April 23, 1935. C. A. ROBINSON ET AL 1,998,688

SYSTEM OF WALL CONSTRUCTION

Filed Oct. 5, 1933 2 Sheets-Sheet 1

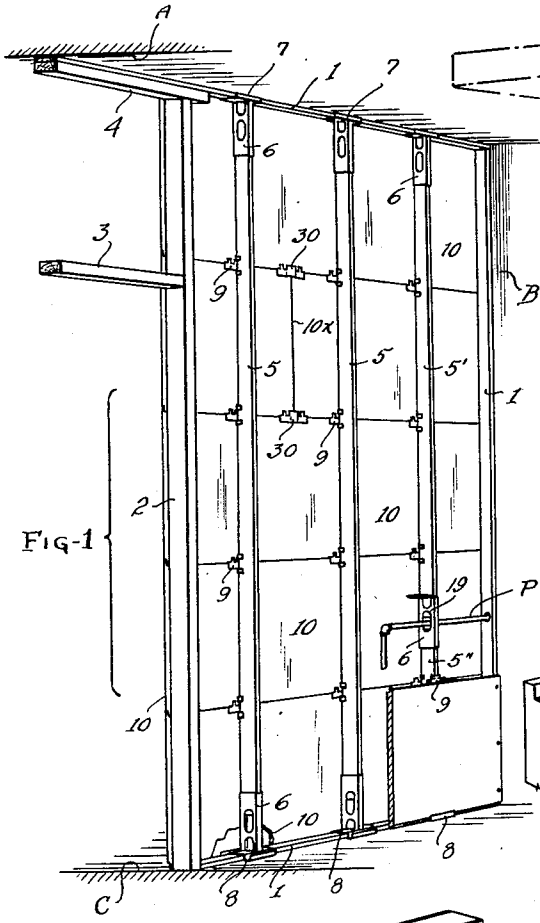

Fig-1

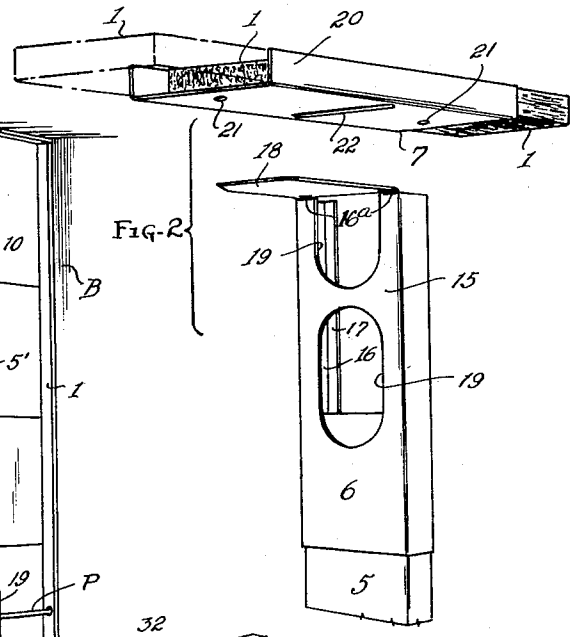

Fig-2

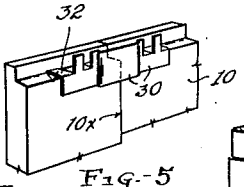

Fig-5

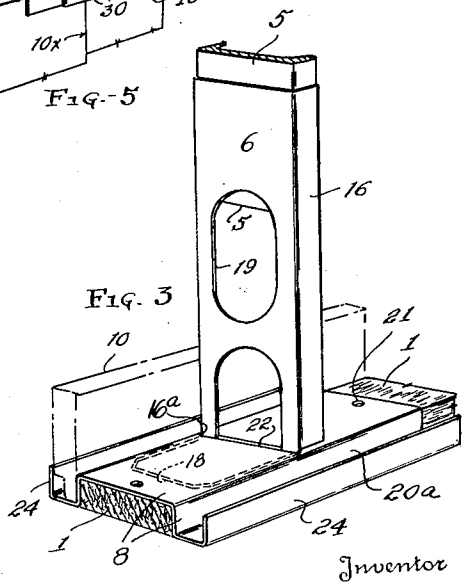

Fig. 3

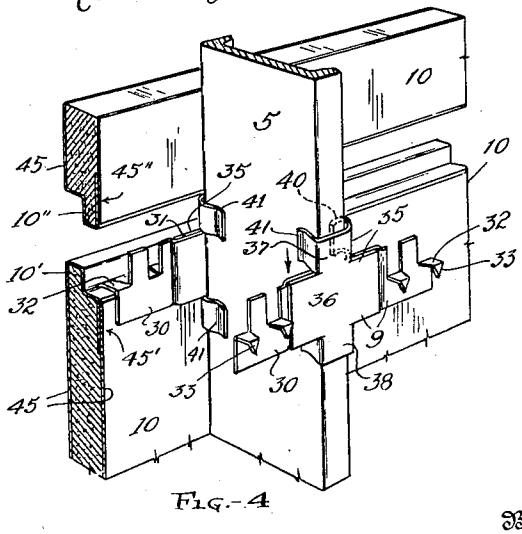

Fig-4

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SYSTEM OF WALL CONSTRUCTION

Filed Oct. 5, 1933 2 Sheets-Sheet 2

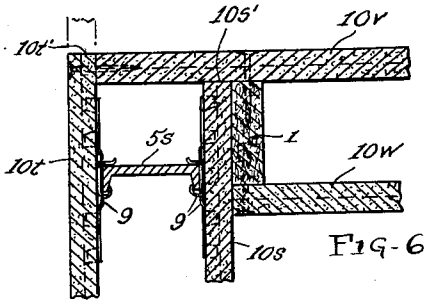

Fig.-6

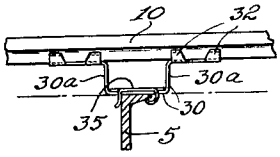

Fig.-5a

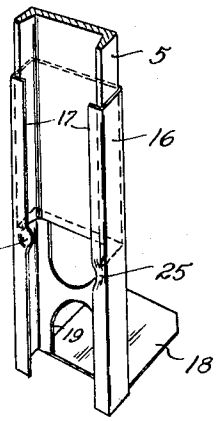

Fig.-7

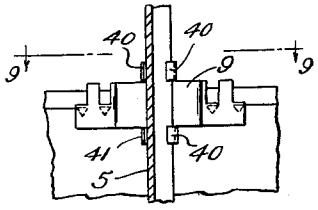

Fig.-8

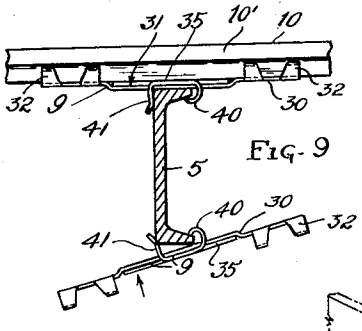

Fig.-9

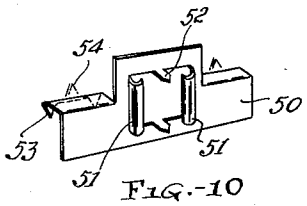

Fig.-10

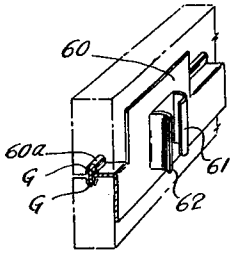

Fig.-11

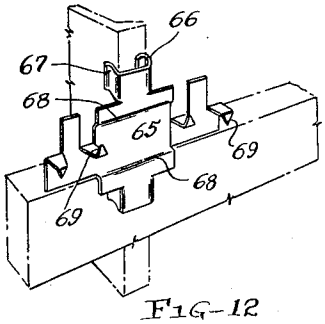

Fig.-12

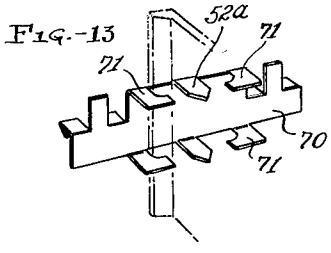

Fig.-13

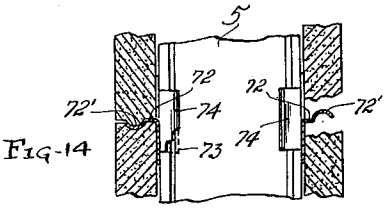

Fig.-14

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UNITED STATES PATENT OFFICE

1,998,688

SYSTEM OF WALL CONSTRUCTION

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Application October 5, 1933, Serial No. 692,278

23 Claims. (Cl. 72—46)

The general object of this invention is to provide a system of wall construction by which walls having the essential desirable operative characteristics of well constructed plastered masonry walls, including the usual jointless finish when desired, may be erected and re-erected a number of times without substantial loss of the materials or impairment of the parts composing the wall.

A further object is to provide a wall comprising a steel framework and sheets or slabs covering the framework, wherein there is no steel exposed on the outer faces of the sheets or slabs.

A further object is to materially reduce the time involved in erecting partitions and other non-bearing walls in buildings, whereby alteration of spaces therein will not occasion such long periods of disuse of the spaces altered as commonly experienced.

Another object is to provide a non-bearing wall having the essential desirable characteristics of masonry walls of this class but which may be dismantled without damaging the building surfaces from which the wall is removed, (floors, ceilings, outside walls and columns e. g.) and which may be economically reerected largely, if not wholly, from the same parts either in the same or in a different arrangement thereof.

Another object is to provide a non-combustible wall having heat and sound insulation characteristics comparing favorably with double plastered conventional walls of equivalent thickness and capable of being re-erected several times without substantial loss of material and economically from the standpoint of time involved.

A further object is to provide a novel method of wall construction obtaining essentially the operative results of a heavily plastered masonry or plastered steel frame wall without requiring a "plastering" operation and attendant long drying period.

