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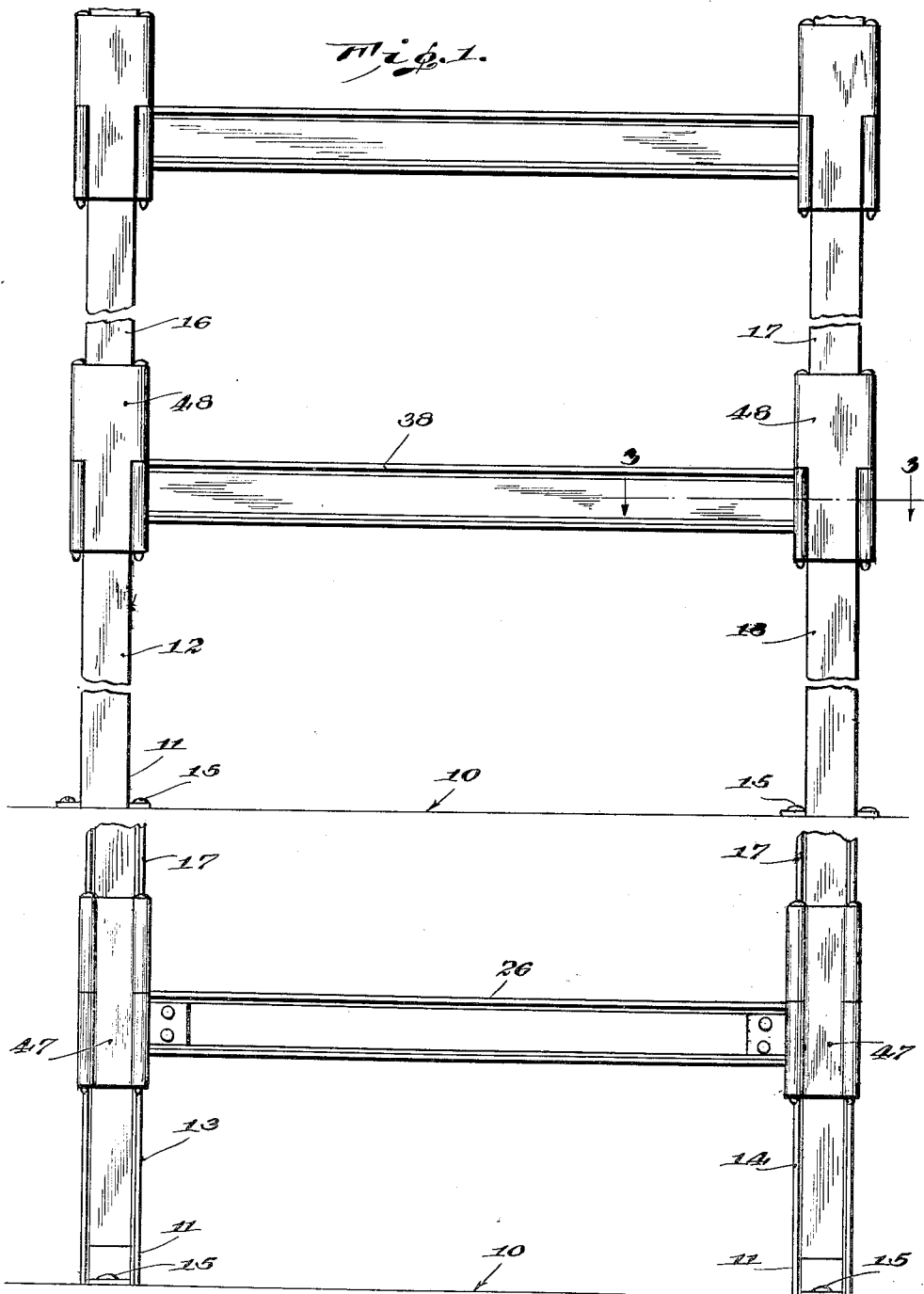
F. LIZASO ET AL

1,915,023

STEEL STRUCTURE

Filed June 8, 1931

3 Sheets-Sheet 1



WITNESS

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Fig. 2.

