

Sept. 14, 1937.

R. A. BADT

2,093,346

METHOD AND APPARATUS FOR BUILDING CONSTRUCTION

Filed March 6, 1937

2 Sheets-Sheet 1

Fig. 1.

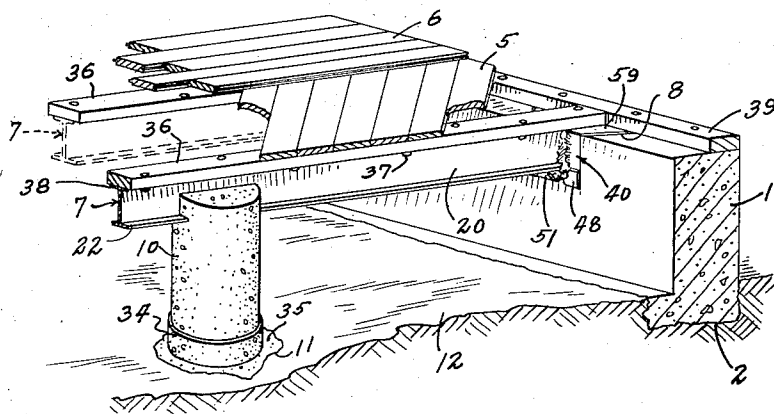


Fig. 2.

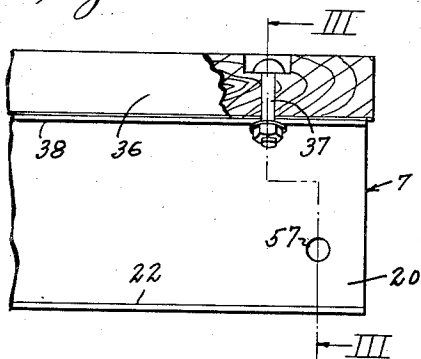


Fig. 3.

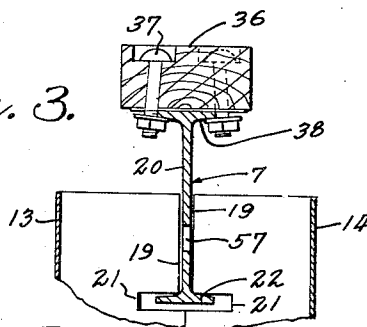
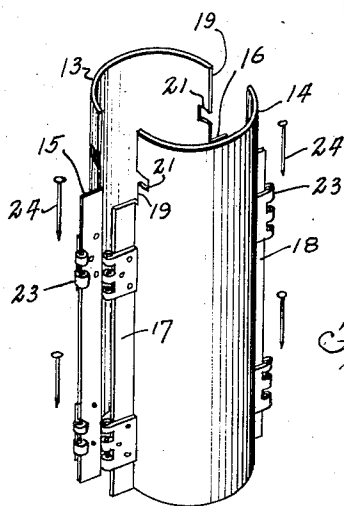


Fig. 4.

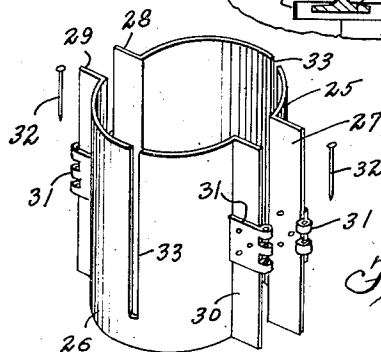


Fig. 5.

