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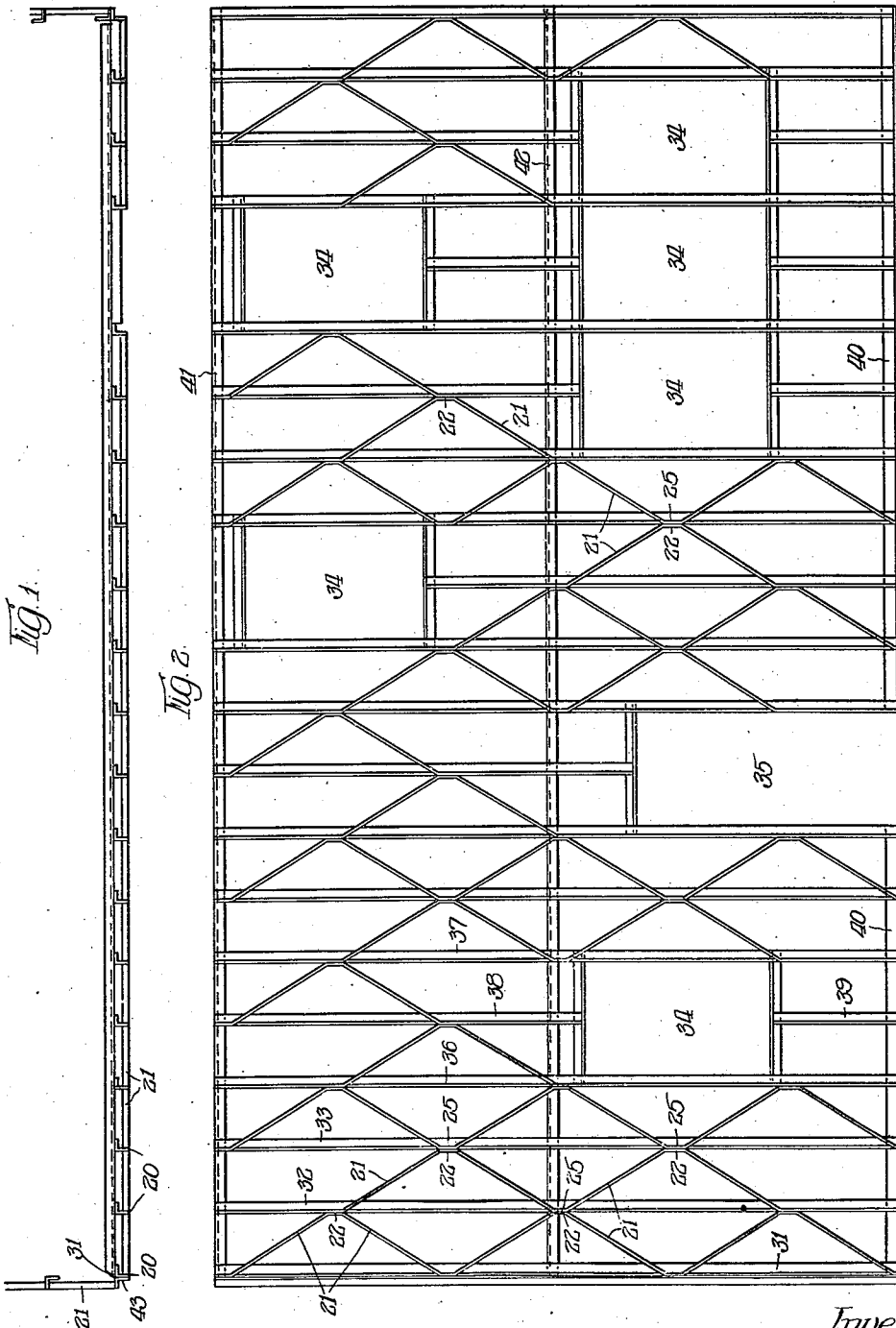
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STEEL FRAME FOR BUILDINGS

