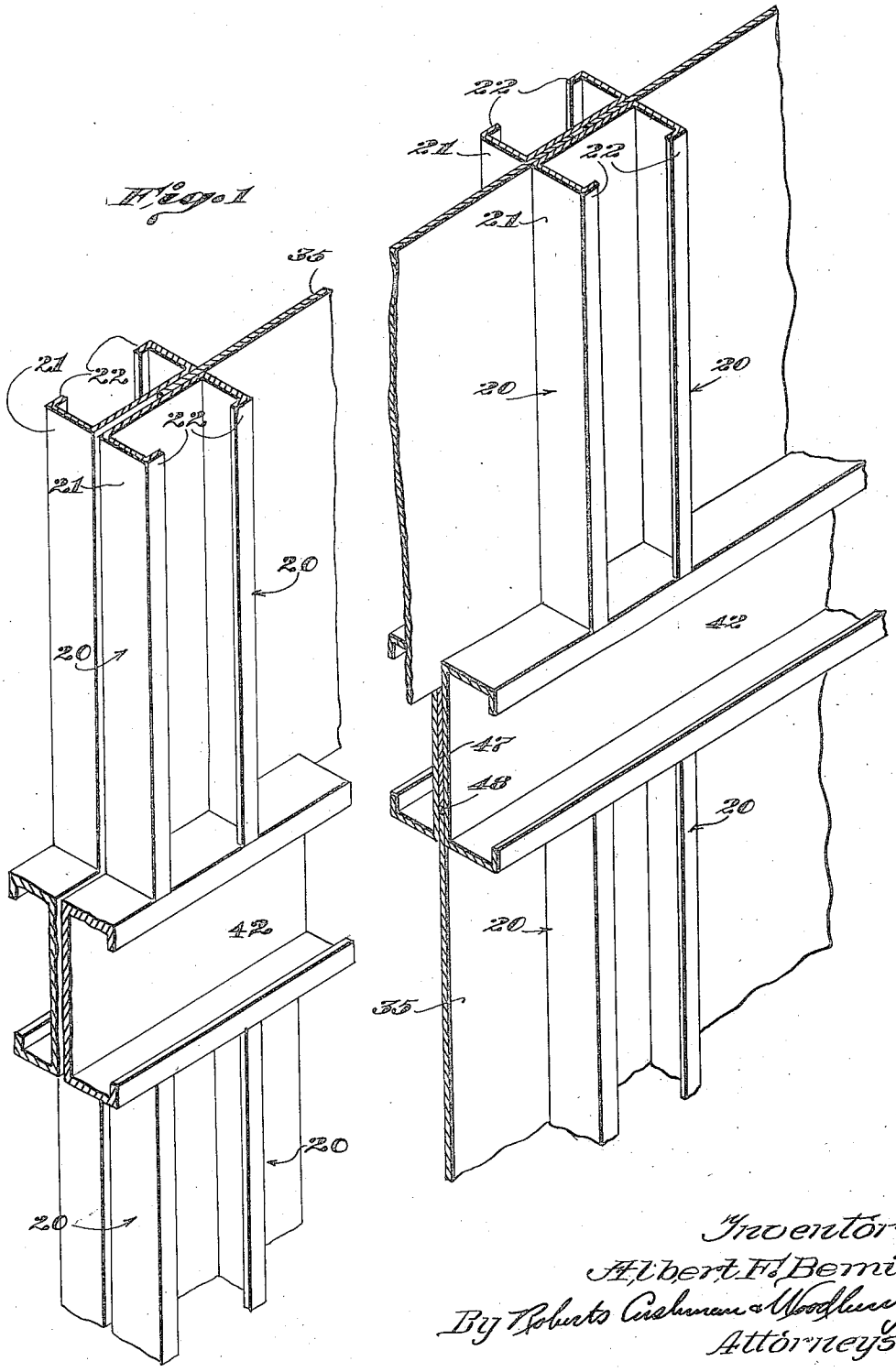
July 1, 1930. A. F. BEMIS 1,769,733

BUILDING

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Fig. 1



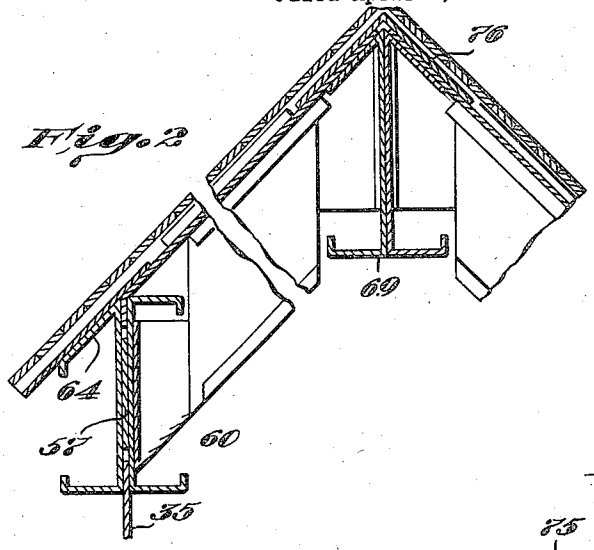
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BUILDING