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2 Sheets-Sheet 2

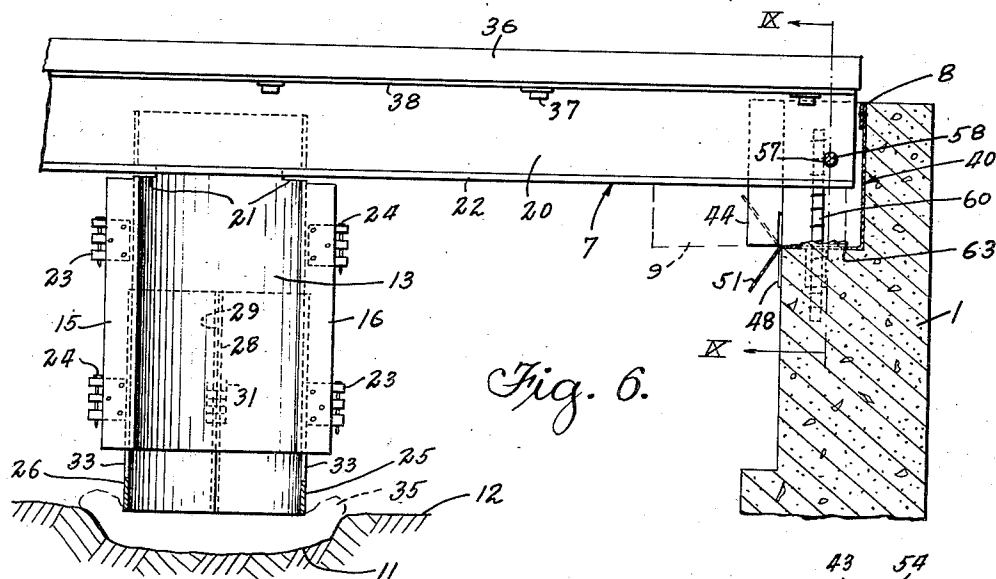


Fig. 6.

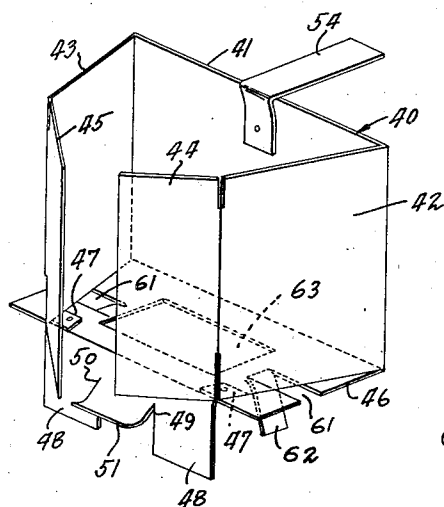


Fig. 7.

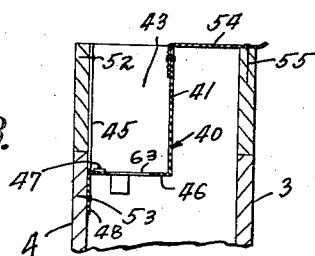


Fig. 8.

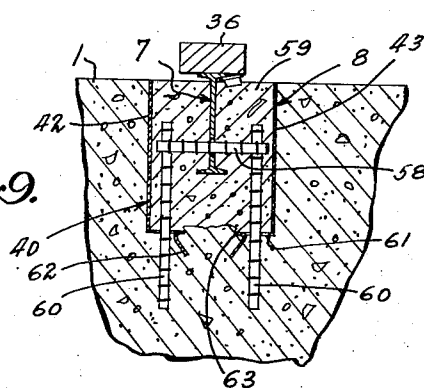


Fig. 9.

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2,093,346

METHOD AND APPARATUS FOR BUILDING
CONSTRUCTION

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Application March 6, 1937, Serial No. 129,435

7 Claims. (Cl. 25—118)

My invention relates to methods and apparatus for building constructions and has particular reference to method and apparatus for setting floor beams in the construction of a building.

In building constructions it is the common practice to cast or erect foundation walls defining the outer boundaries of the building and then to place across these foundation walls suitable beams, sleepers, and the like, upon which the first floor of the building will be placed.

In the present building practice the sleepers are either set upon the upper surface of the foundation walls or are placed in recesses cast into the wall or formed into the wall during its erection, the setting of the beams or sleepers requiring the individual leveling of each of the beams or sleepers by employing wedges or similar shims for raising the beams or sleepers to the desired level.

Where the space between the opposing walls is relatively great, it is necessary to supply additional support to the beams or sleepers intermediate therein, and the common practice of so doing is to erect a plurality of piers at points suitably spaced between the opposed walls upon which the intermediate points of the beams or sleepers may rest. Again it is necessary to use wedges or shims between the tops of these piers and the underneath surfaces of the beams or sleepers in order that the piers may adequately support the beams or sleepers.

