide a plurality of independent concrete reinforcing units that can be rigidly connected together into a continuous concrete receiving and reinforcing structure of any desired width and of any desired length, and that will require the use of a less amount of concrete to obtain the desired strength in the construction of the walls, floors and ceilings and partitions and arches and roofs of buildings, and in the construction of bridges, trestles and culverts.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of units connected to form the reinforcing elements of a concrete floor or ceiling.

Fig. 2 is a side view showing reinforcing units connected to form a side or end wall.

Fig. 3 is a sectional view of one of the circular units shown in Fig. 1, illustrating one arrangement of trussed spokes.

Figs. 4 and 5 show sectional views of circular units having different arrangements of trussed spokes from that shown in Fig. 3.

Fig. 6 is an end view, partly in section, showing the manner of bolting the units of the side walls and ceilings together.

Fig. 7 is a view of a portion of a side wall reinforcement, showing the units, the metal lathing secured thereto, and a temporary canvas covering for stopping the cement which is shot against the lathing.

Fig. 8 is a sectional view showing the application of the reinforcement in bridge construction; and

Figs. 9 to 17 inclusive, are views of various forms of units which may be employed.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings:

The numeral 1 designates one of my complete concrete reinforcing units, and 2 designates the central or hub portion member of the several different forms and shapes of the individual units 1. I have illustrated several concrete reinforcing structures, some of which are shown with two hub bases or central supporting members 2. These several individual units are illustrated in Figs. 3, 4 and 5.

In Fig. 1 of the drawings, two of my independent concrete reinforcing units 1, are illustrated operatively connected together by bolts 3, to form a united floor or ceiling rectangular shaped frame or panel 4, which is made of a length and breadth to fit the exact size of the room, and also to rest on the adjacent walls 5, or partitions 6, of a building.

In Fig. 2, an elevation of the outside walls 5, and of the combined floor and ceiling 4, and of a partition 6, of the first story por-

tion of a building above its foundation portion 7, is shown. As illustrated, the frames or panels in Fig. 2 are made up of a large group of my individual units 1; the several individual elements of each unit and of all of the units which are shown in different sizes being rigidly and firmly secured together, preferably by bolts 3, or they may be secured by any suitable means.

Each individual unit 1, is a complete concrete reinforcing structure by itself, and possesses in itself all of the strength that is necessary to fully strengthen the concrete against all compression, and lateral as well as torsional, strains; and each unit can be made as small as it is practical to make it; that is, the various forms illustrated can be made of any desired diameter to form a unit large enough to fill or cover the entire height and length of an outside wall or an inside partition, or of a floor and ceiling; or, if preferred, two or more of the units 1, can be connected together to fill the entire height and length and the breadth of the part of a building that is to be made of concrete.

In Fig. 1, a pair of single units are illustrated, connected by segmental centrally positioned parts 8, and corner parts 9, of other units, and these two units are made to extend across the entire width and length of the room. The rectangular outlines of the circular form of unit of this Fig. 1, represent the top of the walls or partitions on which this combined floor or ceiling frame or panel form of units rest. In Fig. 2, however, a varied construction of several different sizes of the circular form of unit is illustrated to show the wide range of construction of floors and ceilings, outside or inside partition walls, that are of large area, and this view shows that all of them, by either one or the other of the several trussing arrangements, can be rigidly secured together and trussed, as shown in Fig. 2.

These center arc or segment portions 8, are formed of curved pieces of the rim 11, from which bolts 11^A, extend to and through, and are bolted to the rims of the adjacent units, and the corner pieces 9, are formed of straight pieces of the rim 11, from which bolts 11^B, extend to and through and are bolted to the rims 11, of the adjacent units.

The units that are used in the walls and the partitions and in the floor and ceiling members, and in fact, all units that are positioned at right angles or at any angle to each other can readily be bolted or otherwise secured together.

All of the above arrangements of constructive features that can be applied to the round form of concrete reinforcing units can be applied to either the square, or the oval, or the segment, or the diamond, or the semi-circular, or the polygonal and angular shaped units illustrated, as well as to all irregular shaped forms that can be made up. I have preferably more fully illustrated the round or circular form of unit than any other form, as it is the preferred construction of my concrete reinforcing unit 1, and I will confine the description of the detail construction to this circular form of my concrete reinforcing unit.