Filed Nov. 23, 1927

2 Sheets-Sheet 1



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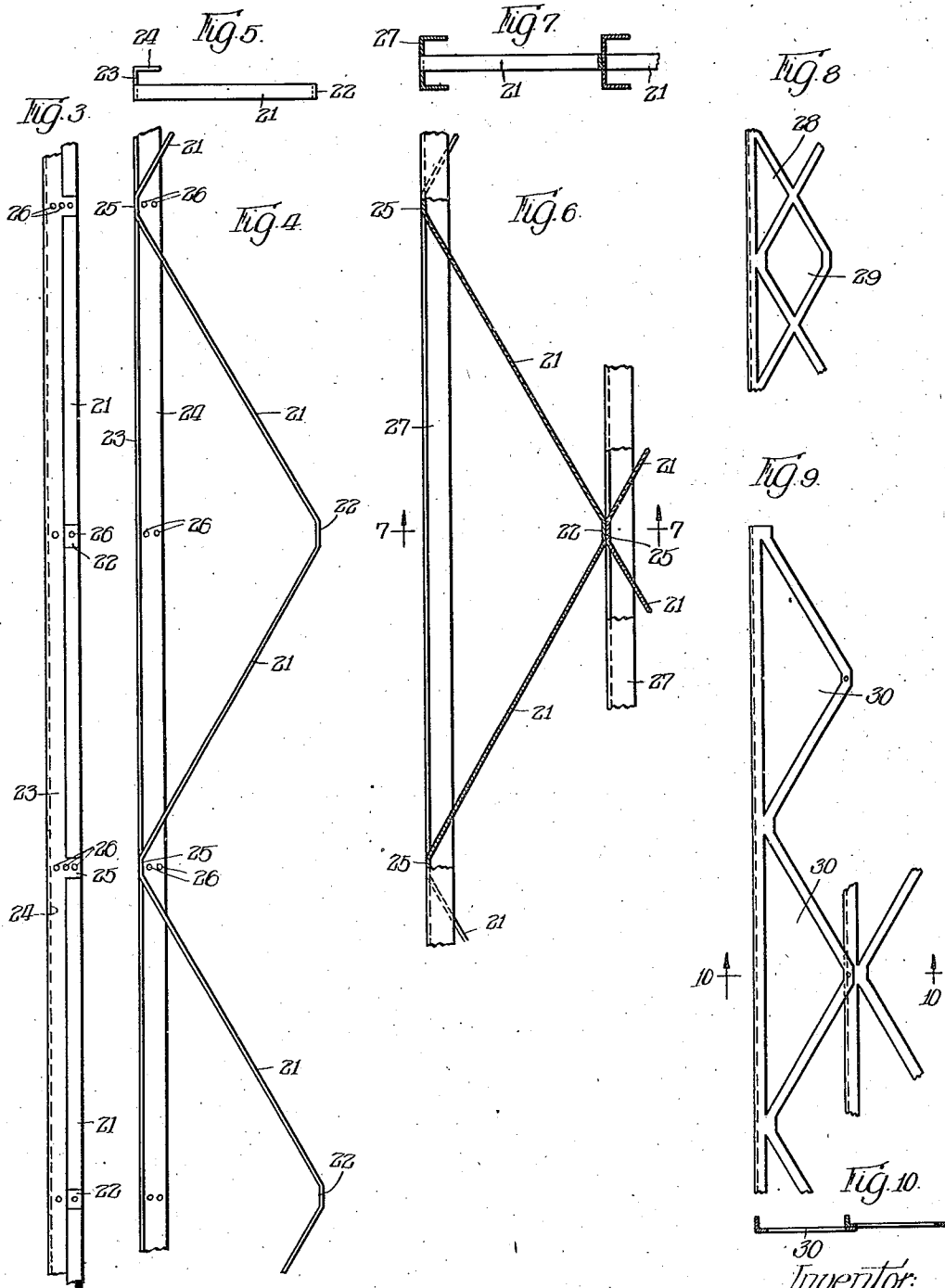
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STEEL FRAME FOR BUILDINGS

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The present invention relates to improvements in steel frames for buildings.

More particularly the present invention relates to steel frames made up of expanded metal members formed from structural steel shapes of usual design.

An object of the present invention is to provide a steel frame for a building or other structure in which expanded metal members are combined in novel fashion to provide relatively great strength.

A further object is to provide a steel frame made up of structural steel members which have had diagonal members swedged therefrom, which diagonal members in adjacent structural steel members are so disposed relative to one another as to provide relatively great strength.

A further object is to provide a structural steel frame for a building or other structure which is cheap to manufacture, sturdy, and well adapted to meet the needs of commerce.

Further objects will appear as the description proceeds.