A further object is to provide a wall including steel frame parts and having a heavy plaster sheathing for carrying the desired decorative or other coating or finish, wherein the steel parts are not subjected to the corrosive effects of moisture during erection of the wall, as in the case of having to apply wet plaster, as on lath or the like, to obtain such heavy plaster sheathing.

Other objects include the provision of a double wall either side of which is complete in itself and can be so used; either side of which can be easily and quickly taken down for the installation of pipes, vents, etc. and re-erected using the same parts; and which in re-erection may in a simple manner be extended outwardly from the wall framework to accommodate pipes, vents, etc. placed in the wall.

Still further objects include the provision of: various improvements in frame structures for partition and other walls, which structures may be quickly, sturdily and accurately erected by the same class of skilled workmen employed to finish the wall; improvements in structural framework with the view to accommodating, plumbing, electric service wires, conduits, etc. within the wall structure; improvements in securing devices, extensions and couplings for rolled steel studs or frame members, and improvements in anchoring devices for securing plaster e. g. slabs, sheets, etc., to structural framework for partitions and other walls.

Other objects and novel features of the invention will become apparent from the following description wherein reference is made to the drawings:

In the drawings:

Fig. 1 is a perspective view showing one embodiment of the invention in the course of construction, the particular embodiment being a partition; Figs. 2 to 5 are perspective views, each on a larger scale, of various details of the structure shown in Fig. 1; Fig. 5*a* is a sectional detail view taken on a horizontal plane cutting a stud and showing an extension anchor for holding slabs in spaced relation to the studding; Fig. 6 is a sectional view taken on a horizontal plane showing a corner detail; Fig. 7 is a perspective view showing the manner in which the preferred stud extensions and/or couplings are locked in position on the studding; Fig. 8 is a vertical sectional elevation taken through a stud in the plane of the wall centrally thereof showing a fragmentary section of wall slab and the preferred form of slab anchoring device; Fig. 9 is a vertical sectional plan taken on a plane horizontally cutting the stud and showing at one side the manner of securing the slab attaching device thereto; Figs. 10 to 13 are perspective views of modified forms of slab anchoring devices, also certain contemplated modifications of slab detail; Fig. 14 is a vertical section through a wall using a slab having a still different edge detail, the anchoring device being modified in accordance therewith.