Such construction is unsatisfactory, first from the standpoint of providing adequate support, since the entire support for the beams or sleepers not only at their ends in the foundation walls but also at each of the piers, must be made through shims or wedges so that there is no fixed connection between the walls and piers and the beams or sleepers supported thereby. As a second consideration the present method of construction is unsatisfactory because of the consumption of time and labor required, first, in erecting the walls with or without sockets for the beams, and, second, the erecting of the piers; and third, the placing of the beams upon the walls and piers, and then the jimmying up and leveling up of the beams not only at the walls but at each of the individual piers.

It is an object of my invention, therefore, to provide a method of erecting buildings wherein the foundation walls may be poured or cast or erected with or without sockets for the reception of the beams and then the beams may be set in place, leveled at each end, and then the leveled beam constitutes a support for a form to be

employed for the casting of one or more piers along its length so that when the piers have been cast they are rigidly attached to the beam and are automatically leveled to the desired level of the beam irrespective of the contour of the ground over which the beams extend and require no shimming or additional leveling at the piers.

Another object of the invention is to provide a method building construction as set forth in the preceding paragraphs, wherein the beams or sleepers employed may be of light metal structural shapes, such as I-beams, channel beams, and the like, and in which the forms for the casting of the piers may be suspended from the metal structure to partially enclose the metal structure and thus tie the beam or sleeper directly to the pier when it is cast.

Another object of the invention is to provide a method of building construction of the character set forth, wherein sockets for the reception of the beams or sleepers may be left in the foundation wall and in which the beams may be placed and leveled and then the sockets may be filled with concrete or similar material to effectively and permanently tie the ends of the beams to the foundation walls to provide complete monolithic support for the ends of the beams independent of the wedges or shims which have been used to level the same.

Another object of the invention is to provide a method of building construction of the character set forth in the preceding paragraphs wherein the beam ends may be placed in the sockets, and then the piers may be cast to support the beam in its level condition and then the shim or wedges employed to level the beam relative to the side walls may be removed so that upon the casting of the material in the sockets such material will completely surround the lower portion of the beam and support the same while the beam is held in level position by the previously cast piers.

Another object of the invention is to provide a readily manipulated form attachable to the beams for the casting of the concrete piers.

Another object of the invention is to provide a form of the character set forth in the preceding paragraphs wherein the form may be adjusted for different lengths, avoiding the necessity of either digging holes or accurate leveling of the ground beneath the building prior to the casting of the piers.

Another object of the invention is to provide a form of the character set forth in the preceding paragraphs wherein the form may be adjusted

for casting of end sockets in the foundation walls, ready for the reception of the beam, which form also constitutes an enclosing form for the later casting of the concrete in the sockets to hold the beams in place therein.

Other objects and advantages will be apparent from a study of the following specifications, read in connection with the accompanying drawings, wherein

Fig. 1 is a diagrammatic perspective view of a portion of a building construction erected in accordance with my method and illustrating the manner in which the beams or sleepers may be supported in the foundation walls and upon the piers;

Fig. 2 is a vertical elevational view of one end of a beam which may be employed in the practice of my invention, partly broken away, and illustrating the manner in which the floor and nailing strip may be attached to the metal beam;

Fig. 3 is a detail sectional view, taken along line III—III of Fig. 2;

Fig. 4 is a perspective view of one of the pier casting forms which may be used in the practice of my method, the two form halves being illustrated in an exploded or separated position;

Fig. 5 is a view similar to Fig. 4, of a sectional form member which may be employed to achieve adjustability in the pier forms;

Fig. 6 is a vertical sectional view taken through a portion of the building erected in accordance with my method and illustrating the manner in which the beams are supported in the foundation walls and how the piers may be cast upon the beam;

Fig. 7 is a detail perspective view of a beam member which may be employed for the production of beam end sockets in the foundation walls;

Fig. 8 is a vertical sectional view, illustrating the manner in which the form shown in Fig. 7 may be secured to the wood forms employed in the casting or erecting of the foundation wall; and

Fig. 9 is a vertical sectional view, taken along line IX—IX of Fig. 6, and illustrating the manner in which the beam is securely fastened in the sockets by the subsequent casting of concrete in the socket.