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Fig. 2



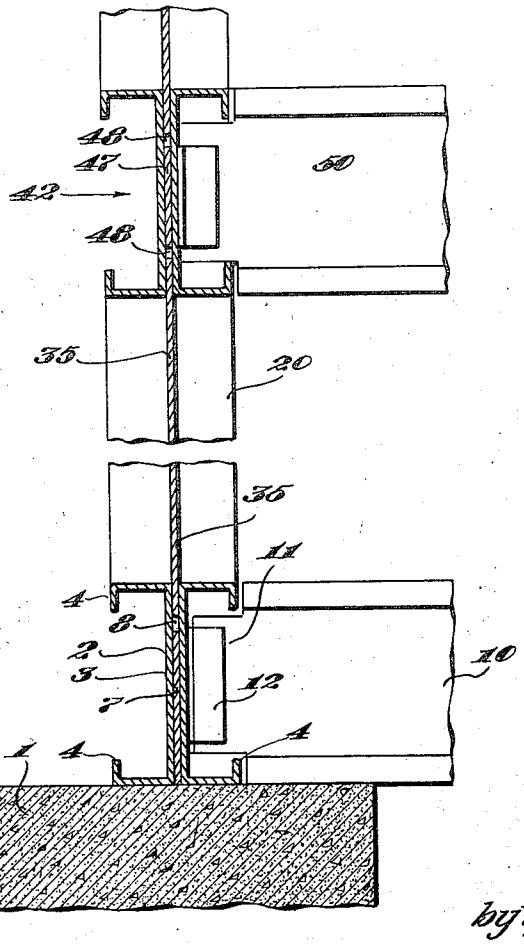


Fig. 3

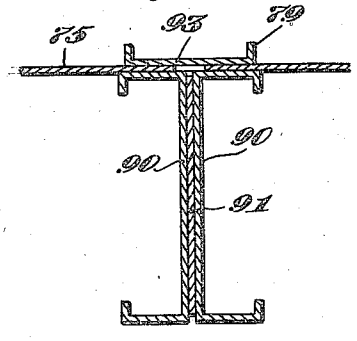
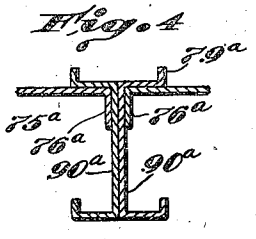


