Oct. 12, 1943. L. K. MAYNE 2,331,709

APPARATUS FOR LOCKING METAL FRAMES TOGETHER

Filed Dec. 28, 1940 2 Sheets-Sheet 1

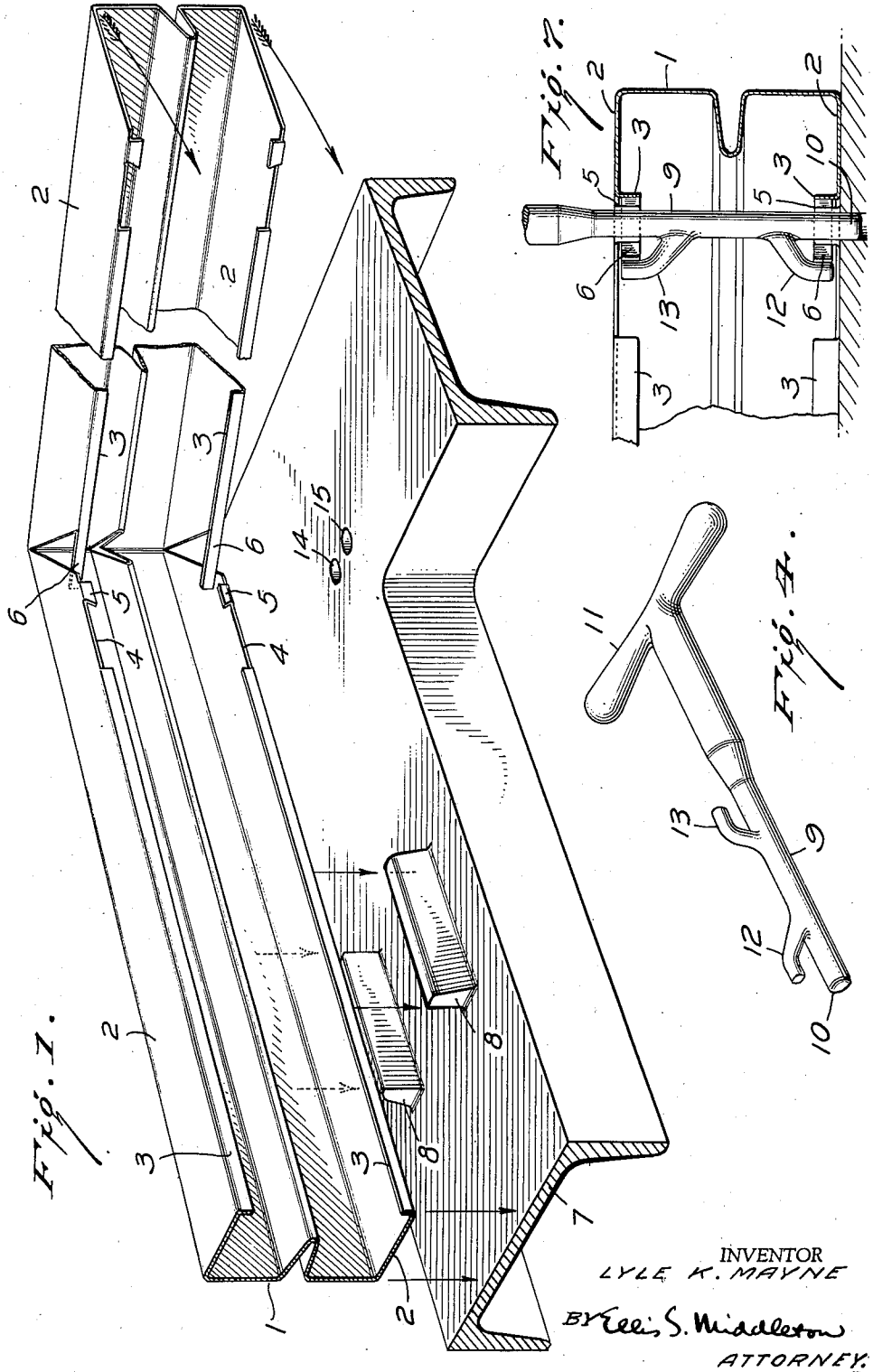


Fig. 1.

