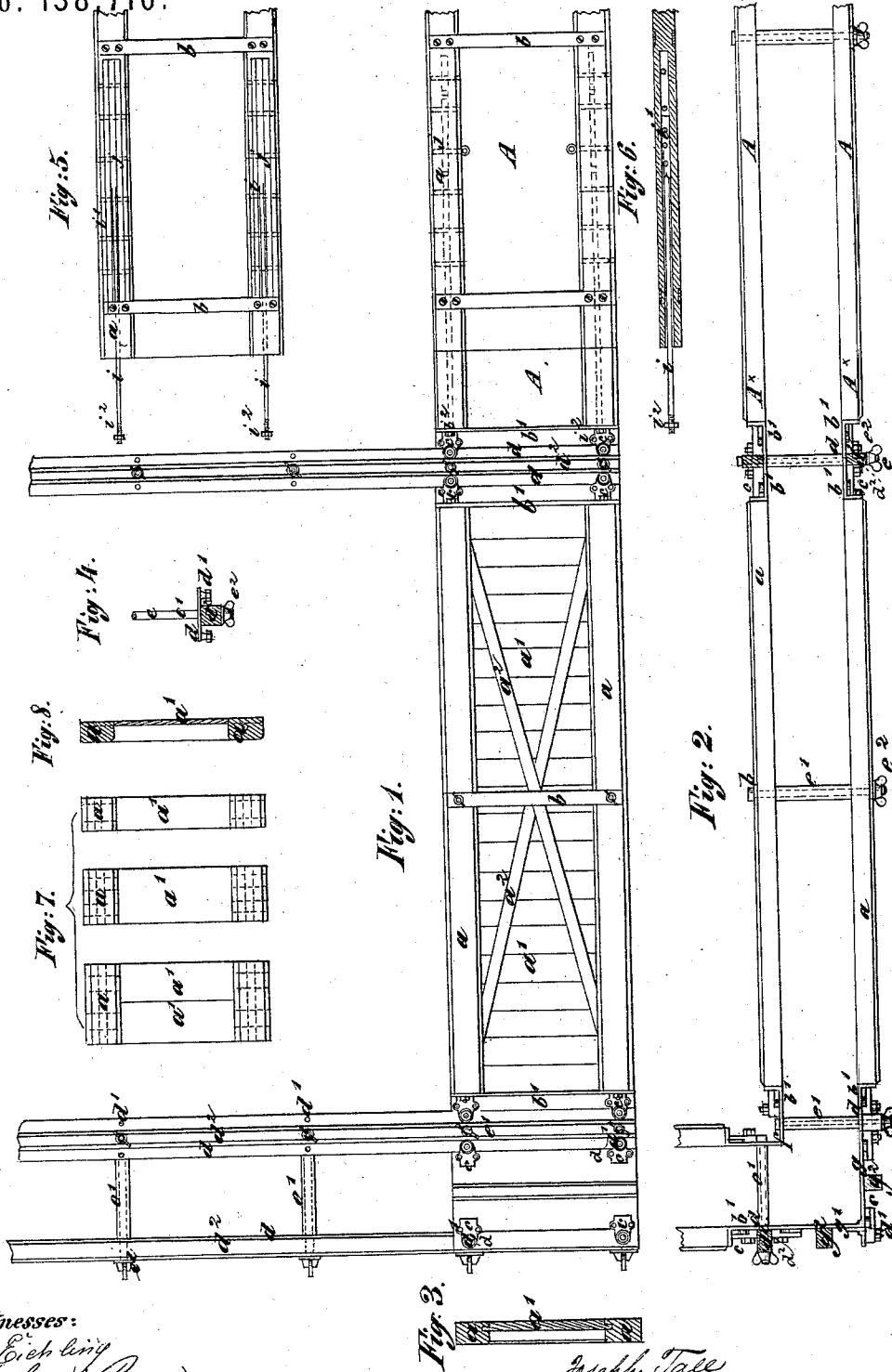


J. TALL.
Construction of Buildings.

No. 138,710.

Patented May 6, 1873.



Witnesses:
H. Eichling
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Fig: 9.