Fig. 4



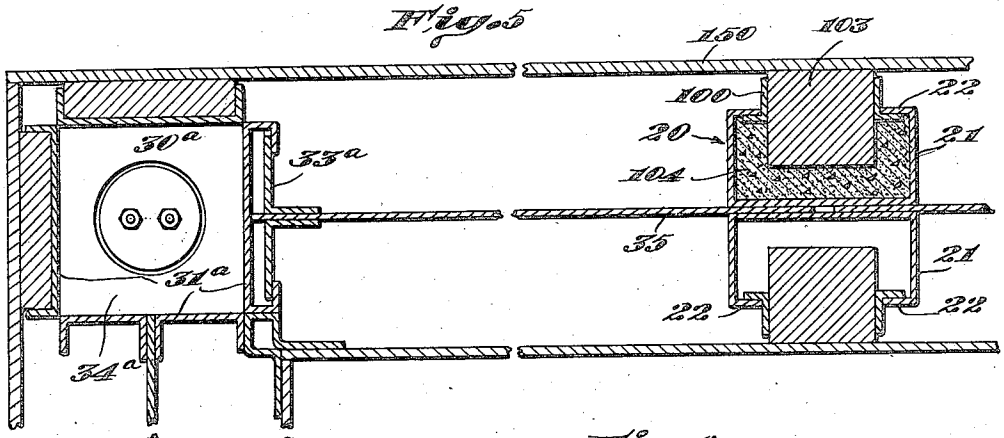
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BUILDING

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Fig. 5



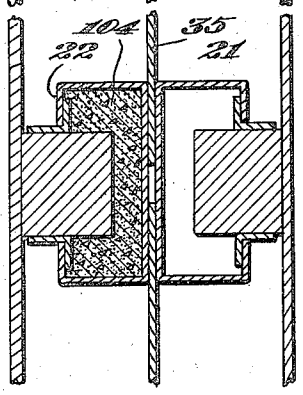


Fig. 6

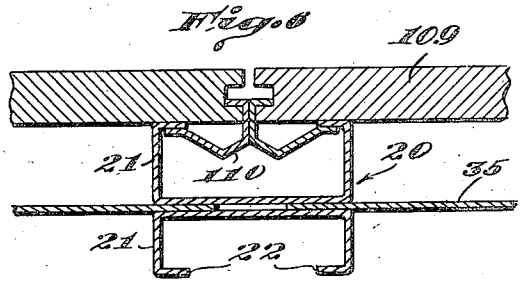


Fig. 7

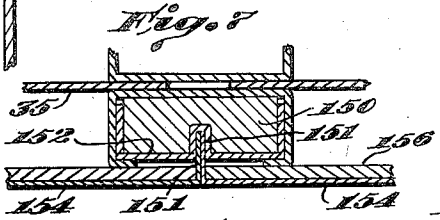
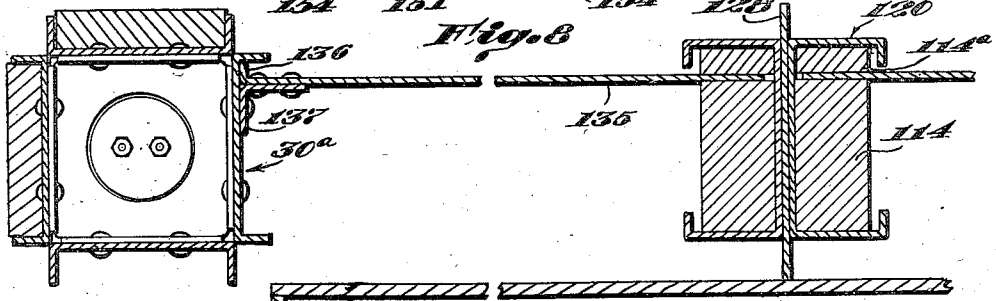


Fig. 8



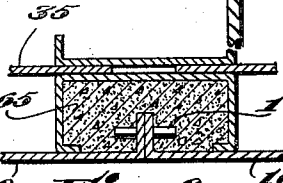


Fig. 9

Fig. 10

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Patented July 1, 1930

1,769,733

UNITED STATES PATENT OFFICE

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BUILDING

Application filed April 3, 1928. Serial No. 266,956.

This invention relates to a building construction and more particularly to a construction of this character adapted to be readily assembled in situ out of standardized structural units which may be manufactured in quantities.