Fig. 2.

Fig. 4.

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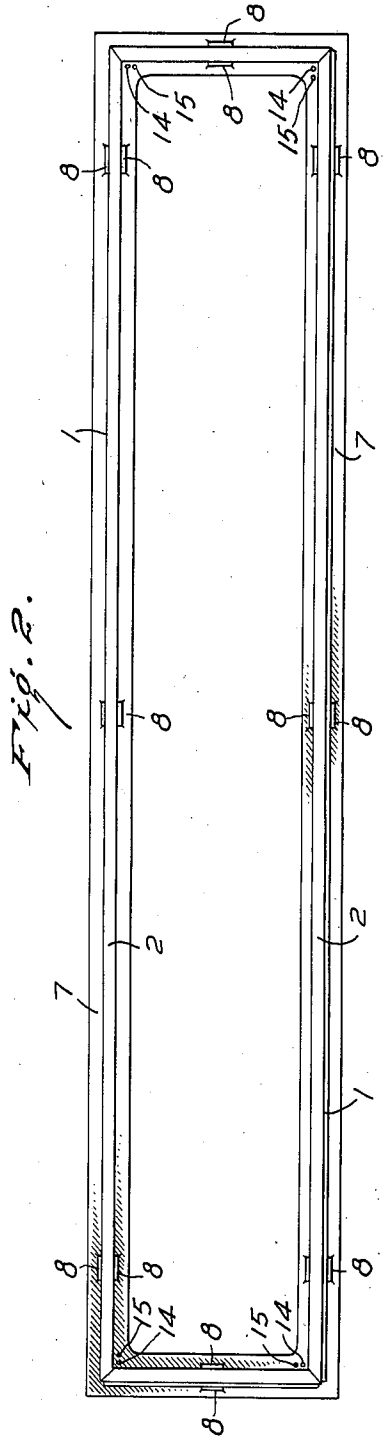


Fig. 2.

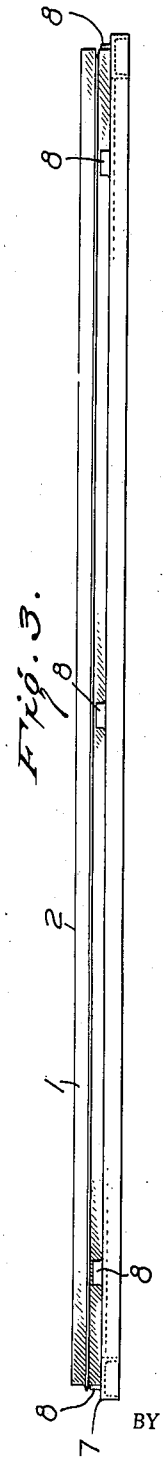


Fig. 3.

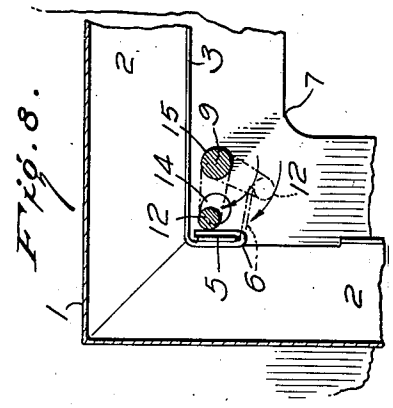


Fig. 8.

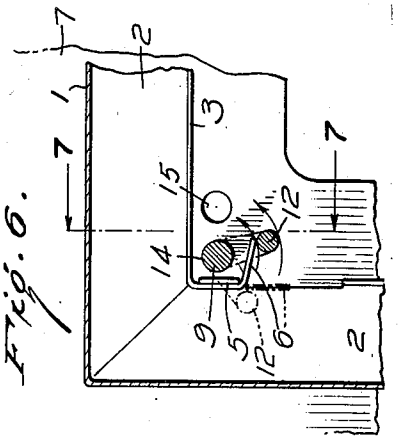


Fig. 6.