Referring to the drawings—

Figure 1 is a top plan view of a portion of the steel frame of a building;

Figure 2 is a front elevation of the steel frame shown in Figure 1;

Figures 3, 4 and 5 are views in front elevation, side elevation and top plan of a commercial angle member which has had diagonals swedged therefrom;

Figures 6 and 7 are views in side elevation and top plan, respectively, showing portions of two commercial channels which have been swedged to provide diagonals, said two channels being disposed in novel relationship with one another;

Figure 8 is a view in side elevation of a commercial angle which has been swedged after a different fashion from that shown in Figure 4, but which is adaptable to the present invention;

Figure 9 is a view showing portions of a pair of commercial angles which have been formed to provide diagonals of still different conformation, said two commercial angle members being shown in novel relationship with one another; and

Figure 10 is a sectional view taken along the plane indicated by the arrows 10—10 of Figure 9.

The present invention will be described with particular reference to steel frames for houses, but it will be clear as the description proceeds that the invention is also applicable to frames for other structures. Figure 1 shows in plan view one side wall of a house or the like and portions of two adjoining side walls. Said side walls are made up for the most part of structural steel members, indicated by the numerals 20—20, portions of which have been swedged to form diagonals in a manner which will be referred to presently. Though the structural steel members referred to are indicated generally by the numerals 20—20, certain of said members, for purposes of description, will be referred to presently by other reference numerals. Figure 2 shows in elevation the structure shown in Figure 1 and shows how the diagonals indicated by the numerals 21—21 of each structural steel member 20 are secured to the next adjacent structural steel member 20. The particular structural steel members chosen for illustration in Figures 1 and 2 are commercial angle members, one flange of each of which has been swedged to form lacings. The lacings referred to, reference being had particularly to Figures 3, 4 and 5, comprise the diagonals 21—21 and the relatively flat portions 22—22 symmetrically disposed between said diagonals. The diagonals 21—21 are preferably of equal length and the flat portions 22 are substantially parallel with the unswedged portion of the flange 23. According to the disclosure, the other flange 24 of each angle member is left in its undeformed state. The flat portion of the flange 23 between adjacent diagonals 21 is indicated by the numeral 25. It will be noted from an inspection of Figures 3 and 4 that the flat portions 25—25 are provided with holes 26 adapted to receive rivets or other holding means. Those portions of the flange 24 adjacent to the flat portions 25 are also provided with holes 26—26 adapted to receive rivets or other holding means. It will be observed also that the flat portions 22—22

are provided with holes 26 and that the flange 24 and the undeformed portion of the flange 23 are likewise provided with holes 26 corresponding to the holes in the flat portion 22 between the lacings 21—21.

The structure shown in Figures 6 and 7 corresponds rather closely to the structure shown in Figures 3, 4 and 5, the principal difference being that according to Figures 6 and 7, a channel member is used, the web 27 of which is slit and swedged to provide diagonals 21—21, which lacings are connected by the undeformed flat portions 25 and by the flat portions 22 similarly to the arrangement in Figures 3, 4 and 5.

Figures 8 and 9 represent commercial angles which have been slitted and swedged to expand same. In the structure shown in Figure 8, one of the flanges of a commercial angle has been stretched in its own plane to form the triangles 28 and the diamonds 29. In the structure shown in Figure 9, one of the flanges of a commercial angle member has been slit and stretched in its own plane to form triangles 30.

The expanded structural steel members above described are connected together in a novel manner, which will now be briefly referred to.

Referring to Figure 2, wherein angle members such as are shown in Figures 3, 4 and 5, are used, one angle member, designated by the numeral 31, having three pairs of diagonals 21 swedged therefrom, is connected to a similar commercial angle member 32 having two pairs of diagonals swedged therefrom, the flat portion 22 between the diagonals in each pair in angle member 31 being disposed flatwise against the flat portion 25 or other undeformed portion of the flange 23 of the next adjacent angle member 32. The flat portions 22—22 of the expanded angle member 32 are connected to the flat portions 25—25 of the next adjacent commercial angle member 33. From an inspection of Figure 2 it will be noted that the diagonals of the commercial angle members are arranged in substantially straight lines. The swedged structural steel members may have a width which is a simple fraction of the width of the windows and doors of standard design. From an inspection of Figure 2 it will be noted that windows 34—34 are provided by a double spacing of the commercial angle members referred to. The door 35 is also provided by a double spacing of the commercial angle members referred to. Referring to the left-hand window 34, it will be noted that said window is bounded by the commercial angle members 36 and 37. Above and below said left-hand window 34 are the commercial angle members 38 and 39, respectively. It will be noted that the angle member 36 has only one pair of diagonals 21—21, and that the angle member

38 has only one pair of diagonals, while the angle member 37 has two pairs of diagonals swedged therefrom similarly to the angle member 32. It will be understood, of course, that the angle members will be so disposed that the diagonals which connect said angle members with adjacent angle members will form struts by means of which stresses will be transmitted along substantially straight lines. It will be understood that the bolt or rivet holes 26 will coincide, whereby the structure may be securely riveted together.