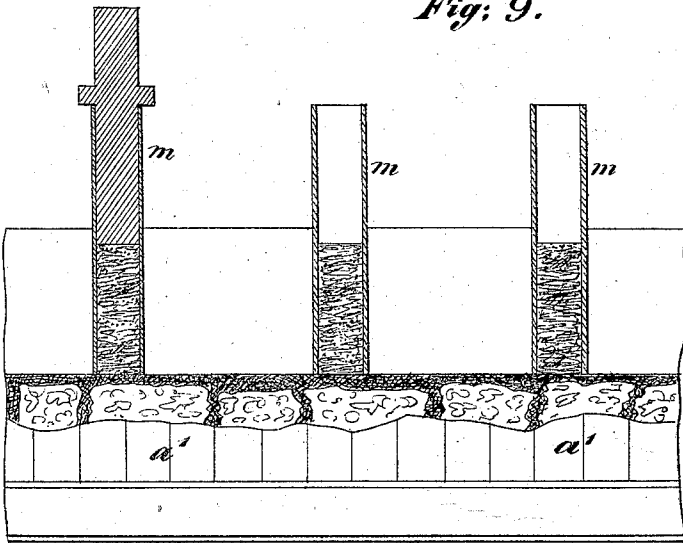


Fig: 10.

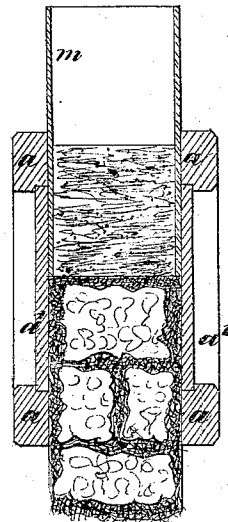


Fig: 12.

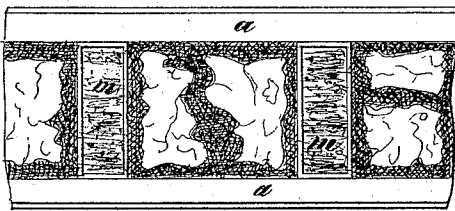
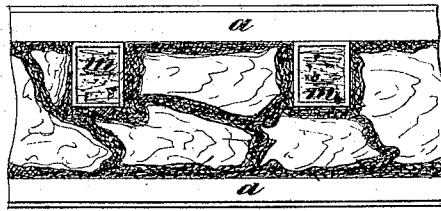


Fig: 11.



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UNITED STATES PATENT OFFICE.

JOSEPH TALL, OF SOUTHWARK, ENGLAND.

IMPROVEMENT IN THE CONSTRUCTION OF BUILDINGS.

Specification forming part of Letters Patent No. **138,710**, dated May 6, 1873; application filed June 4, 1872.

To all whom it may concern:

Be it known that I, JOSEPH TALL, of Law-son street, Great Dover Road, in the borough of Southwark, England, engineer, have invented certain new and useful Improvements in the Construction of Walls, Houses, and other Buildings, of which the following is a specification:

The object of this invention is to enable laborers and unskilled artisans to construct buildings of greater strength in a more rapid manner and at less cost than by the ordinary process of building with bricks or stone. To this end I employ molds, in which the materials to be used in constructing the buildings are placed in layers, and the interstices between such materials are filled up with a grouting or liquid mortar or concrete composed of fine gravel or rough sand and Portland cement, or other cement which will harden or set in a few hours, so that the materials in the mold will form one solid concrete mass of sufficient hardness to allow of the molds being taken to pieces, leaving the walls standing. The molds are formed of frames, consisting of wooden panels of any convenient length and depth, connected at their ends to wrought-iron upright pieces, which may form the angles of the wall or building.

The method of constructing these molds will be understood by reference to the accompanying drawing, in which—

Figure 1, Sheet I, is an elevation of a mold complete and put together ready to construct a wall or one corner of a building. Fig. 2 is a plan view of the same.