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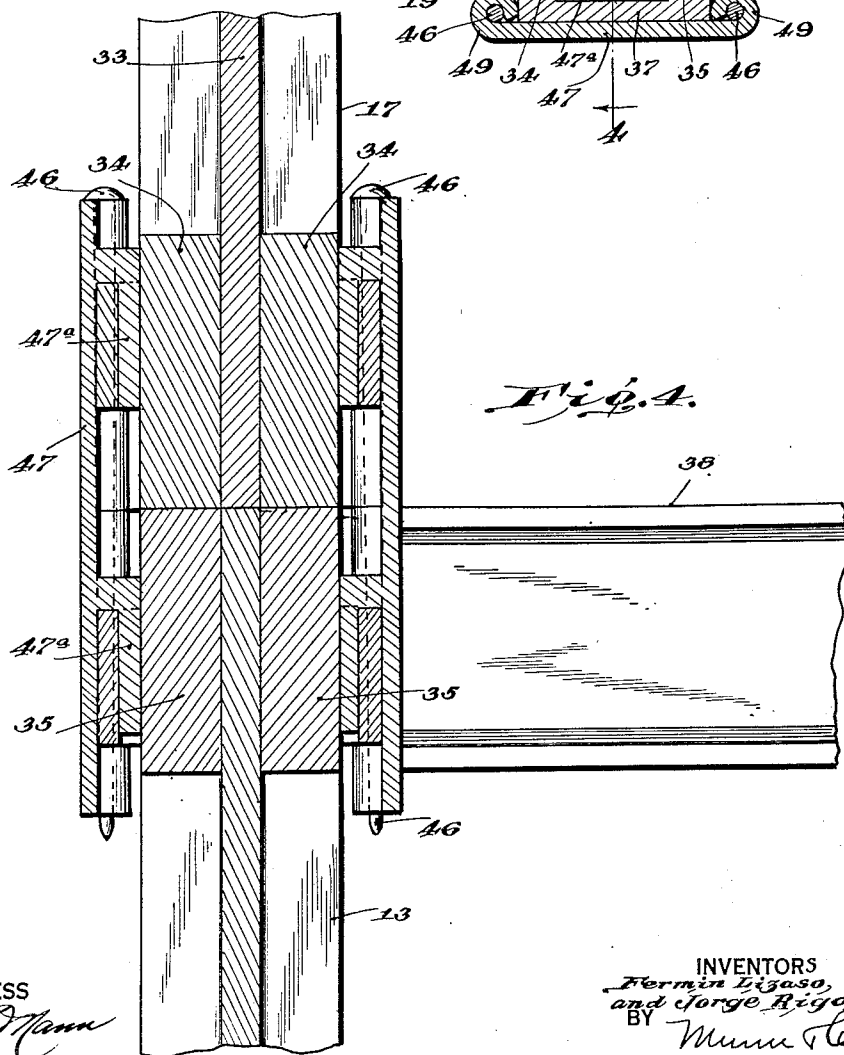
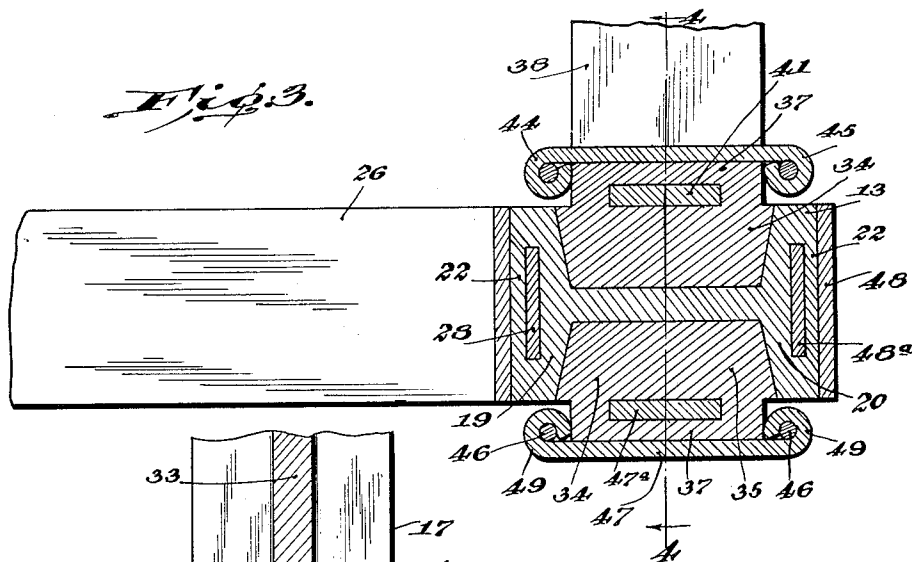
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STEEL STRUCTURE