A plurality of rods 10, that are arranged and adapted to resist compression or tensional or lateral strains are secured at their inner end to the central base member 2, and they extend to and are connected under tension to a round circular inclosing rim 11. The central base member or hub portion 2, comprises a central anchoring member for the inner ends of the rods 10, and my invention comprises any suitable form of construction of this central base member, for securing the inner ends of the rods to this central base or hub member 2. I preferably illustrate, however, a solid central base member 2, and the inner ends of these rods are preferably threaded into threaded apertures formed in its peripheral surface.

This rim 11, may be constructed of any suitable form of cross-section of round, or flat, or channeled, or of any other form of barrel hoop or tire rim iron or steel. They are adjustably secured to the rim 11, in order to place them and the base under firm and rigid tension. I preferably use, however, angle iron shaped rims, in which the two flanges are of the same width, for the rims of my units. The radial rods 10, may also be of any suitable form of construction, and they are preferably positioned at equal distances apart around the central anchoring base or hub, but they may be placed at unequal distances apart if desired.

The outer ends of these rods are extended through the round circumferential rim portion 11, which may be of any desired form, but which I preferably make of structural angle iron, the flanges 12 and 13 of which are preferably of equal length, and the length of the sides or flanges of the angle iron will depend on the size of the circular form of unit; that is, on the diameter and the thickness of the unit, and as to whether it is a single or a double trussed unit, and also on the thickness of the concrete wall, or floor, or other work. If desired, the rods may be left loose in the rim and hub.

The outer ends of the rods 10, are preferably secured to the vertical side 12, of the circular rim portion 11, of the concrete reinforcing unit, by any suitable means, it only being necessary that the hub portion and the rods and the circumscribing rim be secured together under the necessary tension and rigidity to stand firmly and without sagging in any vertical, horizontal or inclined or oblique position in which they may be placed to receive and support the con-

crete mortar when applied to it. I preferably however, thread the outer ends of the rods 10, and extend them loosely through apertures in the vertical flange of the rim 11, and provide their outer ends with nuts, which are turned to rigidly clamp the rim and the rods together.

In Figs. 3, 4, and 5, I illustrate three different arrangements of trussing my concrete reinforcing circular units to meet the requirements of the light and heavy loads that some kinds and character of concrete construction work require, such as roofs, bridges, and warehouse floors.

The principle of the construction of the trussed units in the three Figs. 3, 4, and 5, to resist top central pressures and strains is the same. That in Fig. 3, is a double truss, and it consists of a cross rod 14, at the center of the diameter of the circular unit, and of two bases 14A and 15, one of each of which is secured to the opposite ends of the cross rod 14, at an equal but short predetermined distance from the center of the diametrical plane of the rim portion 11, of the unit.

Fig. 4 represents a one-sided truss, and in this one-sided truss the central anchoring base 2, is used, as in the untrussed units, and a rod 15A, extends through the base 2, at right angles to the diametrical plane of the rim 11, and to the radial direction of the rods 10, of the circular unit, and this rod 15A, projects from the center hub base a predetermined distance, and a hub 16, is secured to its end, from which rods 17, radiate to the horizontal flange of the angle bar rim 11, of the unit, to which they are bolted.

In Fig. 5, a triple form of truss is shown, in which the construction shown in Fig. 3, is illustrated. In this figure, the central double truss of Fig. 3, is used, and in addition, two additional trusses, 18 and 19, are formed, one on each side of the center base 2, and centrally between it and the rim 11, and in this view all of the rods 10, are illustrated secured to the vertical flange of the angle bar rim 11; and while I have illustrated these three arrangements of trusses for the circular units, my invention contemplates, however, broadly the use of any arrangement of trussing the units that will give them the required strength and rigidity to meet the conditions of the work they are to be applied to.

One of the sides of each unit 1, or of a built-up group of units, is covered with a wire screen 20, and the screen can be applied at the factory where the units are made, when the units are made up into wall, or floor or ceiling or partition sizes of frames to fit into and fill the whole sides and floors and ceilings of the medium sized rooms of residences and office buildings.

Where large outside concrete walls or room partitions, floors and ceilings are to be constructed, two or three or more of the square frames, composed of a plurality of the circular units of the same or of different sizes, can be connected end to end and side edge to side edge together, which can be done on the building as it is erected, and if desired the individual units, after being made up, can be placed in edgewise alinement and connected together and built up with segment pieces and riveted or bolted or otherwise secured together to construct walls or partitions and to fill spaces of any area, and the wire screen member can be applied to one of the sides of the units after they are erected on the job.