Referring again to Fig. 1, the surfaces of the ceiling, a vertical wall and a floor bounding a space to be partitioned are indicated at A, B, and C, respectively. The near wall and portions of the ceiling and floor are broken away for clearness of illustration.

The location for the partition having been

marked off on the surfaces A, B, and C the plane of the wall is then fixed by applying guide strips 1 to said surfaces, preferably continuously about the space except where the surfaces are to remain clear, as at doorways. The guide strip may comprise thick fibreboard, wood, etc. and may be cemented in place or nailed or both; in any event it should be securely fastened.

Door and window bucks may be erected following conventional practice; part of a wooden door buck 2 with transom rail 3 and lintel 4, being shown by way of example.

The metal parts of the partition frame comprise flanged studs 5, one being shown in two parts or sections 5' and 5'',—stud extensions or sleeves 6 (identical at top and bottom), ceiling plates 7 embracing the ceiling guide strip and to which the upper stud extensions are secured,—floor plates 8 embracing the guide strip on the floor and supporting the studs through the medium of the lower stud extensions engaged thereby,—and devices 9 adapted to interlock with the studs and arranged to anchor the wall slabs 10 (to be hereinafter described) to the studs.

The preferred form of stud is a channel,—standard furring channels being suitable—these having the required stiffness for non-bearing walls. A channel measuring about 2½'' across the back is recommended for partition work, say in office buildings and the like of average height. For load bearing walls heavier channels are used. The term "stud" for the main frame member 5 is used principally for convenience in view of the fact that the principles of the present invention may be applied to ceilings e. g. and since in some cases the frame members corresponding to the studs herein shown would run horizontally. In some cases Z bars and angle bars may be used in place of channel bars. I-beam sections may also be used.

In order that cutting of studs to fit, during or preparatory to erecting a wall, will not be required, and for other reasons that will appear hereinafter, the studs are furnished shorter than necessary to reach both the ceiling and floor guide strips, and the studs are provided with the extension sleeves 6 at both ends. These comprise web portions 15 and side and inturned flanges 16 and 17 respectively, the flanges being adapted to snugly receive the stud ends so as to be retained securely in place during setting of the studs. At one end of each sleeve 6 is a tongue 18 projecting from the web substantially at a right angle, and the web is provided with a series of openings 19, beginning adjacent the tongue.

It is important in order to better resist strains on the wall normal to the plane thereof to increase the effective horizontal dimensions of the studs in the plane of the wall at both ends where the studs operatively engage the guide strips. This increase is afforded by the plates 7 and 8 as will be apparent from inspection of the drawings.

The ceiling plates 7 are channels, the webs of which lie flat against the face of the guide strip with the flanges 20 snugly embracing the edges of the strip and of sufficient length to form a wide bearing on the strip both horizontally and vertically. The plates 7 (also the floor plates 8) have holes punched therein at 21 in case it is desired to nail or otherwise more securely attach the plates to the guide strips. Extending transversely of the web of each plate 7 (likewise on plates 8) is a slot 22 adapted to receive the tongue 18 of an extension 6. The tongues 18 are of sufficient width to substantially fit the channel effects of the plates 7 and 8 to prevent rotation of the stud on a vertical axis.

The floor plates 8 form saddles for the studs and are constructed similarly to the plates 7 but have, in addition, stirrup portions 24, formed as extensions of the flanges 20a of the floor plates, adapted to receive the lower edges of the slabs 10 (see Fig. 3).

It will be noted from Figs. 1, 2 and 3 that the openings 19 in the extension sleeves provide access from one side of each stud to the other in the central plane of the wall, thus accommodating conduits etc. both at the base and top of the wall. Attention is also called to the fact that the upper- and lower-most openings 19 terminate as archways at the tongues 18 so as to facilitate placing say flexible conduits or wires in a partially or wholly erected wall past several studs. Since the lower opening 19, as shown in Fig. 3, terminates in this manner flush with the top-side of the floor plate 8 and since this top surface is substantially planar it is an easy matter to insert such conduits or wires through the openings in the extensions from one stud to another past several studs, the "fishing" end of the conduit or the "fish wire" in case of a bundle of wires being supported by the guide strip 1, and easily sliding over the slight abutment presented by the end edge surfaces of the floor plates. Since the tongues 18 lie entirely below the raised portions of the floor plates the entire top surfaces of the floor plates may be substantially smooth and uninterrupted from one end to the other. Short sections of studding (see 5' and 5'' Fig. 1) may be connected by the extension sleeves 6 in an obvious manner and since in order to thus form in effects a single rigid stud it is not necessary to bring the adjacent stud ends together, horizontal passage for pipes, etc. such as indicated at P, Fig. 1, may be thus afforded (through the openings 19 in the connecting sleeve) at any portion of the wall.