A building constructed in accordance with the present invention may be provided with frame members of a standardized type preferably formed of metal and adapted to be welded, riveted, bolted or otherwise secured to adjoining structural parts. The frame members may be built up of separate structural elements, which themselves may be of a standardized type and which accordingly may be manufactured by methods and with machinery which permit their production at a low cost. These standardized frame members are particularly designed and arranged to cooperate with and to interfit with web members which preferably may be of sheet form and which extend between the frame members, forming therewith a substantially continuous protective web or seal of metal or other suitable material. Thus it may be preferable to utilize fireproof material, such as asbestos board or suitable insulating sheets rather than the metal web sheets. The preferred form of structural frame members are adapted to receive the web sheets between the face portions of the wall, thus permitting an unusually effective protection against fire, since the walls may be subjected to severe heat before the intermediate webs will fail. Furthermore, this arrangement cooperates with the wall finishing material in affording spaces between adjoining frame elements, these spaces being adapted to provide heat insulation or to receive structural material such as concrete, or forming heating or ventilating flues for the building if desired. Furthermore, a web of this type, which may be secured to frame members upon both of its vertical edges as well as its bottom and top edge, provides an unusually stiff and rigid reinforcement for the frame members, while bracing them in relation to each other.

The upper and lower horizontal frame members with an intermediate web therebetween, the latter being braced by vertical reinforcing members or studs, form a wall section quite analogous to the ordinary plate girder. The structural strength of this wall section is high due to this advantageous distribution of material and to the depth of the web, which ordinarily approaches a story in height. The frame members themselves may be arranged to receive both interior and exterior wall finishing material in many different ways and of many different characteristics, the structural frame elements preferably being shaped and disposed in order to permit the ready application of the wall finish in practically any preferred manner.

The above and further objects and advantageous features of the invention will be apparent to those skilled in the art upon a reading of the subjoined description and claims in conjunction with the accompanying drawings, in which:

Fig. 1 is a broken perspective view of a portion of a wall assembly constructed in accordance with the present invention;

Fig. 2 is a broken vertical section through a portion of a building construction in accordance with the present invention;

Fig. 3 is an enlarged section of a rafter construction;

Fig. 4 is a corresponding view of an optional form of construction;

Fig. 5 is a horizontal section of a corner assembly showing adjoining portions of the wall similar in section;

Fig. 6 is a sectional detail of a wall showing one mode of securing finishing material thereto;

Fig. 7 is a sectional detail showing one means for securing wall finish in place;

Fig. 8 is a view similar to Fig. 5 but illustrating an optional embodiment of the invention;

Fig. 9 is a view similar to Fig. 7 but showing an optional construction; and

Fig. 10 is a perspective detail of a portion of the assembly shown in Fig. 9.

A building of the type disclosed herein may be erected upon any suitable foundation or base 1. To this end, lower girt mem-

bers or sills 2 are located upon the foundation. These members are more particularly shown in Fig. 2 and are formed of similar channel portions 3, the opposite legs of each channel having inturned flanges 4 disposed in alignment with each other in a plane substantially paralleling the bight portion of the channel. Preferably these channel members 3 are arranged back to back, with the faces of their bight portions in juxtaposed parallelism and with a spacer plate 7 located therebetween. In the case of the sill or lower girt members 2 the spacer plate 7 preferably terminates below the top of the member to provide a recess 8 having a thickness corresponding to the thickness of the plate 7.

The joists or cross beams for the lower floor are designated by the numeral 10 and may rest upon the base 1 and/or the lower portion of the sill, preferably having tongue-like portions 11 which are engaged within the inner channel of the latter. Suitable angular brackets 12 may be riveted or welded to the seal properly to retain joists 10 in place.

Disposed at suitable intervals, preferably at predetermined distances, are a plurality of stud elements 20 having their lower ends resting on, and, if desired, secured to the upper portion of member 2, while at the corners and at the junctures or intersections of vertical walls, I preferably provide main structural columns or posts 30^a.