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3 Sheets-Sheet 2



WITNESS

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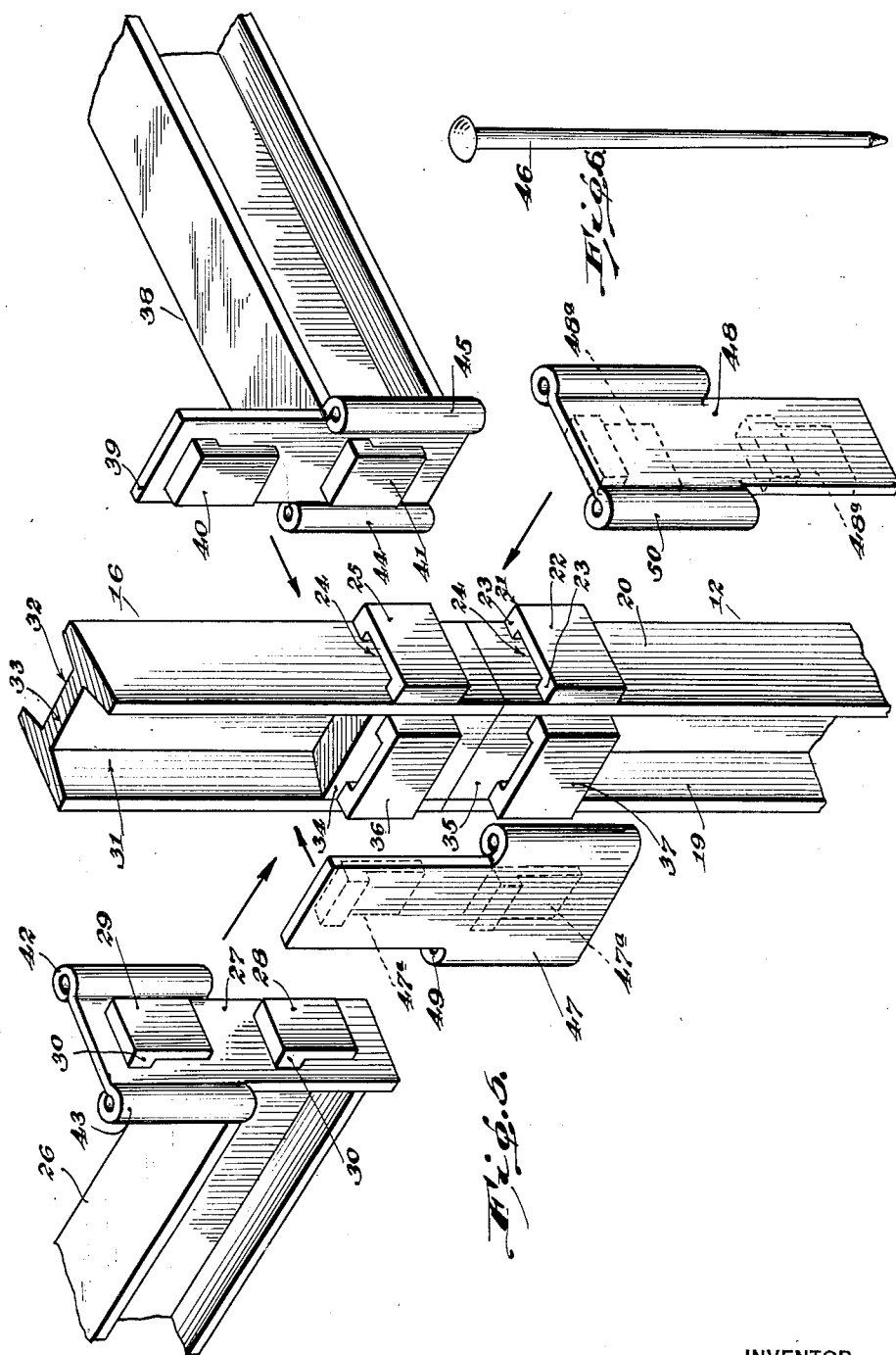
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STEEL STRUCTURE

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3 Sheets-Sheet 3



WITNESS

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UNITED STATES PATENT OFFICE

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STEEL STRUCTURE

Application filed June 8, 1931. Serial No. 542,926.

Our invention relates to steel building structures and to an improved method of erecting the same.

An object of the invention is to produce a steel structure which may be assembled without the use of rivets.