To set the stud in place, the preferred procedure is to first attach the extension sleeves 6 to the opposite ends of the stud, definitely locating the lower sleeve to provide the desired open space for conduits and the like through the openings 19. The position of the sleeve is maintained by crimping the flanges 17 inwardly as at 25, Fig. 7, as by means of a pair of pliers, thus providing abutments adjacent the ends of the stud flanges. The upper extension sleeve 6 is then located so that the overall length of the stud including the extension sleeves is somewhat less than the height of the space in which the stud is to be erected. The floor and ceiling plates are now assembled onto the tongues 18 of the sleeves 6 and the stud swung to vertical position. The floor plate 8 is then set down in the desired location on the lower guide strip. The ceiling plate 7 is then raised into embracing relation to the ceiling guide strip which may be done while standing on a step ladder by lightly tapping the lower end of the upper extension sleeve 6 with a hammer. When the upper extension sleeve is thus raised as far as it will go the flanges 17 of this sleeve are then crimped at the upper extremities of the flanges of the stud (cf. Fig. 7). If the stud is out of plumb it may be moved by driving one of the plates 7 or 8 in the required direction on the guide strip. The plates 7 and 8 may then be nailed onto the guide strips as through the openings 21 in the respective plates.

It is highly important that the studs be pre-

vented from moving in either direction in the plane of the wall at both ends of each stud and from being twisted out of position. As will be seen from Fig. 2 the necks 16a connecting the web portions 15 of the extensions 6 to the tongues 18 are only of sufficient length in the direction of the webs to lie within the slots 22, the flange portions 16 of the extensions abutting adjacent flat surfaces of the ceiling or floor plates as the case may be (see Fig. 3) when the studs are in position, in other words, extending at right angles to the ceiling and floor plates. Thus the studs when in upright installed position cannot be moved in any direction with respect to the ceiling and floor plates nor can they become displaced by rotation about their respective axes.

The detailed construction of the slab attaching or anchoring devices 9 varies somewhat in accordance with the edge detail of the slabs, the shape of the stud, and in accordance with the manner in which the slab is to be secured, i. e. whether single devices are to secure the edges of one or both adjacent slabs. The primary purpose being to form a strong, tight wall without necessarily requiring a plaster coating, a slab with interlocking edge joints is most desirable, that is to say wherein one slab holds another in position against movement in at least one horizontal direction, and the construction of attachment device adapted particularly for slabs with edge details forming conventional rabbet joints will be first described.

The slab edges as shown in Figs. 1 and 4 have oppositely offset tongues 10' and 10'', and the slabs are set against the studding in such manner that the lower tongue of an upper slab sets behind the upper tongue of the under slab, consequently it is only necessary to secure the upper edge of each slab to the studding, assuming the lowermost slab has its lower edge properly secured. In view of the primary purpose above stated, engagement of the slabs to secure them to the studs is effected inwardly from the outer faces of the slabs and the present arrangement including the improved slab attachment or anchoring device accomplishes this and the slabs are held in an exceedingly efficient manner permitting a given wall to be expeditiously erected and re-erected indefinitely using the same parts.

Referring to Fig. 4, two slab anchoring devices are illustrated each comprising two parts: a slab anchoring plate 30 and a clip 35, the latter being arranged to engage and interlock with the stud and to simultaneously rigidly secure the plate 30.

The plate 30 may be economically made from an elongated rectangular sheet metal blank, and has a central depression 31 (see Fig. 9 particularly) extending entirely across the plate, and outstruck aligned tongues 32 the ends 33 of which are pointed and bent to extend nearly parallel to the plane of the plate, (slightly outwardly inclined to draw the slab toward the stud) the points 33 being in a common plane. The tongues 32 are wider adjacent the body of the plate than at the bases of the points so as to better resist bending or being sprung when the points are driven into the slab, as will be presently described.

The clip 35 may likewise be economically formed from a rectangular sheet metal blank and has a rectangular central body 36 substantially fitting the depression 31 which latter is ordinarily of a depth equal to the thickness of the stock from which the clip 35 is formed so that all the slab contacting faces of the entire device will be flush with each other. Extending from the upper and lower margins of the blank forming the clip 35 are tongues 37 and 38. The opposite ends of the tongues are struck back and snugly straddle the plate 30 whereby the body portion 36 of the clip is further definitely located in the depression 31 against any relative rotation (skewing) of the two parts of the device. The struck back portions of the tongues are formed to provide paired yielding lugs or hooks 40 (see also Figs. 8 and 9) to interlockingly engage the free edges of a stud channel flange and to provide paired yielding abutment fingers 41 for frictionally and yieldingly engaging the web of the channel stud at the base of the flange to hold the lugs 40 firmly interlocked with the flange of the stud.

It will be noted in Figs. 4 and 9 that the lugs or hooks 40 extend about the flange of the stud 5 clear thereof and contact with the inner surface of the flange inwardly (toward the web) from the edge of the flange, whereby each lug or hook may accommodate flanges that vary somewhat in width and nevertheless tightly grip such flanges due to yielding of the hook-shaped lug.

The gripping of the studs is for an overall effective distance longitudinally of the stud such that the clip is guided for substantially right line movement along the stud (without becoming skewed) notwithstanding the application of an unbalanced force on the clip (as by a blow of a hammer on one side or the other of the clip, see below) to move the clip downwardly on the stud in securing the slabs. In the form shown—see particularly Fig. 8—it is evident that the effective gripping distance along the stud is about three times the total width of the stud flange. The actual effective distance may be varied in accordance with the thickness and temper of the stock used to form the lugs and fingers, but for studs of the proportions shown, and for the thickness of the clip stock shown, a gripping distance of from two and one-half to three and one-half times the stud flange width is ample.

It will be noted that the unbent webs connecting the lugs and fingers 40 and 41 lie in the same plane with the central portion 36 of the clip whereby the web is spaced from the underlying surface of the stud a distance corresponding to the thickness of the plate 30. By this means the metal of the clip in the plane of the portion 36 (at the neck connecting the lugs and fingers to the central portion of the plate) yields to accommodate any variations in the thickness of the stud flanges, should the yielding of the hooks be insufficient, as well as to accommodate other variations, say in the formation of the hooks 40 or thickness of stock used to make the anchor parts.

The lug and abutment device just described may be just as effectively used with an I-beam stud or frame member section or with the flanges of simple angle bars or Z bars.