Referring to the drawings, I have illustrated in Fig. 1 a diagrammatic view of a portion of a building including a foundation wall 1 which may be erected in any well known manner, as, for example, by the casting of concrete in a trench 2 between wood forms 3 and 4, such as those illustrated in Fig. 8. The foundation wall 1 may be erected to any desired height, preferably to a height approximately equal to the desired level of the first floor. In ordinary building constructions the floor proper must be supported upon suitable cross beams extending between the foundation walls, such beams being commonly known as sleepers and ordinarily consisting of a plurality of wood strips 2' x 10' extending in parallel relation to each other and spaced approximately 18 to 24 inches apart. Upon these sleepers is laid the sub-floor 5 and upon the sub-floor is laid the surface flooring or finished flooring 6.

Since the method and apparatus employed in the practice of my invention is particularly adapted to the employment of metal members in place of the wooden sleepers, I have illustrated in Fig. 1 the sleepers as comprising a plurality of light weight I-beams 7 which may extend between the foundation walls on opposite sides of the

building, or, where the building is of great width they may extend from one of the foundation walls to a central beam extending parallel to the foundation walls.

In the practice of my invention, particularly in using the metal beams in place of the wood sleepers, I prefer to cast or erect the foundation wall 1 with a plurality of sockets 8 distributed along the inner face of the wall 1, such sockets having any desired shape, though I prefer that they should have the shape illustrated particularly in Figs. 1, 6 and 9. That is, the sockets should extend inwardly from the inner surface of the wall 1 and be narrower at the point of communication with the inner surface of the wall than at any other point in the wall. The sockets 8 are preferably of greater width and height than required to accommodate the end of the beam 7 so that the beam may be laid loosely therein, and, by employing wedges 9 (see Fig. 6) the ends may be raised or lowered as may be required to level the beam 7 accurately.

It will be understood by those skilled in the art that the foundation wall 1 may be erected only to the height of the desired location on the lower face of the beam 7, in which event the beam 7 may be laid upon the upper edge of the wall 1, and, by using wedges or shims, may be accurately leveled. The beam 7, now leveled, is ready for the pouring or casting of the piers 10 employed to support the intermediate portions of the beams and for this purpose a small hole 11 may be scraped out of the ground surface 12 and immediately above this opening a form may be suspended over the beam.

The form may take any desired shape or construction, though I prefer to employ a form such as that shown in Fig. 4, this form comprising a pair of complementary members 13 and 14, each of which describes a substantial semi-cylinder, and each of which is provided upon each of its side edges with an outstanding flange. The flanges for the member 13 are indicated at 15 and 16 while the corresponding flanges for the member 14 are designated with the reference characters 17 and 18. A vertically extending recess or cutout 19 is preferably provided upon the extreme side edges of the members 13 and 14 and preferably extends over the upper end of each of these members so as to provide a small space between the abutting, meeting edges of the form members to accommodate therebetween the vertical web 20 of the beam 7. Also extending over each of these recess or cut away portions is a circumferentially extending slot 21 adapted to receive that half of the lower flange 22 of the beam 7 which lies upon that side of the central web 20, the assembly members 13 and 14 providing a substantially T-shape slot therebetween for the reception of the lower portion of the beam 7. By making the form in two complementary members 13 and 14 these two forms may be separated along a central plane extending longitudinally of the assembled form members and placed one on each side of the beam, with the slots 21 engaging the lower flange 22 of the beam, then the two members 13 and 14 may be secured together, as by means of connecting mechanisms illustrated herein as constituting merely complementary halves of hinges 23 the pintles of which may be merely large nails 24 which when the members are assembled in close relation may be dropped down through the pintle openings in the hinge members 23 and the two members 13 and 14 will be secured together with their slots 21 engaging the flange 22 of the beam and the entire form will

be suspended directly over the beam. The form members 13 and 14 are preferably constructed of a height of approximately 24 inches, though it will be understood that this height may be varied to suit varying conditions of spacing the beams 7 above the ground surface 12.