Another object of the invention is to provide improved structural steel elements which may be formed at the factory with interengaging means so as to enable their assembly into a building structure at the point of operations without the use of special tools or equipment.

A further object of the invention is to design a building structure which will result in a great saving of time, labor and expense in the production thereof.

A still further object of the invention is to provide improved and novel means for securing the steel elements together.

Other objects and advantages of the invention will become apparent during the course of the following detailed description when read in conjunction with the accompanying drawings, which form a part of this specification, and in which:

Figure 1 is a side elevation of a building structure, constructed according to our invention;

Fig. 2 is a similar view taken at right angles to Fig. 1;

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a perspective disassembled view of the elements of the invention, illustrating the method of assembly; and

Fig. 6 is a perspective view of one of the locking pins employed in the invention.

Referring now to the drawings in detail wherein a preferred embodiment of the invention is shown by way of example, and wherein like numerals refer to like parts throughout the same, 10 indicates a suitable foundation or base to which the lower ends 11 of a plurality of spaced upright column members 12, 13 and 14 are anchored in any conventional manner illustrated at 15. While only three upright columns are shown

by way of example it will of course be understood that any number may be employed depending upon the size of the building to be constructed. The columns 12, 13 and 14 are preferably in the form of I-beams as usually used in structural steel work.

Each of the columns 12, 13 and 14 supports a superposed column 16, 17 and 18 respectively. The columns 16, 17 and 18 are also preferably I-beams and are disposed in vertical alinement and in end to end relationship with respect to their supporting columns 12, 13 and 14.

Referring particularly to Figs. 3 and 5, it will be seen that the outer faces of the flanges 19 and 20 of each of the upright columns 12, 13 and 14 are provided with a socket member 21 adjacent the upper end thereof. Each of the socket members 21 comprises a U-shaped strap having the web portion 22 spaced from the surface of the flanges 19 and 20 and having the legs 23 thereof formed integral with said flanges at the time of manufacture or rigidly secured thereto in any suitable manner such as welding before the columns leave the factory. It will be clearly seen that the U-shaped straps define a rectangular upwardly opening socket 24 with the face of the flanges of the I-beam.

The superposed columns 16, 17 and 18 have the outer faces of the flanges thereof also provided with vertically disposed socket members 25 adjacent the lower and upper ends thereof, the sockets 25 being in vertical alinement and in spaced relation with respect to the sockets 21 on the lowermost set of columns. Suitable horizontal I-beams or girders 26 extend between the opposed flanges of adjacent upright columns and each of these horizontal beams are provided at their ends with vertically disposed plates 27 which are disposed in a plane at right angles to the longitudinal direction of the beam. The plates 27 are either formed integral with the end of the beam or are rigidly secured thereon at the factory. The outer face of each of the plates 27 is provided with a pair of vertically spaced downwardly extending tongue members 28 and 29.

Each of the tongue members at their upper ends being provided with a thickened portion 30 rigid with the plate 27 and serving to space the depending portion of the tongues from said plate. When the I-beam 26 is in position in the building the tongues 28 and 29 engage in the socket portions 24 of the socket members 21 and 25 respectively thereby securing the cross beam to the vertical columns and also serving to lock the meeting ends of the vertical columns from lateral displacement.

Each of the vertical columns is formed solid at their meeting ends, the channels 31 and 32 on opposite sides of the web portion 33 thereof having filler blocks 34 and 35 seated therein. The filler blocks 34 and 35 are rigidly secured in place within the channels of the vertical columns and have their outer faces disposed flush with the edges of the flange portions thereof. The filler blocks 34 and 35 are formed with socket members 36 and 37, respectively, of similar construction to the socket members 21 and 25 on the flange portions of the vertical columns.

The horizontal I-beams 38 extending between the opposite channel faces of adjacent column members are also provided with vertically disposed plates 39 at their opposite ends, the plates 39 carrying vertically spaced tongue members 40 and 41 of a construction similar to the tongues 28 and 29 on the cross beam 26. The tongues 40 and 41 are engaged within the sockets of the members 36 and 37 respectively when the beams 38 are placed in position in the building.

The plates 27 are provided with vertically extending integral sleeve portions 42 and 43 which are formed with the side edges of the plate and which extend from the upper end to a point midway of the length thereof. The plates 39 are formed with sleeve portions 44 and 45 similar in construction to the sleeves 42 and 43, and extending from a point midway of the sides of the plate 39 to the lower end thereof. It will be readily seen from an inspection of Figs. 1, 2 and 4 that when the beams 26 and 38 are in place in the building structure, the sleeves 42 will be disposed in alinement with the sleeves 44 so that a tapered locking pin 46 may be driven into the sleeves so as to further lock the parts against relative movement.

