No. 708,548. Patented Sept. 9, 1902.

C. E. HEBBERD.

CONSTRUCTION OF METALLIC FRAME BUILDINGS.

(Application filed Apr. 11, 1902.)

(No Model.)

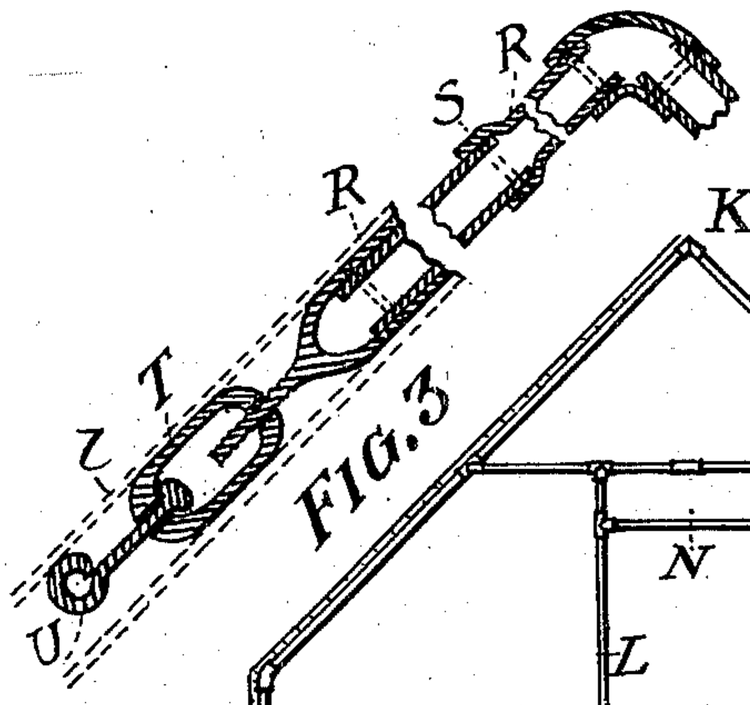

FIG. 3

FIG. 1

FIG. 4

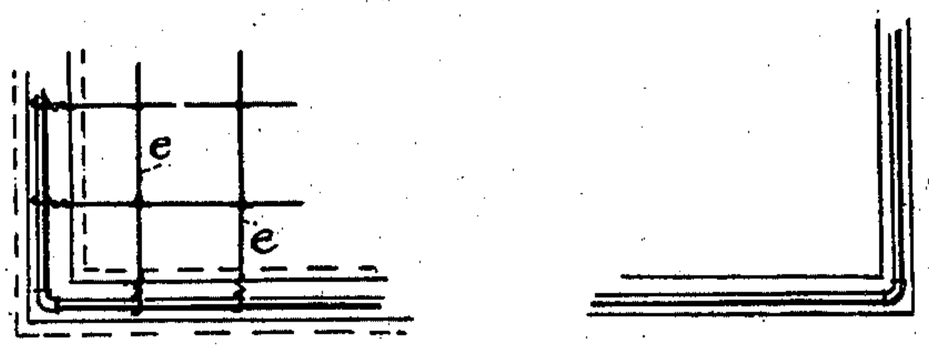

FIG. 2

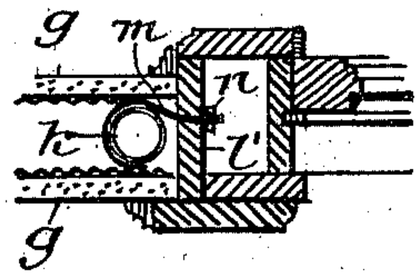

FIG. 5

WITNESSES:
William Fox
Edgar R. Head.

Chas. E. Hebberd INVENTOR

BY Phillips & Abbott his ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES E. HEBBERD, OF BROOKLYN, NEW YORK.

CONSTRUCTION OF METALLIC-FRAME BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 708,548, dated September 9, 1902.

Application filed April 11, 1902. Serial No. 102,337. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HEBBERD, a citizen of the United States, and a resident of the borough of Brooklyn, city, county, and State of New York, have invented a new and useful Improvement in the Construction of Metallic-Frame Buildings, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a transverse section taken through a small building embodying my invention and which illustrates in elevation the shape, form, and connections of my improved metallic frame. Fig. 2 is a ground plan showing portions of the frame and corners thereof. Fig. 3 is a detail, on an enlarged scale, showing an improved method of connecting the metallic members of the frame. Fig. 4 is a section indicating the method of inserting angle-braces and other joints and also the application of concrete siding to the building. Fig. 5 is a detail in horizontal section, showing the method of combining window and door casings and connecting the same with the iron framing.

Similar letters of reference indicate corresponding parts in all the figures.