The free ends of the fingers 41 are curved outwardly somewhat to assist in springing the assembled device (plate and clip) onto the stud. This is accomplished as shown in Fig. 9 by first hooking the lugs 40 onto the stud flange and then forcing the assembled device toward the stud as by thumb pressure (indicated by arrow in Fig 9) on the margin of the body portion of the clip, rotating the clip about the flange contacting portion of the lugs or hooks as a center.

When interlocked with the stud as above described the slab anchoring device 9 cannot be pulled off except by swinging the same about

the hook, reversely to attaching the device, nor moved in any but one direction, namely; up and down the flange. The points **33** are held rigidly in position to simultaneously pierce the slab as above described when the anchoring device is driven downwardly on the stud as by a blow of a hammer where indicated by the arrow on Fig. 4.

If furring of the slabs is desired for any reason, say to better accommodate pipes, vents, conduits, etc. in a wall already erected without such elements, this may be accomplished by forming the end portions of the plate **30** which support the tongues **32** in a plane outwardly offset from the vertical edges of the body portion **36** of the clip **35** as suggested in Fig. 5*a*. Here the slab engaging portions of the plate **30** are shown as connected with the central portion by outwardly extending arm portions **30***a* of the plate **30**.

Referring again to the preferred form of slabs these are preferably formed from a body of high grade gypsum plaster but may be of any other suitable composition—say for obtaining higher thermal insulation or sound absorption or sound insulation etc. values; the plaster body being contained in a suitable strengthening and/or protective envelope **45**—say chipboard or other heavy paper. The envelope is folded about the edges of the slab (may be done in a board mill such as are commonly used to make plaster board, plaster lath etc.) in such manner that the joints, which are overlapping edges as shown, see **45'** and **45''**, Fig. 4, occur on the inner surface adjacent the studs, the entire outer surfaces of the slabs being continuous and jointless.

It will also be noted that the overlap of the envelope sheets occurs opposite the portions of the plate **30** which contact with the slab edges, thus reinforcing the envelope where it is most likely to be torn as by burrs on the anchors e. g. The slabs are preferably from ¾ to 1 inch thick, 2 feet wide and from 8 to 10 feet long (as cut on the mill e. g.).

Reverting again to the anchor devices **9** and particularly the plates **30** and slab engaging prongs **32—33** it will be apparent from the above discussion of the slab that the points or prongs **33** which preferably have an effective length of $\frac{3}{16}$'' to ¼'' will penetrate the usual paper envelope and enter the plaster body, fully interlocking with the slab when the anchoring device is seated. Prongs of the proportion shown, notwithstanding the slight inclination outwardy from the plate **30** to draw the penetrated slab theretoward, do absolutely no damage to the slab and the slab, in being used over again, may be engaged in the previously made openings and still be effectively secured. When a second slab is set on top of a slab secured at its upper edge by the anchoring devices described, the lower tongue thereof (see **10''** Fig. 4) engages the flat faces of the horiozntal portions of the tongues **32** and the weight of this second slab further insures that the prongs will remain interlocked with the slab secured thereby.

Further desirable features of the anchoring device are that any outward pull of the slabs is imposed on the plate **30** and clip **35** centrally of both since these parts are substantially symmetrical on opposite sides of the tongues **32**; the interlocking engagement between the tongues **40** and **41** provide sufficiently wide apart bearing on the stud to insure parallelism of the anchoring device with the stud and slab; the plate **30** continuously contacts both inner marginal edges of the adjacent slabs for a considerable distance horizontally, thus greatly assisting in maintaining the edges in alignment; and,—having in mind the dissimilarity of the two sides of the stud and that the prongs **33** must always extend downwardly—the anchoring devices may be used interchangeably on either side of the wall (clip **35** merely needs inverting to meet the two conditions shown on Fig. 4).

The two piece anchoring device may be modified to include the further features shown in Figs. 10 to 13 hereof or any equivalent of any of these illustrated modifications, and instead of the present novel manner of engaging the slabs, the anchoring devices generally may be modified to engage slabs, sheets, strips, etc. in the various ways shown by the prior art. In the case of using slabs presenting a fairly broad upper edge surface, slab piercing devices separate from the tongues of the plate **30** may be used (nails, staples etc.—not shown—engaging suitable modified tongues corresponding to the tongues **32**).

It is obvious that the anchoring devices may be disengaged from the slabs and studs in dismantling the wall for re-erection or storage of the wall parts, the procedure being the reverse of the manner of engagement with said parts.

In Fig. 5 is shown a detail of the condition illustrated in Fig. 1 where two slabs **10** terminate, as at **10***x* Fig. 1, in overhanging relation to the studding. The part **30** only of the improved anchoring device may be used as illustrated to fully secure the edges, (partly in conjunction with the slabs above and below the joint which bond with the slabs so terminating).

One manner of forming a corner with the improved wall is illustrated in Fig. 6. Assuming the portion of the wall (slabs at **10***s* and **10***t*) has been set up in accordance with the previous description with the endmost stud **5** set fairly close to the end of the erected wall where the corner is to occur, as illustrated, a vertical guide strip **1** is located at the edges of all the slabs in the position **10***s*, say cemented on or nailed on. The stud **5***s* in the position shown forms a rigid backing for the wall which may now be erected to the right of the slabs **10***s* and **10***t* starting with the guide strip in accordance with the above description. The slabs **10***s* may be cut off at **10***s'* or shorter since these ends are concealed in the finished wall. The slabs in the position **10***v* overlap the outer edge of the guide strip and abut the slabs at **10***t*. After these slabs **10***v* are erected the protruding ends of the slabs **10***t* may be nailed to the slabs at **10***v* and are then sawed off squarely as at **10***t'*. The inner row of slabs at **10***w* abut the slabs **10***s* and their margins lie adjacent the guide strip **10***s* as shown and the slabs at both **10***v* and **10***w* may be nailed to the guide strip in an obvious manner.