The form 13-14 so suspended should have its lower end positioned immediately above the ground surface 12 and if this lower end is spaced one inch or less from the ground surface level it is ready to receive concrete without further work. If, however, the ground surface 12 should be uneven and the lower ends of the form are spaced more than one inch or so above the surface of the ground, additional form members may be added to the lower end of the members 13 and 14. Such additional members may be constructed as shown in Fig. 5, comprising also a pair of complementary members 25 and 26 which, like the form members 13 and 14, may have outstanding flanges 27, 28, 29 and 30 associated with hinge members 31 by which these complementary form members 25 and 26 may be secured together by nails or similar pintles 32.

The form members 25 and 26 are preferably provided with elongated slots 33 extending from their upper ends to a considerable distance longitudinally of the members 25 and 26, this slot 33 permitting the reception of the assembled flanges 15, 17, and 16, 18 and allowing the form members 25, 26 to rest upon the ground with their upper portions snugly fitting the exterior of the form 13, 14 and acting as extensions for the form 13-14.

In the event such additional form members 25, 26 are required, the concrete may then be poured and allowed to set for a reasonable length of time after which the forms may be removed merely by removing the pintles 24 and 32 and taking the forms away from the completed pier 10 which will then have the shape illustrated in Fig. 1.

It will be noted from an inspection of Fig. 1 that the pier will be substantially cylindrical in shape, having an enlarged portion 34 if the extension forms 25, 26 have been used, while the lower portion of the concrete deposited in the form will fill the scraped out hole 11 to form a footing 35. It will also be noted from an inspection of Fig. 1 that by reason of the form members 13, 14 fitting around the flange 22 and the web 20 the upper end of the concrete pier surrounds and grips the flange and web of the beam 7, thus rigidly and permanently connecting the beam 7 with the pier.

It will also be noted that since the forms have been suspended over the beams the piers will necessarily be of the correct height to hold the intermediate portions of the beam 7 at the correct level and thus the operation of leveling or wedging or shimming the beam at each of the piers is avoided. The beams 7 are preferably furnished to the contractor with a nailing strip 36 secured thereto as by a plurality of countersunk bolts 37 distributed along the length of the nailing strip 36 and preferably alternately on opposite sides of the beam 7, the lower ends of the bolts or the ends thereof engaging the underneath surface of the top flange 38 of the beam 7. This nailing strip 36 may be employed as a nailing strip to which the subfloor 5 may be nailed. Also a nailing strip 39 may be secured to the upper edge of the foundation wall 11 upon which the flooring 5 may be nailed and to which any studding or

other upright members for the further construction of the building may be secured.

By virtue of the fixing of the beams 7 directly to the piers 10, it will be apparent that the beams cannot bend or twist, thus obviating the necessity of any cross-bracing between the beams which may be used as sleepers for supporting the floor. It will therefore be obvious that my method of construction permits the use of either wood or metal sleepers in a manner involving the minimum of effort in insuring complete leveling of all points of support of the sleepers, while at the same time the sleepers or beams are supported above the ground by piers through which termites or other insects cannot reach the wood portions of the building.

The beams, supported by their piers and held level thereby, may now be fixed to the foundation walls at either end by removing the wedges or shims or other devices which had originally temporarily held the beams in level relation in the wall sockets. And then the sockets may be filled with concrete, permanently tying the beam ends to the foundation walls.

In carrying out this part of my method, I prefer to employ a form member 40, such as that shown in Fig. 7, which may be made of relatively thin sheet metal and preferably comprises a box-like device having a rear wall 41 to set the walls 42 and 43 preferably extending at acute angles relative to the rear wall 41. The front of the box-like form is preferably constructed by a pair of leaves 44 and 45 which may be extensions of the side walls 42 and 43 bent inwardly and preferably of such width that the two leaves when aligned with each other will substantially close the front of the form 40. The bottom wall 46 of the form 40 may be constructed by bending an extension of each wall 41 forwardly to close the lower portion of the space enclosed by the walls 41, 42, 43, 44 and 45, the bottom wall 46 being preferably attached to the side walls 42, 43 by ears 47 extending from the side walls and riveted to the bottom wall 46. The extreme front edge of the bottom wall 46 is preferably bent downwardly as flange 48 and this flange is provided with a pair of slits 49 and 50 to provide a tongue 51 which may be bent upwardly for a purpose to be more fully hereinafter described.