At the present time, as is well known, metal is very extensively used in the construction of expensive heavy buildings in cities.

The object of my invention is to devise a plan or system by which metal, preferably, but not exclusively, in tubular form, can be used in the construction of relatively inexpensive buildings, such as cottages, stables, and the like. My invention is not by any means limited to such relatively inexpensive affairs, because it is applicable to buildings of very considerable size and cost.

My system admits of the use of ordinary iron or steel pipe and the usual fittings employed for making necessary connections, such as are in common every-day use in hundreds of constructions and the price of which, by reason of commercial competition, has been reduced to such a degree that it will be possible under my system to erect a substantial spacious building at a low cost, and it will embody also the advantages of being partly, if not entirely, fireproof.

My construction is such that the frames may be made "knockdown," so that the buildings may be portable, if desired.

Another feature of my improvement is the employment of special fittings, halved to fit over the pipes at any point, so that they may be secured in position by means of bolts and nuts, the necessary tension being secured by means of turnbuckles or other forms of traction devices, thus dispensing with the somewhat expensive threaded joints throughout and eliminating much skilled labor and cost in erecting the structures.

Ordinary timber may be introduced in the construction, if desired, either for the floors, roofing, or siding, and in some instances this will be more desirable.

Referring now to the drawings, special reference being had to Figs. 1, 2, and 4, A are foundation-walls, shown as of brickwork.

B represents an ordinary pier, such as a locust post, constituting the foundation.

C represents uprights of ordinary iron pipe of the requisite thickness.

D D are couplings. They are preferably made of two halves, as shown in Fig. 4, the upper half a being connected to the lower half a' by bolts a^2, and the lower part or upper part, as the case may be, has a connecting-socket with which the corner-brace F (see Fig. 1) may engage. These couplings may be made the same throughout the entire building—that is to say, in two parts—so that they may be clamped to any of the pipes at any desired point.

At the floor-sections I prefer to put in an ordinary T connection, as illustrated at G, into which the cross beam or plate H is threaded, so as to draw the building together and give it good firm support. At the upper ends of the corner-posts angle connections I are employed, into which the rafter-pipes J are threaded, and the rectangular solid coupling K is located at the ridge-line.

The window and door openings are composed of similar sections of piping, as shown in Fig. 1.

L L are two sections of piping which are threaded into T connections M M and are connected to the plate H below by similar connections, and between them there are cross-pieces N N, which define the window-opening.

The same general construction is shown in Fig. 1 for a door-opening.

O O are the two upright sections of tubing.

P P are the couplings.

Q is the cross-header at the top of the door-opening.

In order that the expense may be reduced in the construction of the building and in the cost of putting it together, sometimes instead of threading the ends of the pipe-sections and screwing them into couplings, which have also to be threaded, I make the parts as shown in Fig. 3, in which the tube-sections R R are provided with a hub at one end, into which the ends of the adjacent pipe enter, and suitable holes are made through the sides of the hubs and the ends of the pipe-sections, through which bolts or rivets S pass. In order to apply the necessary tension, I provide a turnbuckle T, threaded to one of the connecting parts R, as shown, and having a hook U, forming part of the turnbuckle, which is adapted to engage with the adjacent part of the frame, so that by turning the turnbuckle the strain may be applied to bring the whole thing up to the proper position and tension. I sometimes also employ a turnbuckle of a different construction, as shown in Fig. 4, in which a headed rod V engages in a suitable hole or slot made in the ends of the pipe-sections R, and the turnbuckle W is employed by which the strain may be applied.

The exterior walls and the floors and partitions may be made of timber, as shown in Fig. 1. *b b* illustrate the ordinary floor-joist, and *c* the usual flooring or boards; but I prefer, in order that the construction may be more nearly fireproof, to make the floors, partitions, and exterior siding of cement reinforced by metal rods or wires passing through it.

e e (see Figs. 1 and 2) represent cross rods or wires, which preferably have considerable strength, which are wrapped around and thoroughly fastened to the metal tubes whether they be vertical or horizontal and are stretched tightly across the intervening space, so as to form the siding or partition or flooring and ceiling, as the case may be. These rods or wires cross one another in such manner as may be preferred, so as to produce the necessary meshing and interlacing of the same. They may be wired together at their junctions, as shown at *f*, Figs. 1 and 4. Suitable metallic lathing may then be attached to these wires or rods. After the wires or rods and metallic lathing have been put in place they are covered with such thickness of cement, concrete, or plaster as may be requisite for the purpose intended, and the walls may be doubled, as shown at *g g* in Fig. 4, and so, also, may the partitions and flooring, or they may be single in thickness, as preferred. I advocate always making them double; but it is quite possible to make a very serviceable partition, and in certain localities outside walls also, of a single thickness.