When the wall is erected the horizontal joints and all others are carefully pointed and made smooth, and the wall surface then given the usual sizing and/or any desired decorative or other coating. No plaster is necessary or desirable if the wall is to be re-erected using the same slabs.

The modified anchoring device **50** shown in Fig. 10 comprises a single metal plate having lugs or hooks **51** corresponding in general function to the lugs **40** previously described, and abutment fingers **52** outstruck therefrom to engage the web of the stud. If this device **50** is to secure slabs according to the above description, that is to say, to secure the same by points or prongs as at **53** engaging one slab edge only, then the two sets

of lugs 51 are essential to enable interchangeably fitting both flanges of the same stud. However, one lug 51 may be dispensed with if the device 50 may be used either side up as in the case of having additional slab engaging means (points 54 e. g. shown in broken lines) so as to interlock with both adjacent slabs.

Fig. 11 shows a different manner of making a one piece clip and also a modified slab detail. Here the lug and abutment finger arrangement 61, 62 is more nearly the same as in Fig. 4, the lug and abutment allowing the plate 60 to be slid on the stud while interlocked therewith to enable interlocking engagement with slabs, the latter being as shown, grooved on both edges at G. T-shaped slab engaging lug member 60a are shown, the head of the lugs engaging both grooves.

Fig. 12 shows an embodiment of anchoring device 65 also adapted to be made from a single piece of sheet metal but having the stud engaging lug 66 and stud abutment fingers 67 located in pairs at the top and bottom edges thereof. Preferably the lug and finger supporting portion of the plate is offset slightly outwardly from the central portion of the plate as at 68 so that the necks connecting the lugs and fingers 66—67 with the body of the plate may be sprung somewhat as required by variations in the stud flanges e. g. the same as in the case of the two piece anchor above described. Fig. 12 shows prongs 69 for engaging the slab turned both ways whereby two adjacent rows of slabs may be secured in substantial alignment with no interlocking formation between the slab edges. The slab edges are shown as perfectly flat. In this case nails, staples, etc. may be effectively used say in suitable openings punched into flat tabs (not shown) bent outwardly from the body of the anchor and adapted to lie between the adjacent edges of the two slabs.

Fig. 13 shows a one piece anchoring device wherein spaced portions of the upper and lower edges of the metal plate 70 are bent to lie parallel to each other forming two pairs of flange engaging hooks 71 and intermediate channel web engaging abutments 52a between the two pairs (corresponding to 52 Fig. 10).

If the edge detail of the slabs comprises a simple tongue and groove arrangement as shown in Fig. 14 the interlocking engagement between the slab attaching anchors and the slabs may comprise extensions 72 of the anchors (corresponding to the arms 32, Fig. 4) with depressed outer extremities 72' substantially complementary to the groove. The remainder of the anchor construction may be in accordance with any of the previously described illustrative embodiments of anchors. To simplify the construction of the anchors the slabs on one side of the wall may be set with the grooves up and the tongues down, and on the opposite side of the wall with the grooves down and the tongues up as shown. As illustrated the arrangement of stud flange engaging hooks 73 and fingers 74 are substantially in accordance with Fig. 11, which see.

It is to be understood that all the above described sheet metal parts may be suitably treated by any known process to resist corrosion. No special treatment is usually found necessary for office, school, church, buildings and the like.

We claim:

1. In a system of wall construction, a plurality of elongated flanged frame members in spaced substantially parallel arrangement, a plurality of wall slabs positioned in rows extending crosswise of the frame members, anchor devices having rigid portions adapted to engage the slabs and rigidly hold the slabs, and means on each of said anchor devices adapted and arranged to detachably firmly grip one of said frame members at the flange thereof, at the surface of the frame member opposite the flange and at the face of the frame member adjacent the slab to be attached for a total effective distance lengthwise of the said member at least about two and one half times the width of the flange to thereby insure right line travel of the anchor device longitudinally of the frame member to which attached notwithstanding an applied external unbalanced force tending to cause rotation of the anchor about an axis transverse to the longitudinal axis of the frame member.

2. In a system of wall construction a plurality of elongated flanged frame members in spaced substantially parallel arrangement, a plurality of wall slabs positioned in rows extending crosswise of the frame members, anchor devices each having a substantially rigid portion adapted to engage a slab at both sides of the frame member with which associated and rigidly hold the slab, and means on each of said anchor devices rigid with the aforesaid portion adapted to detachably and firmly grip one of said frame members at the flange thereof on three sides of said frame member for an effective distance lengthwise of said member at least about two and one half times the width of the flange thereof, so that the anchor will not be appreciably rotated in a plane parallel to the plane of the wall under an applied external unbalanced force tending to cause such rotation and sufficient to cause the anchor to travel longitudinally on the frame member.

3. In a system of wall construction comprising substantially parallel flanged frame members, rows of slabs arranged adjacent the flanges of the frame members substantially in edge to edge relationship to each other with said edges extending transversely of the frame members, attaching members for said slabs adapted and arranged to attachably and detachably interlock with the flanges of the frame members without deformation of said attaching members and to grip said flanged frame members with sufficient pressure and for a sufficient distance therealong to insure that the attaching members will be accurately guided for movement longitudinally thereof and parallel thereto while interlocked therewith notwithstanding the application of unbalanced external forces on the respective attaching members to effect such movement, and substantially rigid means on said attaching members arranged to engage and forcibly penetrate said slabs at the edges thereof and to rigidly secure the slabs so engaged when the attaching members are slid along the frame members as stated.

4. In a wall comprising flanged frame members and slabs of penetrable material adapted to overlie the frame members, a slab anchor comprising a plate adapted to extend in face to face contact with one of the frame members and having prongs operatively rigid therewith at one side of sufficient stiffness to pierce the slab material at the edge of a slab to secure the same, and means on the opposite side of the plate operatively rigid therewith and arranged to detachably interlock with the flange of a frame member and abut the frame member on the surface thereof opposite the flange, the total distance of abutment and

interlocking of said means along the frame member being sufficient to accurately guide the plate for right line movement on the frame member to which attached, whereby the prongs may be caused to simultaneously enter the slab by driving the plate along said frame member.