The panel-frames, which form the sides or faces of the wall, are constructed of two strong horizontal wooden bars, *a a*, which form the top and bottom rails of the frame, shown in section at Fig. 3. These bars are grooved or rabbeted at their inner sides so as to receive the rabbeted ends of the boards *a' a'*. When these are driven in place the panel is held together by the wrought-iron bars or straps *b*, Fig. 1, and the angle-iron ends *b' b'*, and are still further strengthened and rendered rigid by the diagonal braces or struts *a² a²*. The angle-irons *b' b'* are secured onto the ends of the frames by screw-bolts, and on the angle-

irons are riveted the eye-pieces *c c*, which are made with conical holes to receive the conical screw pins or studs *d¹* of the upright pieces *d*, Figs. 1 and 2, and one of which is shown detached at Fig. 4. These uprights consist simply of a sheet of wrought-iron of suitable width, strengthened or rendered rigid, as shown, by means of a wooden bar, *d²*. Conical screw pins or studs *d¹* are riveted, as shown at Fig. 4, at intervals, to the wrought-iron uprights. There is an upright of this kind for each side of the frame; and the two pieces are bolted together by screw-bolts *e*, which pass through the plate *d* and wooden bar *d²*, as shown at Fig. 4, the two parts being kept at a proper distance apart by means of the short iron tubes *e¹*, all the parts being firmly bound together by screwing up the thumb-nut *e²*. When the pair of uprights are properly placed on the concrete foundation the side panels *a a¹* are adapted thereto by placing the eye-pieces *c* on the conical screw pins or studs *d¹* and then screwing up the nuts. The corners of the wall or building are formed by an internal wrought-iron angle-piece, *f*, Fig. 2, in combination with the upright pieces *d d* and two wrought-iron panels, *g g¹*. The corner panel *g* is made of wrought-iron, and is precisely like the uprights *d*, except that it is wider and only the same height as the frames *a a¹*. It is provided with eye-pieces *c c* on each side to fit onto the conical screw-studs *d d¹* of the adjoining pieces. The piece *g¹* is also made of iron, strengthened by the upright *g²*; and on one side there is a piece of angle-iron riveted thereto to carry the conical screw-stud *d¹*, and at the other side a pair of eye-pieces are riveted. All this wood and iron work is well painted; and before being used the internal surface of the mold should be well payed over with soap and water to prevent the cement and concrete from adhering thereto.

The apparatus, as shown in the drawing, is intended to form walls nine inches thick; but if it be desired to construct thicker walls longer screw-bolts *e* must be used, and the tubes *e¹* must be lengthened by adding on short pieces of tube of the required length. The iron panels *g g¹* at the corners must also be of greater width so as to fill up the vacant space that

will occur when the outer panels *a* are moved further away from the inner panels so as to increase the thickness of the walls.

In order to admit of the panels being used in constructing various parts of the building it will sometimes be found convenient to alter the side panels, either by increasing or diminishing their length, so as to make them fit various parts of a building. This is effected by the use of panels so constructed that pieces may be added onto one of their ends. The way in which this is effected is shown at Figs. 5 and 6, Sheet I. The panel *A* in Fig. 1 is an expanding panel of this kind. The top and bottom rails *a a* of the expanding panel are bored out longitudinally to receive a rod, *i*, which is made square at its inner end, and is provided with holes at *i¹ i¹* to receive cross-pins *j j*, Fig. 1, which are inserted in transverse holes made in the rails *a a*, as indicated by dots in Figs. 1 and 5. The outer ends of the rods *i i* are screwed to receive nuts *i² i²*, as shown in the figures. The rods *i i* are capable of being moved longitudinally in or out of the rails, and are kept from turning round in their holes by their square ends *i¹ i¹*. A number of spare pieces of panel of various widths, as shown in elevation at Fig. 7 and in edge view or section at Fig. 8, are always kept in stock, so that additional pieces of any width may be added. The transverse holes shown by dots in the rails or bars *a a* of the long panel are four and a half inches apart and the holes made in the square ends *i¹ i¹* of the rods *i i* are one and a half inch apart, so that the rod may be fixed by the pins *j j* at any distance being a multiple of one and a half inch.