After the unit, or group of units, with the wire screen backing member attached to one side of them, are placed or erected in the position where concrete is to be applied to them, then a sheet of canvas 21, is spread over and confined by any suitable means against the wire screen 20, as shown in Fig. 7. The unit or units are then closed or housed in on one side by the screen and the canvas, and the opposite side of the unit or units, either in single or in framed, or built-up forms, are open to receive the concrete mortar, which is applied with and by means of the well-known and commonly used air pressure concrete, or paint, or other readily flowing plastic material discharging gun, which device does not form a part of my invention.

The operation of building reinforced concrete members of any kind or form or of constructing anything pertaining to buildings, or bridges, or any other kinds of work for which concrete is or can be used, is to place my reinforcing unit or units in the exact center of the place or position, and of the thickness the concrete member or construction is to be when done, with the wire screen and the canvas on one side of it, and then apply the concrete to the unit or group of units, against the wire screen and the canvas, and fill in and around and over the members of the unit or units until the required thickness of the concrete has been obtained throughout the entire area of the member, or of the concrete construction work being built, or that is confined to a single unit, or to a frame, or panel of units, as the case may be.

The concrete can be uniformly and evenly applied in a solid monolithic mass all around the several parts of the units, and the walls, floors and partitions of buildings can be constructed of even thickness.

After the concrete work has been completed for any unit or group of units, the canvas is removed, but the wire screen is left embedded in the surface of one side of the concrete members.

Fibers or strips of African steel, cane,

bamboo, or of strips also of wood-fiber, or any other suitable material may be used in place of metal, either wholly or in part, for the construction of the units, where metal is difficult to obtain or is too expensive to use, as in tropical countries.

Concrete members of any shape, such as the walls and partitions and floor and ceiling members of small houses, and of particular things that can be made of concrete, such as arches, key-stones, door and window lintels and cap members, and many other things can be completely constructed of concrete reinforced by one or more of my units, and shipped from the factory all complete, ready to be put in place.

My invention provides a reinforcing unit for concrete construction that is easy to construct, and that requires less metal and concrete to give the strength required, and that can be more quickly and cheaply erected than many of the concrete reinforcement arrangements in use, and while I have shown and described the preferred construction and arrangement of my invention, I do not wish to be limited to that shown and described, as changes may be made without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a concrete reinforcing unit, the combination of a hub base provided with a plurality of rods radiating from it at predetermined distances apart, and of any predetermined length, and a single circumscribing rim member surrounding said hub base at a predetermined distance from it and secured to the outer terminal ends of said rods, said rim member and the outer ends of said rods being so coöperatively arranged and connected as to secure said rim under a compressive tension against said hub base, a rod extending transverselv through said hub base to the radial direction of the rim rods a predetermined distance, a hub base on the outer end of said transverse rod, and rods secured at one end to the hub base on the end of said transverse rod, and extending to and secured under tension to said rim.

2. In a concrete reinforcing unit, the combination of a rim, with a transversely arranged center base or anchor rod at the axial center of the rim, and extending at substantially right angles on both sides of it at a predetermined distance from the radial center of said rim, a hub base member on the opposite ends of said transverse center rod, and rods secured at one end to said rim and extending to and secured to said hub bases, whereby said rim and its rods are doubly trussed against lateral pressure, an intermediate hub base centrally between the axial hub and said rim, transverse rods through said hubs, hub bases on the opposite ends of said rods extending in opposite directions to and secured to the rim and to the axial hub base, said rods having means including threaded portions for adjustably securing them to said rim.

3. In a concrete reinforcing unit, a rim and a transversely arranged center base or anchor rod at the axial center of the rim, and extending at substantially right angles on both sides of it at a predetermined distance from the radial center of said rim, a hub base member on the opposite ends of said transverse center rod, and rods secured at one end to said rim and extending to and secured to said hub bases, whereby said rim and its rods are doubly trussed against lateral pressure, an intermediate hub base centrally between the axial hub and said rim, transverse rods through said hubs, hub bases on the opposite ends of said rods extending in opposite directions to and secured to the rim and to the axial hub base, said rim being preferably of angle iron construction, and said rods being preferably threaded to the hub bases at one end and threaded at their outer ends and extending through apertures in said angle iron, and nuts threaded to the ends of said threaded rods and turned against said angle iron to clampingly place said rim and rods and said hub bases under tensional radial strain.

In testimony whereof I affix my signature in presence of two witnesses.

ORREN ALLEN.

Witnesses:
G. SARGENT ELLIOTT,
ELIZABETH SMITH.