5. In a system of wall construction comprising substantially parallel frame members and rows of slabs arranged adjacent thereto in close edge to edge relationship, the combination of slab attaching means adapted to firmly grip said frame members with sufficient force to require a blow to be driven longitudinally thereof when in gripping position thereon, means associated with said attaching means and adapted to engage each with one edge of one of two adjacent slabs inwardly from the exposed or outer surfaces of the slabs when the attaching means are driven along the frame members, and means interlocking the adjacent edges of the slabs when two slabs are brought together in said edge to edge relationship whereby the successive rows of slabs may be rapidly erected in fixed relation to the frame members and with the outer surfaces of the slabs free from projecting portions of said slab attaching means.

6. In a wall comprising substantially parallel flanged studs and rows of slabs arranged adjacent said studs in edge to edge relationship with each other, sheet metal clips adapted to interlock with and firmly grip the flanges of the studs for such distance therealong as will guide the clips for sliding right line movement and require a blow on the clip to effect such movement, each of the clips having a plurality of prongs outstruck therefrom having end portions bent substantially parallel to the major faces of the slabs for retaining engagement with the edges of the slabs inwardly from the outer faces thereof.

7. In a wall comprising substantially parallel flanged frame members and rows of slabs arranged adjacent said frame members in edge to edge relationship with each other, sheet metal clips adapted to interlock with the flanges of the frame members and each having a plurality of stiff prongs outstruck therefrom and bent substantially parallel to the major faces of the slabs for firm engagement with the edges of the slabs inwardly from the outer faces thereof, and means on said clips adapted to detachably secure the same to the frame members, said means including means to firmly grip the flanges of the frame members for a substantial distance therealong and additional means to frictionally engage the surfaces of the frame members opposite from the flanges thereof, the gripping and frictional engagement being with sufficient force so that the clip requires a blow to move the same on the frame member to which attached to effect engagement of the prongs with said slab edges.

8. In a wall, channel shaped frame members, slabs respectively extending across the flanges of the frame members the slabs at each frame member being in substantially edgewise contact with each other thereby forming a double wall, substantially identical slab attaching members each adapted to extend adjacent either flange and securingly engage a slab at the flange adjacent which the attaching member extends and in upright position at either flange, and a channel engaging device adapted to interlock with the channel in relatively upright position at one flange and in relatively inverted position at the other flange and to operatively engage a said slab attaching member in either of said positions to hold the same in slab securing relation to the channel.

9. In a wall of the class described, a device for attaching slabs to frame members having flanges, said device comprising a metal plate adapted to lie against the outer surface of one of the flanges, said plate having means thereon to engage and secure a slab, and a separate sheet metal clip having four tongues struck therefrom and extending rearwardly toward the flange at opposite edges of the plate, two of said tongues extending substantially in contact with one edge of the plate and two extending substantially in contact with the opposite edge to thereby align the plate with the clip, two of said tongues being hook-shaped to engage and grip the flange and two being adapted to frictionally engage the frame member on a surface thereof opposite from the flange.

10. In a wall comprising flanged frame members and relatively heavy slabs adapted to extend in mutual edgewise contact crosswise of the flanges of the frame members, a clip comprising a metal plate lying between one of the flanges and an adjacent slab, and means carried by the plate extending outwardly between adjacent slabs to secure one of said slabs, inwardly extending tongues on the plate arranged in pairs, one tongue of each pair being arranged to hook over and firmly grip the flange of a frame member and the other of the same pair to yieldingly and firmly frictionally engage the frame member on the opposite side thereof from said flange, whereby the frame member is securely gripped at spaced points therealong and on both sides thereof by said tongues and the plate guided for sliding right line movement along the frame member.

11. In a system of wall construction comprising substantially parallel metal frame members, rows of slabs arranged to overlie the frame members in edgewise interlocking engagement with each other and having imperforate edge surfaces, slab attaching members and means detachably connecting the same with said frame members, said means gripping the frame members with sufficient force so that each of said attaching members requires a blow to drive the same along the frame member to which attached, sharpened prongs carried on each of said attaching members and adapted to penetrate the body of one of said two adjacent slabs at the said imperforate edge surfaces thereof inwardly from the outer or exposed face of the slab and at any portion of said edge surface when the attaching members are driven along the frame members as stated, the other of said two adjacent slabs holding the prongs in position and being retained adjacent a frame member by the aforesaid interlocking engagement of the slabs.

12. In a wall of the class described comprising parallel flanged frame members and rows of slabs in mutual edge to edge relationship adjacent the frame members, a clip for attaching the slabs to the frame members, said clip comprising a sheet metal plate adapted to overlie the flange of a frame member and to extend along the inner marginal surface of a slab, means on the plate adapted to engage and secure one of said slabs, a depression in the plate disposed between the plate and the slab secured thereby, and means lying within and substantially fitting said depression and retained in place thereby and having tongues adapted to interlock with the flanges of said frame members on two opposite edges of said

plate to hold the plate in position on the frame members.

13. A device for attaching slabs to flanged frame elements, said device comprising a central sheet metal body having means on the front side to engage and hold the edge of a slab, and two pairs of frame element engaging tongues struck rearwardly from the sheet metal, one tongue of each pair being curled into a hook to engage the flange and the other tongue of each pair being adapted to frictionally engage the frame element opposite the respective hook, there being means to maintain the metal connecting each hook with its corresponding tongue spaced from the frame element whereby the said metal may spring toward or away from the frame element as required by variations in the thickness of the flange of such frame element engaged by the hooks.