Supposing it be desired to lengthen the panel *A*, Fig. 1, to the extent of either of the pieces shown at Fig. 7, the rods *i i* are drawn out to the desired extent and the end piece *A** of the panel is detached from the part *A* and drawn off the rods *i*, and one of the pieces shown at Fig. 7 is placed on the rods by passing the latter through the holes in the bars or rails *a* of the additional piece, as shown by dots in Fig. 7. The additional piece is pushed close up to the piece *A*, and then the end piece *A** is replaced on the rods, which are then screwed up again by the nuts *i²*, so as to bind or secure all the parts firmly together. If the panel requires to be shortened the nuts *i²* are removed and the end panel *A** and the additional panel are taken off the rods *i i*. The end panel, or, if desired, a shorter one, may then be replaced and the whole tightened up again by means of the nuts. The panel will thereby be shortened to the extent of the extra panel which has been removed.

Having explained the construction of the mold or apparatus used for the purpose of the invention, I will now proceed to explain the manner of using the same and of forming or constructing walls therewith. A suitable level foundation having been formed in the ordinary manner, the several parts of the mold or ap-

paratus are set up and put together as shown at Figs. 1 and 2, Sheet I. A layer of concrete composed of broken stone, gravel, or other hard substance mixed with cement and water is then spread over the bottom of the mold to the thickness of about three inches, to form a bed for the second layer, which will consist of lumps or blocks of rough unhewn stone. These lumps are packed in as close together as they conveniently can be, leaving only room between them to receive a liquid grouting composed of sand or fine gravel and cement. When the layer of packing has been laid in the liquid grouting is poured in so as to fill all the interstices between the blocks of stone and produce a moderately fine face to the wall when the panels *a a* are removed. This mode of forming the walls will be understood by referring to Figs. 9, 10, 11, and 12.

In order to form recesses or openings in the walls to receive the ends of the joists cores made of sand, dust, or other friable substances are embedded in the walls while they are being built. To this end hollow iron boxes *m m m*, Figs. 9, 10, and 11, Sheet II, are employed. When the wall has been raised to the required height to receive the joists the boxes *m m*, which are rectangular and have neither top nor bottom, are placed on the bed of concrete, which must be accurately leveled in the molds for the purpose, as shown in the longitudinal section, Fig. 9, and the cross-section, Fig. 10. The wooden joists will be of various dimensions according to the size of the intended building, but, supposing the joists are nine inches deep, they should enter the wall four and a half inches. The boxes *m* should, therefore, in their horizontal section or plan, be four and a half inches long by three inches wide, as shown in the plan view of the wall at Fig. 11. The boxes *m m* are placed against the inner panel *a* of the mold and at suitable distances apart, according to the distance the joists are to be situated apart. For the other ends of the joists it will be necessary that the boxes should be double the length in plan, so as to allow room for the joists to be pushed back in the recesses in order to get the other ends in their places. These extra-long boxes *m* are shown in the plan view, Fig. 12. When all the boxes *m* are properly arranged in the molds they must be filled nine and a quarter inches deep with sand or some other friable substance, which should be rammed down solid. The molds may then be filled with the concrete up to or a little above the level of the sand in the boxes *m*. These latter may then be drawn up, leaving the sand core in the concrete. When the boxes have been removed the filling of the molds may be completed and the wall carried up the required height. Upon removing the panels *a* of the molds the sand cores may easily be picked out, thereby leaving the necessary recesses for the ends of the joists.

Having now described my invention, and having explained the manner of carrying the

same into effect, I claim as the invention secured to me by Letters Patent—

1. The molds for forming walls of concrete, composed of frames consisting of panels connected at their ends to wrought-iron pieces which may be used to form the corner or angle of a wall or building, in combination with the screw-bolts *e*, the nuts *e*², and tubes *e*¹, substantially as and for the purposes herein set forth.

2. The adjustable panels, in combination with the metal rods *i*, provided with holes *i*¹ arranged to receive cross-pins *j*, and constructed and arranged to admit of additional or short

lengths of panel when necessary, substantially as and for the purpose set forth.

3. The iron boxes *m*, when used in combination with sand, dust, or other friable substance, capable of removal with facility from the wall, for the purpose of leaving recesses to receive the ends of the flooring-joists, substantially as described.

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