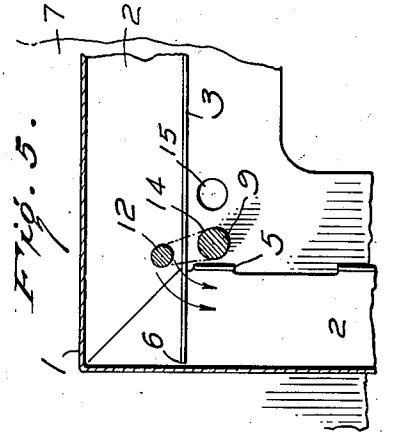


Fig. 5.

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2,331,709

APPARATUS FOR LOCKING METAL FRAMES TOGETHER

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Application December 28, 1940, Serial No. 372,088

2 Claims. (Cl. 153—15)

The present invention relates to an apparatus for locking metal frames together and constitutes an improvement upon the invention of my copending application Serial No. 284,626, filed July 15, 1939, now U. S. Patent 2,241,266, issued May 6, 1941.

There is on the market today a building unit which includes a precast slab of set cementitious material of gypsum or the like having tongued and grooved metallic edge members.

A preferred manner of constructing the frame of this unit is, first, to form a shape by passing a hot rolled galvanized steel strip through requisite punches and forming dies to shape it into a channel element having a web and flanges at each end of the web, with terminal portions of the flanges extending at an angle thereto and constituting strengthening portions. As usually made, there are two such channel members, the web of one including a tongue and the web of the other including a groove. Each of these shapes is then bent to form two sides of a rectangular frame and the two thus formed sections joined together to make a rectangular frame by inserting flat angular locking pieces into the corners.

These open metal frames are then placed upon molding tables and the plastic cementitious mix poured thereinto and permitted to set. The precast shapes are then subjected to a drying temperature and the slabs are ready for use.

While the above method of manufacture of the frames is eminently satisfactory, yet it is the purpose of this invention to accomplish the same end in a cheaper manner with the same degree of efficiency.

To this end, the invention contemplates in its broadest aspect, the forming of channel members which will eventually constitute a frame, from hot or cold rolled metallic strips by passing them through requisite dies and rolls and then bending them to shape.

Where the frame is made from a single strip or where made from two or more strips, the adjoining ends are fastened together in the following manner:

In the punching operation which precedes the shape rolling of the strips, sections are removed so that when finally rolled, an extension will be provided on the strengthening portions of the flanges and these made to engage isolated upstanding ears on an adjacent side of the frame and the frame sides thus locked together. The invention is here particularly concerned with mechanism for engaging the extensions with the ears.

The invention is specifically concerned with mechanism for locking the parts of a metallic frame, the frame being of any shape and useful for any purpose, where the frame includes a metal strip normally adjacent one edge of, and at an angle to, a side of a metallic ear. The mechanism of the invention contemplates a base to receive the frame parts, having two apertures therein, and a tool having a shank, the end of which is insertible in one of the apertures to act as a pivot, the tool carrying a cam finger which extends outwardly from the shank and is engageable behind the metal strip so that rotation of the tool cams the strip around one side and edge of the ear. When the tool is then inserted in the second aperture and rotated in the opposite direction, the strip is then further cammed flat against the opposite side of the ear, thus locking the parts of the frame together. By providing a pair of cam fingers on the tool, top and bottom strips may be operated upon simultaneously to lock the frame together at its top and bottom.

The invention further consists in the novel arrangement, combination and construction of parts more fully hereinafter described and shown in the accompanying drawings, in which—

Fig. 1 is a composite fragmentary view showing the manner of initially bending of a specific type of frame and the placing of it upon the base;

Fig. 2 is a plan view of a frame in place ready for locking operations;

Fig. 3 is a side elevation of Fig. 2;

Fig. 4 is a perspective view of the tool used for locking the corners together;

Fig. 5 is a fragmentary sectional plan view showing the position of the tool of Fig. 4 at the start of the locking operation;

Fig. 6 is a view similar to that of Fig. 5 showing the position of the parts at the end of the first camming operation;

Fig. 7 is a sectional elevation along the line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 6 showing, however, the position of the parts at the end of the final camming operation.