The bottom extremities of each of the angle members 31, 32 and 33 and the like may be secured to a bottom angle or to bottom angles 40—40. The upper extremities of the angle members may be secured to the horizontal angle member 41. An angle member 42 may be secured to the upright angle members 31, 32 and 33 and the like, intermediate of the distance between the angle members 40 and 41. Angle members 42—42 in the framework of adjacent walls may form supports for joists.

From an inspection of Figure 1, it will be clear that the present invention provides a convenient means for making the corner connections between walls at right angles to one another. It will be noted that the vertical angle member 31 has its swedged flange in juxtaposition to the unswedged flange of a similar angle member 43, which angle member 43 has its diagonals 21 disposed in position to form part of a wall at right angles to the wall made up of the angles 31, 32, 33 and the like.

Though the walls shown in Figures 1 and 2 are made up of angle members having portions of one flange swedged to form diagonals, it will be clear without detailed explanation that the channels shown in Figures 6 and 7 may be used, if preferred, instead of the angle members shown in Figures 1 and 2, which angles are shown in more detail in Figures 3, 4 and 5. It will also be clear that the swedged angle members shown in Figures 8, 9 and 10 may be used in place of the angle members shown in Figures 1 to 5, inclusive.

The illustrated embodiments of the present invention have been chosen merely for purposes of illustration and should not be considered in a limiting sense. Many modifications will occur to those skilled in the art. It is intended to cover all such modifications that fall within the scope of the appended claims.

What is claimed is—

1. A steel frame comprising a plurality of commercial shapes, which shapes have portions thereof swedged to form diagonals, the diagonals in each of said shapes being united to unswedged portions of an adjacent shape disposed with relation to the diagonals in

the next adjacent shape to form substantially straight line struts.

2. A steel frame comprising a plurality of structural steel members arranged in parallel relationship with each other, each of said structural steel members having two walls in substantially right-angular relationship with each other, one of said walls of each of said structural steel members being swedged to provide diagonals, the diagonals in each of said shapes being united to unswedged portions of an adjacent shape and arranged in substantial alignment with the diagonals of adjacent structural steel members to form struts.

3. A steel frame comprising a plurality of structural steel members having walls disposed in angular relationship with one another, one of the walls of each of said structural steel members having a portion thereof stretched to form diagonals, the stretched portion of each of said stretched walls being secured to an unstretched portion of the corresponding wall of the next adjacent structural steel member.

4. A steel frame comprising a plurality of structural steel members having walls disposed in angular relationship with one another, one of the walls of each of said structural steel members having a portion thereof stretched to form diagonals, the stretched portion of each of said stretched walls being secured to an unstretched portion of the corresponding wall of the next adjacent structural steel member, the other walls of said structural steel members being disposed substantially in one plane.

5. A steel structure comprising a plurality of frames in right-angular relationship with one another, each of said frames comprising structural steel members arranged in parallel relationship with one another, each of said structural steel members having adjacent walls in right-angular relationship with one another, one of said walls having portions thereof stretched to form diagonals, said stretched portion being secured to an unstretched portion of the corresponding wall of the next adjacent structural steel member, said angularly disposed walls at the edges of adjacent frames being secured together to form a corner construction.

6. A frame structure adapted to form the wall of a building comprising a plurality of equi-spaced structural steel members arranged in parallel relationship with one another, transverse structural steel members secured to certain of said first-mentioned structural steel members to provide openings suitable for doors and windows, said openings having a width equal to the spacing between a plurality of said first-mentioned structural steel members, said structural steel members having portions thereof swedged to form diagonals, pairs of said diagonals being

connected by flat portions, said flat portions being united to unswedged portions of an adjacent shape, said openings being free of said diagonals, said diagonals in adjacent structural steel members being positioned to form substantially straight line struts.