Figs. 5 and 8 show post 30^a, made up of channels 31^a, which have their legs extending in the same direction as the adjoining walls and which are provided with connecting elements 34^a at their tops and bottoms. Preferably the girt or sill members 2 extend between the posts 30 or 30^a although, if desired, the posts may be secured above the sills or girts 2. Web sheets 35 preferably are arranged with their lower edges engaged in the recessed portions 8 of members 2, while the stud members 20 comprise similar channel members 21, one of which is disposed at each side of the intermediate seal. Each of the channels 21 preferably is provided with inturned flanges 32 at the outer ends of its legs, these flanges being preferably in parallelism with the bight portion of the channel.

Preferably the web sheets 35 have their vertical edges located between the inner and outer channel members 21 of each stud unit as shown in Fig. 5 so that each stud comprises a structural element at each side of the intermediate web 35 and the joint between the web sheets is sealed by the channel members which have their bight portions brought into engagement with opposite face portions of the margins of the web sheets. These parts, i. e. channels 21 and the edges of the web sheets are secured to each other by any suitable means such as rivets, bolts, or welding. If rivets are used, preferably suitable holes are provided in the sheets and in the channels at modular distances so that they are readily brought into registration upon assembly of the parts.

The posts may similarly provide a tight metal seal or joint with the edge of the adjoining intermediate sheet. For this purpose, for example, I may engage angle members 33^a with opposite faces of this margin of the web sheet, each of these angles being arranged so that one flange thereof is engaged behind a flange 32 of the post 30^a. In order to lock these parts in position I may pour a concrete or any suitable filler into the space thus defined within the channel that receives the end of the web sheet.

At the level of the second floor are located suitable girt members 42 which closely resemble the sill or lower girt members 2 with the exception that the intermediate spacer plate 47 is so dimensioned that it leaves two recesses 48 at the upper and lower parts of the girt, the upper part of webbing 35 for the lower floor obviously being engaged in the lower recess 48, as shown. The joists 50 for the second floor may be secured to girts 42 in a manner similar to that described with reference to the securing of the first floor joinsts to members 2. Succeeding stories may be formed above the girt 42 in the same manner as the first story wall was formed above the girt 2.

If it is desired to provide a pitched roof for this building, the upper girt preferably is formed of inner and outer channel members 60 and may be provided with an intermediate spacer plate 67 to form a recess to receive the upper edge of the adjoining web 35. The upper leg of the outer channel of the girt member 60 is given a downward inclination, as shown in Fig. 2 and as designated by numeral 64. The roof sheets or webbing 75 engage within the upper recess in the upper girt member, as shown, and extend upwardly to the ridge where they may engage the upper surface of a ridge member 69. This member may be formed of channel sections arranged back to back but without any spacer plate therebetween; the upper legs of these channels are given a downward inclination which corresponds to the angle of the roof, these legs thus being in alignment with the legs 64 of girt members 60. A suitable angular capping strip 76 is located above the upper ends of the web sheets 75.

The rafters may be formed in various manners, for example, as shown in Fig. 3, these parts may be built up of channels 90 arranged back to back with or without a suitable spacer member 91 disposed there-

between. A suitable covering strip 93 may be disposed above the sheets 75 and may protect joints between the same after the member disclosed above with reference to the stud assembly. A roof of this character is adapted to be finished in many more or less conventional ways. For example, nailing strips may be disposed in channels 93, a stucco roof might be applied above the plates 75 or asphalt with limestone chips might be applied thereto; thus, the continuous metal seal provided by this invention permits the application of any suitable roofing material.

Fig. 4 illustrates an optional form of rafter joint wherein roof plates 75[a] having down-turned flanges 76[a] are secured to the bight portions of the rafter channels 90[a], these channels being arranged back to back in the manner described above. The upper legs of these channels are provided with upturned or out-turned flanges 79[a] which correspond to the flanges 79 illustrated in Fig. 3 and which may be utilized for similar purposes.