In the case where the upright columns are disposed inwardly of the building structure so that horizontal beams are secured to the socket members on four sides thereof, each of the right angularly disposed beams would have the sleeve portion thereof locked to the sleeve of the next adjacent beam as explained above with respect to the beams 26 and 38. However, when the vertical column is disposed at a corner of the building and the cross beams are attached to only two

faces thereof as shown in Fig. 5, we have provided locking plates 47a and 48a which are provided with spaced tongue members for engagement with the sockets carried by the spacer blocks and the faces of the flange portions of vertical columns, the locking plates being also provided with registering sleeve portions 49 and 50 for the reception of a locking pin 46. It will thus be seen that the ends of the radiating horizontal beams in addition to having the tongue portions thereof engaged within the sockets on the vertical columns, will all be locked together to form an integral structure by reason of the registering sleeve portions thereof being locked together by the tapered pins 46.

A building constructed according to our invention may be carried to any height desired, the joints between the vertical columns and the horizontal beams being disposed at each floor level as in the case of buildings as now constructed.

From the foregoing description we believe that the details of construction of our invention will be readily understood and we will therefore now proceed to describe the method employed in constructing such a building. It is preferable in carrying out the invention that the columns and horizontal beams be formed at the factory with their respective tongue and socket members so that it will be unnecessary to do any welding, riveting, or cutting at the scene of the building construction. In fabricating the building, the lowermost of the vertical columns are placed in position on the foundation 10 and the next superposed upright member of an adjacent pair are placed in position as shown in Fig. 5, whereupon one of the cross beams is placed in position with the tongue members thereof engaging the respective sockets on the adjacent ends of the superposed pair of uprights. After this first cross beam has been placed in position it will be unnecessary to artificially support the uprights of the second story engaged by the ends thereof. This operation is then continued until all of the upright members for the second story of the building are locked in position as above described whereupon the operation may be repeated for the third story of the building and so on until the steel structure has been carried to the desired height.

It will thus be seen that we have provided a steel building structure which may be quickly and easily assembled at the scene of the building operation without necessitating the employment of any special tools, riveting or welding machinery, thereby greatly reducing the cost of the building operation and practically eliminating the noise which has commonly been associated with the construction of structural steel buildings.

Although a preferred embodiment of the invention has been shown and described, it will be understood that various changes in the details of construction may be made without departing from the spirit of the invention as defined by the appended claims.

We claim:

with, the sleeves on the plate of adjacent beams being disposed in alinement, and a locking pin disposed in said alined sleeves.

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1. In a steel building structure, spaced upright sectional column members, composed of I-beams in end to end relationship, socket members formed on the oppositely directed faces of the flange portions of said I-beams adjacent the meeting ends thereof, cross beams extending between adjacent upright members and having vertical plates formed with the ends thereof, said plates having tongue members engageable with the sockets on the opposed flanges of the I-beams. 75
2. In a steel building structure, spaced upright sectional column members, composed of I-beams in end to end relationship, socket members formed on the oppositely directed faces of the flange portions of said I-beams adjacent the meeting ends thereof, cross beams extending between adjacent upright members having vertical plates formed with the ends thereof, said plates having tongue members engageable with the sockets on the opposed flanges of the I-beams, and filler members within the channels of said I-beams adjacent the meeting ends thereof, said filler members terminating flush with the edges of said flanges and having socket members formed therewith, and cross beams extending between opposed channels of said upright members having vertical plates formed with the ends thereof, said plates having tongues for engagement with the sockets of said filler members. 83
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3. In a steel building structure, spaced upright sectional column members, composed of I-beams in end to end relationship, socket members formed on the oppositely directed faces of the flange portions of said I-beams adjacent the meeting ends thereof, cross beams extending between adjacent upright members and having vertical plates formed with the ends thereof, said plates having tongue members engageable with the sockets on the opposed flanges of the I-beams, filler members within the channels of said I-beams adjacent the meeting ends thereof, said filler members terminating flush with the edges of said flanges and having socket members formed therewith, cross beams extending between opposed channels of said upright members having vertical plates formed with the ends thereof, said plates having tongues for engagement with the sockets of said filler members, the vertical plates on the ends of said horizontal beams having sleeve members formed there- 110
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