7. A steel frame adapted to form the wall of a building comprising a plurality of equi-spaced parallel structural steel members, each of said structural steel members having two walls in substantially right-angular relationship with each other, certain of said structural steel members being interrupted, and transverse structural steel members at the extremities of said interrupted first-mentioned structural steel members providing openings having a width equal to the spacing between a plurality of said first-mentioned structural steel members, one of said walls of each of said structural steel members being swedged to provide diagonals, pairs of diagonals in each of said structural steel members being united to unswedged portions of an adjacent structural steel member, said diagonals being arranged in substantial alignment with the diagonals of adjacent structural steel members to form struts.

8. A steel frame adapted to form the framework of the wall of a building comprising a plurality of structural steel members each having walls disposed in right-angular relationship with one another, and transverse structural steel members connecting certain of said first-mentioned structural steel members, certain of said first-mentioned structural steel members being interrupted at said transverse structural steel members to provide openings equal to the spacing between a plurality of said first-mentioned structural steel members, one of the walls of each of said first-mentioned structural steel members having a portion thereof stretched to form diagonals, pairs of said diagonals being connected by flat portions, said flat portions being secured to unstretched portions of the next adjacent structural steel member whereby to form substantially straight line struts.

9. A steel frame comprising a plurality of commercial shapes each having walls in right-angular relationship with each other, one of said walls of each of said shapes having portions thereof swedged transversely in the direction of another of said walls to form diagonals, the diagonals in each of said shapes being united to unswedged portions of an adjacent shape disposed with relation to the diagonals in the next adjacent shape to form substantially straight line struts.

10. A steel frame comprising a plurality of structural steel members arranged in parallel relationship with each other, each of said structural steel members having two walls in substantially right-angular relationship with each other, one of said walls of each

of said structural steel members being swedged transversely in the direction of another of said walls to provide diagonals, the diagonals in each of said shapes being united to unswedged portions of an adjacent shape and arranged in substantial alignment with the diagonals of adjacent structural steel members to form struts.

11. A steel frame comprising a plurality of structural steel members having walls disposed in angular relationship with one another, one of the walls of each of said structural steel members having a portion thereof stretched transversely in the direction of another of said walls to form diagonals, the stretched portion of each of said stretched walls being secured to an unstretched portion of the corresponding wall of the next adjacent structural steel member.

12. A steel frame comprising a plurality of structural steel members having walls disposed in angular relationship with one another, one of the walls of each of said structural steel members having a portion thereof stretched transversely in the direction of another of said walls to form diagonals, the stretched portion of each of said stretched walls being secured to an unstretched portion of the corresponding wall of the next adjacent structural steel member, the other walls of said structural steel members being disposed substantially in one plane.

13. A steel structure comprising a plurality of frames in right-angular relationship with one another, each of said frames comprising structural steel members arranged in parallel relationship with one another, each of said structural steel members having adjacent walls in right-angular relationship with one another, one of said walls having portions thereof stretched transversely in the direction of another of said walls to form diagonals, said stretched portion being secured to an unstretched portion of the corresponding wall of the next adjacent structural steel member, said angularly disposed walls at the edges of adjacent frames being secured together to form a corner construction.

14. A steel frame adapted to form the wall of a building comprising a plurality of equispaced parallel structural steel members, each of said structural steel members having two walls in substantially right-angular relationship with each other, certain of said structural steel members being interrupted, and transverse structural steel members at the extremities of said interrupted first-mentioned structural steel members providing openings having a width equal to the spacing between a plurality of said first-mentioned structural steel members, one of said walls of each of said structural steel members being swedged transversely in the direction of another of said walls to provide diag-

onals, pairs of diagonals in each of said structural steel members being united to unswedged portions of an adjacent structural steel member, said diagonals being arranged in substantial alignment with the diagonals of adjacent structural steel members to form struts.

15. A steel frame adapted to form the framework of the wall of a building comprising a plurality of structural steel members each having walls disposed in right-angular relationship with one another, and transverse structural steel members connecting certain of said first-mentioned structural steel members, certain of said first-mentioned structural steel members being interrupted at said transverse structural steel members to provide openings equal to the spacing between a plurality of said first-mentioned structural steel members, one of the walls of each of said first-mentioned structural steel members having a portion thereof stretched transversely in the direction of another of said walls to form diagonals, pairs of said diagonals being connected by flat portions, said flat portions being secured to unstretched portions of the next adjacent structural steel member whereby to form substantially straight line struts.

Signed at Gary, Indiana, this 11th day of November, 1927.

WALTER A. BATES.