Fig. 5 shows one means of providing for the application of wall finish material to a building constructed in accordance with the present invention. For this purpose angle members 100 are secured to the flanges 22 of the stud assembly 20, the flanges holding therebetween a wood nailing piece 103 to which finishing material 150, such as sheathing, slabs or the like, may be secured. If desired, concrete 104 may be poured within the stud channel after the nailing member is located therein. Fig. 6 shows another method of securing wall finish to a wall of the character disclosed above. For this purpose suitable wall boards or slabs are provided with clips 110 adapted to engage behind the flanges 22 of one of the channels 21 of stud 20.

Fig. 8 illustrates an optional form of invention provided with corner posts 30[a] of the character previously described but having the web sheets 135 located near to one face of the wall. For this purpose the web sheet may be secured to the post 30 by means of a bent-up flange 136 and, if desired, an angle member 137 engaging appropriate parts of the post. In accordance with this form of invention the studs may be similarly formed of channels 120 located back to back and having a suitable spacing plate 127 located therebetween. Preferably this plate projects beyond the channels to provide outstanding flanges 128 upon the stud, these flanges affording suitable means for the application of any desired wall finishing material. The edges of the web sheets 135 are then received within the channels as shown in Fig. 7, suitable retaining blocks 114—114[a] being utilized for this purpose if desired, although obviously the edges of the channel may be bent up and welded or otherwise secured in engagement with the channels.

Fig. 7 illustrates another means for securing wall finish to the studs. For this purpose a suitable filler block 150 with a vertical recess 151 is located within the channel. Blocks 150 may carry a metal finishing sheet 152, if desired. The wall finishing sheets 154 have similar inturned flanges which are fit securely within the recess 151, as shown. If desired sheets 156 of non-resonant insulating material may be located between the sheets and the faces of the studs.

In the construction shown in Figs. 9 and 10 the finishing plates 160 have inturned flanges 161 with registering openings 162 through which pins 164 may extend. These sheets are temporarily held in place while concrete 165 is poured within the adjoining channel to engage pins 164 and to hold the sheets firmly in place.

Obviously a building of the type described above and disclosed herewith may be formed of standardized frame members which themselves are preferably formed of two or more simple structural parts. This construction may be characterized by a continuous sealing web which may be made substantially integral with the metal frame, thus affording unusually effective protection against the penetration of moisture as well as permitting excellent fireproof qualities. While the web sheets preferably are formed of sheet metal, obviously other material may be substituted therefor to suit individual purposes. Among such materials I particularly contemplate fiber board, asbestos sheet or board, wire mesh sheets or the like. Obviously, the central web may define inner and outer spaces between the studs which are suitable for heat insulation for the reception of concrete or other filler or structural material or which are particularly well adapted to form ducts for ventilation, heating, cooling or the like. While I have shown and described a preferred mode of assembling the parts, it is obvious that this may be varied in many ways without departing from the novelty inherent in the present invention.

I claim:

1. A building wall comprising parallel structural frame members, three parallel layers of material spaced from each other and bridging the spaces between the frame members, thereby providing two spaces for insulation or the like between each pair of adjoining, parallel members, the intermediate layer being formed of metal, the frame members also being formed of metal and having an interfitting engagement with the sheet to compose therewith a substantially continuous metallic seal.

2. A building wall comprising structural

frame members, three layers of material spaced from each other and bridging the spaces between the frame members, thereby providing two spaces between opposite face layers of material, the intermediate layer being disposed in spaced parallelism to the outer layers, the frame members comprising similar structural elements at each side of the central layer, said frame members having an interfitting engagement with the central layer to compose therewith a substantially continuous protective seal.

3. In a building construction, a wall having the characteristics of a plate girder, said wall having upper and lower horizontally disposed, metal girt members and an intermediate web of substantially a story in height between the girts, said girts comprising substantially similar structural elements, one of said elements of each girt being located upon each side of the web and having flanges extending outwardly at right angles to the web, and means securing the web to the frame members.

4. In a building construction, a wall having the characteristics of a plate girder, said wall having upper and lower horizontally disposed, metal frame members and an intermediate web of substantially a story in height between the frame members, said frame members being substantially symmetrically disposed in relation to the plane of the web, means securing the web to the frame members, and vertical studs each comprising a pair of structural elements, one of which is secured against each face of the web.