In order that the joints where the turnbuckles or similar devices are located may be as stiff against bending strains as the other parts of the frame, I sometimes provide a sleeve *l*, (see Figs. 3 and 4,) which is adapted to slide longitudinally on the tubes R R and somewhat snugly fit them, so that after the turnbuckles have been suitably manipulated this sleeve may be driven or moved longitudinally, so as to embrace and cover a considerable length of the ends of the adjoining tubes R R, thus preventing transverse bending. I show it in full lines when in position and in dotted lines, Fig. 4, when retracted for the exposure of the turnbuckle. In Fig. 3 I show it in dotted lines only.

The framing is connected to the foundation as shown in Fig. 1, in which the end of one of the uprights C (indicated at *h*) is shown as embedded in the brickwork of the foundation, and at *i* on the opposite side of that Fig. 1 and also in Fig. 4 the upright C is shown as "footed" upon the foundation timber or sill *h'*, to which it is securely fastened by lag-screws or spikes *i'*, passing through a suitable terminal plate, to which the post is threaded.

In Fig. 5 I show a detail of the method in which a window and door casing may be fastened to the metallic framing. One of the upright pipes which constitute the window or door opening is indicated by *k*. The siding is indicated by *g g*, the same as in the other figures. The casing is indicated by *l'*. *m* is a stiff metal rod threaded at its end and provided with a nut *n*. The other end of this stiff metallic rod is curved so as to fit about and embrace the upright *k*. A hole is then bored at a suitable place in the casing *l'*, and the threaded end of the curved bolt or rod is passed through the hole and secured by the nut *n*. There will be such number of these bolts at each door or window casing or framing as may be necessary securely to hold it in place.

In Fig. 4 the water-table is shown at h^2. The roof may be made by employing a timber ridge-pole and with boarding fastened by staples or otherwise to the tubular rafters, to which shingles or metal will be applied in the usual way, or the construction which I prefer may be the same as that described above for making the partitions, siding, &c.—that is to say, the cross and interlacing rods or wires with metallic lathing and cement filling. This makes a peculiarly serviceable and reliable roof.

It will be obvious to those who are familiar with such matters that various modifications may be made in the details of construction of the parts without departing from the essentials of the invention. I therefore do not limit myself to such details.

It will be observed that under my system a very substantial and practical fireproof building may be made at an exceedingly small cost and that it may be erected with great rapidity. The side walls and partitions

after the cement has become dry are, in effect, continuous unbroken plates of stone or cement work, reinforced by metallic rods or wires passing through them, which are known to have exceeding strength. These are set edgewise and are fully stayed and supported in all directions. Consequently the building will be peculiarly stiff; also, the flooring, owing to the tension which should be applied to the rods or wires which are embedded in the cement and to the stiffness also given by the partitions and bracing, will have great strength and permanence, and the roof will be absolutely waterproof and require no metal or other shingles, although I prefer to coat it with suitably-prepared asphalt or equivalent water-repelling material, so as to prevent the moisture from penetrating the cement.

My building is practically imperishable, because, as is well known, metal work embedded in cement will last for an indefinite time. If the building is intended to be a portable one, then the partitions, roofing, siding, floors, &c., should not be made of cement, but of woodwork so constructed that it may be knocked down and the frame exposed.

Obviously, if desired, metal lathing or its equivalent may be suitably attached to the tubular framing and the wall material applied upon it.

Having described my invention, I claim—

1. A building, the frame of which is composed of metallic pipe the ends of which are united by cross-bolts and suitable turnbuckles to apply the requisite strain.

2. A building, the frame of which is composed of metallic pipe, the ends of which are united by cross-bolts and suitable turnbuckles to apply the requisite strain, the walls and partitions being made of metallic rods or wires embedded in cement.

3. A building, the frame of which is composed of metallic pipe with suitable connections, the window and door openings being made of sections of pipe coupled together, the door and window casings being attached to the metallic framing with threaded bolts which engage with the tubing adjacent to the door and window openings.

4. A building the frame of which is composed of metallic pipe, the ends of which are united by cross-bolts and certain turnbuckles, and a sleeve adapted to inclose the turnbuckles and lap on the ends of the adjacent sections of pipe, for the purpose set forth.

5. In a metallic-frame building a turnbuckle interposed between the adjacent ends of the metal elements composing the frame whereby the requisite strain may be applied to draw the parts to position and a sleeve adapted to inclose the turnbuckle and to lap onto the metal elements at each side of the turnbuckle, for the purpose set forth.

Signed at the city of New York this 7th day of April, 1902.

CHAS. E. HEBBERD.

Witnesses:
PHILLIPS ABBOTT,
F. M. DONSBACH.