Referring now to Fig. 1, a fragment of a metallic frame is shown to consist of a length of strip metal formed either by hot or cold rolling and which has been passed through a punching

machine and cutter to give it the proper configuration. The strip is then bent by passing it through forming rolls in the usual manner so as to give it the configuration shown at the left hand end of Fig. 1. This shape then consists of a web 1 having flanges 2 at the side edge of the web, the side edges being provided with terminal portions 3 which serve to strengthen the entire structure.

As shown in Fig. 1, during the forming operations, metal has been removed as at 4 from the side edge terminal portions so as to leave upstanding ears 5. Also, the side edge terminal portion 3 projects beyond the flange 2 so as to form an extension 6 at the part of the frame which is to be the eventual corner.

After the blank strip has been cut and formed into shape, the extreme right hand end is then bent in the direction of the arrow as shown in Fig. 1 and then placed upon base 7 between pairs of positioning lugs 8 so as to hold adjacent sides of the frame substantially at right angles to each other. As a consequence, the relative positions of the extension 6 and the upstanding ear 5 are as shown in Fig. 5 for instance.

In locking the corners together, use is made of the tool of Fig. 4, which includes a shank 9, the end 10 of which is used as a pivot point, the shank having a handle 11 thereon and carrying a pair of outwardly and oppositely extending cam fingers 12 and 13.

At this point, the end 10 of the tool shank is inserted in an aperture 14 in the base 7 so that the cam fingers 12 and 13 lie inside of the metal frame and behind the extensions 6. The parts then occupy the position shown in Fig. 5.

Rotation of the tool in a counterclockwise direction causes the operations shown in Fig. 6 to be performed. Thus lower cam finger 12 contacts with the back side of the extension 6, bends it flat against the back of upstanding ear 5 and partially around one edge thereof. Further rotation of the tool in a counterclockwise direction causes the finger 12 to clear the end of the extension 6. The tool is then withdrawn from this aperture and inserted into aperture 15. Rotation of the tool in a clockwise direction and as shown in Fig. 8 causes the projecting end of the extension 6 to be cammed completely over the edge of ear 5 and flat against its outside or front face so that the parts then occupy the position shown in Fig. 8.

It will be observed that where the frame to be locked contains upper and lower side edge terminal portions as shown and the tool of Fig. 4 having two cam fingers is used, both upper and lower extensions 6 are made to embrace their ears 5 simultaneously and in one set of operations.

The other three corners of the rectangular frame may be locked together in exactly the same manner as above set forth.

It will be seen from the above that such a method of fastening the parts together or strengthening the corner in which the web is integral thereover is accomplished in a particularly simple manner.

If it is desired to fill these frames with cementitious material such as gypsum or the like, the fastening parts do not objectionably project which might otherwise interfere with the close fitting of the parts during erection.

Obviously the frame may be formed from a single strip of sheet metal or more than one as the case may be, for even if a plurality of pieces are used, when the four corners are locked together in the manner indicated, a particularly rigid structure results.

While the invention has been shown and described with particular reference to specific embodiments, it is to be understood that it is not to be limited thereto but is to be construed broadly and restricted solely by the scope of the appended claims.

I claim:

1. In a mechanism for locking parts of a metallic frame together, where the frame includes a metallic strip normally adjacent one edge and at right angles to a side of a metallic ear, the combination of a base adapted to support the frame, the base having two apertures therein, a tool having a shank, the end of which is insertable in either of the apertures to act as a pivot, a cam finger on the shank extending upwardly therefrom and adapted when the shank is inserted in one aperture to engage behind the said metal strip of the frame, rotation of the tool while in the said aperture and in one direction, being adapted to cam the strip around one side and edge of the ear of the frame, rotation of the tool while in the other aperture and in an opposite direction being adapted to cam the strip from the above position flat against the other side of the said ear, to lock the parts of the frame together.

2. The mechanism of claim 1 in which the tool is provided with an additional and oppositely extending cam finger similar in all respects to that first-mentioned, the second-mentioned cam finger being adapted to engage a second metal strip on the said frame to manipulate it around a second ear on the said frame simultaneously with the manipulation of the first strip as above-mentioned.

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