14. In a wall of the class described including flanged frame members and slabs, a slab attaching clip comprising a sheet metal plate having means on one side to engage and secure a slab, and a pair of tongues struck therefrom and lying opposite said means, one tongue being in the form of a hook, arranged to extend about the edge of the flange of a frame member materially out of contact therewith and thence into yielding contact with the flange materially inwardly from such edge of the flange, the other tongue being spaced from the hook with one of its major faces positioned for yielding sliding contact with the surface of the frame member opposite the flange when the hook is positioned on the flange as stated and the plate rotated toward the frame member about the flange contacting portion of the hook-shaped tongue as a center.

15. In a wall of the class described, comprising substantially parallel frame members and rows of slabs arranged adjacent the same substantially in edge to edge contact and extending transversely of the frame members, fastening devices for the slabs adapted to be quickly attached to and detached from the frame members and movable thereon, said fastening devices having relatively rigid projections carried thereby and extending between the adjacent slabs, said projections being adapted to be driven into engagement with the edges of said slabs inwardly from the outer faces thereof, and being inclined with respect to the slabs and the direction of movement of the devices when driven as aforesaid in a manner to draw the slab engaged thereby inwardly toward the frame member during driving of the projections as stated, whereby the slabs will be secured in rigid relationship to the respective frame members to which attached.

16. In a system of wall construction a plurality of elongated flanged frame members in spaced substantially parallel arrangement, a plurality of wall slabs disposed in rows extending crosswise of the frame members, anchor devices for securing the slabs to the frame members, each of said anchor devices having means thereon adapted and arranged to forcibly engage the edge of a slab adjacent one of said frame members and stress the slab toward the frame member when moved parallel to the frame member, and a portion detachably and slidably engaging said frame member at the flange thereof with sufficient pressure and for a sufficient distance lengthwise of the frame member so that the frame member engaging portion of the anchor device remains parallel to its original position on the frame member while moved on the frame member to cause the slab engaging portion to engage and stress the slab as aforesaid.

17. In a wall of the class described, a series of flanged studs, slabs extending across the flanges and in edge to edge relationship, said edges extending transversely of the studs, clips having means on one side thereof to interlock with the flanges of said studs in a manner to require the clips to be driven along the studs and having outstruck prongs thereon at the opposite side, respective portions of said prongs being inclined downwardly and outwardly with relation to the studs when the clips are positioned on the studs, the inclined portions being disposed inwardly from the outer or face surfaces of the mounted slabs and engaging the slab edges inwardly from said surfaces in a manner to draw the engaged slab edges inwardly as the clips are driven downwardly on the studs.

18. A partition wall frame structure comprising a guide strip adapted to be secured against the ceiling, floor or upright wall surfaces of the space to be partitioned, U-shaped sheet metal anchoring members embracing the guide strip and having slots extending transversely of the strip on the inner faces thereof, flanged main frame members for the partition extending between the U-shaped members, and tongues carried by the frame members adapted to be inserted into said slots to a position between the U-shaped members and the guide strip to anchor the frame members in position, the bases of the tongues extending vertically through the slots and being substantially closely embraced by said slots on perimetral surfaces thereof on all sides, whereby the frame members are prevented from being moved with respect to the anchoring members lengthwise and laterally of the guide strip and prevented from dislocation by rotation on their respective axes.

19. A partition frame structure comprising guide strips adapted to be secured to the ceiling and floor of a building, a plurality of studs, anchoring devices for the studs comprising sheet metal plates arranged to overlie and embrace the respective guide strips, said plates having slots extending transversely of the guide strips, stud extensions carried on the ends of the studs and each having a horizontally extending tongue adapted to enter the slot of the respective plate and lie between the plate and guide strip, the extensions embracing the stud ends in telescoping relation thereto for adjustment along the studs, the extensions having relatively short necks connecting the same to the tongues and extending vertically through respective slots in the horizontal planes thereof, said extensions also having respective abutments arranged to contact with the plates when the tongues are in the aforesaid position and the extensions are disposed substantially perpendicular to the plates, whereby the stud is prevented from moving longitudinally of the plates in either direction.

20. In a wall of the class described a plurality of studs in parallel relationship, slabs adapted to cover said studs and disposed adjacent the same substantially in edge to edge relationship with each other, means to secure the slabs to the studs, and means to anchor the opposite ends of the studs to an existing wall of the building, said anchoring means comprising sleeves slidable on the studs and apertured in the plane of the wall for receiving conduits and the like adapted to be placed in the wall.

21. In a wall comprising flanged studding and slabs arranged adjacent thereto, a sheet metal stud extension, said extension having portions thereof arranged to embrace the stud flanges and connecting web portions therebetween, said web portions having respective openings therethrough disposed beyond the ends of the studs for receiving conduits and the like adapted to be placed in the wall, and means to secure the extremities of said extensions to an existing wall of a building.

22. In a wall of the class described, a plurality of channel studs in parallel relationship one or more of said studs being in sections, slabs adapted to cover said studs and disposed against both flanges thereof, said slabs being substantially in edge to edge relationship with each other, means to secure the slabs to the studs, and means to secure the stud sections together comprising a sheet metal sleeve having a web and inturned flanges telescopingly embracing aligned stud sections and having an opening in the web thereof whereby pipes etc. in the wall may extend crosswise of the studding out of contact therewith.

23. In a hollow wall comprising studding and wall surface forming means covering the studding on both sides and substantially concealing the studding, a slotted stud supporting sheet metal floor plate having a substantially planar upper surface, a stud embracing sleeve having a lateral tongue adapted to engage the slot of the floor plate to locate and secure the sleeve, the sleeve comprising a web having flanges to clasp the stud, and the web having an opening for conduits or wires, said opening extending upwardly from the plate and laterally of the wall for distances sufficient for the opening to loosely receive the usual conduits and wires, the entire lower edge of the opening being flush with the planar surface of the plate, whereby such conduits may be easily slid across the planar surface of the plate and through the openings of several sleeves.

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