5. In a building construction, a wall having the characteristics of a plate girder, said wall having upper and lower horizontally disposed, metal frame members and an intermediate web of substantially a story in height between the frame members, said frame members comprising substantially similar structural elements, one of said elements of each frame member being located upon each side of the web and having flanges extending outwardly at right angles to the web, means securing the web to the frame members, and vertical studs each comprising a pair of structural elements, one of which is secured against each face of the web.

6. A building wall comprising a plurality of studs, each stud comprising a pair of structural elements, each of said elements having a face in juxtaposed parallelism to a face upon the other element, and a central web of protective material held in place by the studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the studs, and having their horizontal edges received in recesses in adjoining frame members.

7. A building wall comprising a plurality of studs, each stud comprising a pair of structural elements, each of said structural elements having a face in juxtaposed parallelism to a face upon the other element, and a central web of protective material held in place by the studs, said web being formed of plates having their vertical edges secured between the juxtaposed parrallel faces of the elements, and a horizontal frame member extending along one end of the studs, said frame member being recessed to engage an upper edge of the web.

8. A building wall comprising a plurality of studs, each stud comprising a pair of structural elements, each of said structural elements having a face in juxtaposed parallelism to a face upon the other element, and a central web of protective material held in place by the studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the studs, and a horizontal frame member extending along one end of the studs, said frame member being formed in two sections with juxtaposed parallel faces which provides a recess, the horizontal edges of said sheets engaging said recess.

9. A building wall comprising a plurality of studs, said studs each comprising two parts, each of said parts having a face in juxtaposed parallelism to a face upon the other part, and a central web of protective material held in place by the studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the studs, and main frame posts at wall junctures paralleling the studs, said posts having recesses to engage edges of the web sheets.

10. A building wall comprising a plurality of studs, each stud comprising a pair of structural elements, each of said elements having a face in juxtaposed parallelism to a face upon the other element, and a central web of protective material extending between said studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the studs, and having their horizontal edges received in recesses in adjoining frame members, said structural elements having flanges angularly disposed with respect to said parallel faces for stiffening said central web.

11. A building wall comprising a plurality of studs, each stud comprising a pair of structural elements, each of said structural elements having a face in juxtaposed parallelism to a face upon the other element, and a central web of protective material extending between said studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the elements, said structural elements having flanges angularly disposed with respect to said parallel faces for stiffening said central web, and a horizontal frame

member extending along one end of the studs, said frame member being recessed to engage an upper edge of the web.

12. A building wall comprising a plurality of studs, each stud comprising a pair of structural elements, each of said structural elements having a face in juxtaposed parallelism to a face upon the other element, and a central web of protective material extending between said studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the studs, said structural elements having flanges angularly disposed with respect to said parallel faces for stiffening said central web, and a horizontal frame member extending along one end of the studs, said frame member being formed in two sections with juxtaposed parallel faces which provide a recess, the horizontal edges of said sheets engaging said recess.

13. A building wall comprising a plurality of studs, said studs each comprising two parts, each of said parts having a face in juxtaposed parallelism to a face upon the other part, and a central web of protective material extending between said studs, said web being formed of plates having their vertical edges secured between the juxtaposed parallel faces of the studs, the parts comprising said studs having flanges angularly disposed with respect to said parallel faces for stiffening said central web, and main frame posts at wall junctures paralleling the studs, said posts having recesses to engage edges of the web sheets.

14. In a building construction, a wall having the characteristics of a plate girder, said wall having upper and lower horizontally disposed metal frame members and an intermediate web of substantially a story in height between the frame members, the latter affording outstanding flanges at each side of the plane of the web, and vertical frame elements at each side of the web, said elements having juxtaposed parallel faces engaging opposite faces of the web and affording flanges substantially perpendicular to the plane of the web.

Signed by me at Boston, Massachusetts, this 17th day of February, 1928.

ALBERT F. BEMIS.