The form member 40 may be placed between the wood forms 4 and 3 (see Fig. 8) prior to the pouring or casting of the foundation wall, a plurality of such form members 40 being spaced along the forms 3, 4 at the desired locations for the ends of the beams or sleepers 7. Then the sheet metal of the form member 40 will permit the securing of the form member 40 at a number of places by tacks or nails 52 driven through the leaves 44, 45 constituting the front wall of the form member 40 while the nails or tacks 53 may be driven through the flange 48 to further secure the form member 40 in position. I prefer to rivet a strap 54 to the rear wall 41 of the form member 40 of sufficient length to extend across the space between the rear wall 41 to the opposite wood form 3 where it may be nailed or tacked as indicated at 55. The function of the strap 54 is to prevent the bulging inwardly of the rear wall 41 as the concrete is poured into and sets around the form member 40, while the tacks or nails 53 in the flange 48 will prevent the upward bulging of the lower wall 46 and thus will insure the formation of a "dove-tail" socket within the wall 1 ready for the reception of the beam end.

After the concrete of the foundation wall 1

has been allowed to set the wood forms 3 and 4 may be stripped off and the form member 40 may be left in the socket so constructed. The ends of the beams 7 may then be placed in the sockets and leveled as hereinbefore described after which the piers 10 may be cast and then the wedges or shims employed in leveling the ends of the beams may be removed from the sockets.

At this point in the operation the beams freely hang in the sockets, preferably without actually contacting the form member 40 or the surrounding concrete of the foundation wall. Each of the beams is preferably provided at its ends with a small hole 57 extending through the web 20 of the beam and preferably near the lower flange 22 thereof through which a short bar 58 may be placed so that when the concrete is poured into the socket it will surround the bar 58 and rigidly tie the beam end to the foundation wall.

In order to insure a complete tie between the section of concrete 59 poured into the socket and the remainder of the concrete wall 1, I prefer to pass one or more short sections of reinforcing rod 60 down through the form member 40 and into the concrete of the wall 1. For this purpose it will be noted that I have provided a pair of openings 61 in the lower wall 46 which may be readily formed by cutting out or bending out a tongue 62 from the lower wall 46, the reinforcing rods 60 being shoved down through these openings immediately after the concrete is poured for the wall 1. Thus the upper ends of the reinforcing rods 60 will project into the socket formed by the form member 40 and then when the concrete 59 is poured into the socket the reinforcing rods will permanently tie this small block of concrete to the remainder of the wall.

In order to further secure the concrete 59 within the form member 40 to the remainder of the wall, I prefer to provide a relatively large opening 63 in the form wall 46 of the form member 40, leaving a border of metal around this opening sufficient to prevent inflow of concrete when the wall is poured. This opening 63 will allow the concrete 59 cast within the form member 40 to become securely bonded with the remainder of the wall.

While I have illustrated the form member 40 as having a shape which produces a "dove-tail" socket in the wall 40, and prefer this construction by reason of the fact that the block of concrete 59 tied by the bar 57 to the beam is, by reason of the "dove-tail" shape of the socket, more rigidly secured to the wall 1, it will be understood by those skilled in the art that by employing proper reinforcing rods projecting into the socket and into the wall 1, the shape of the socket may be varied, if desired, and yet a permanent tie between the block of concrete 59 and the main body of the wall 1 may be secured.

It will be observed that after the forms 3 and 4 are stripped from the wall 1, the front leaves 44, 45 of the form member 40 will be free to move outwardly and I employ this freedom by bending these leaves outwardly a sufficient distance to permit the ready passage therebetween of the end of the beams 7 and then these leaves, being made of relatively thin sheet metal, can be bent back so as to engage the web 20 of the beam end and snugly engage the upper and lower flanges 22 and 38 of the beam 27, thus enclosing a space around the end of the beam into which the concrete may flow without substantial leakage around the beam 7. It will also be noted that the tongue 51 on the flange 48 may be bent upwardly

to substantially close the space between the lower wall 46 of the form 40 and the bottom flange 22 of the beam 7, thus completely enclosing the beam and preventing the loss of a material amount of concrete when the concrete 59 is poured into the socket.

It will be observed therefore that I have provided a method of building construction which varies from the common practice in that the beams or sleepers are temporarily placed in their desired relation with the foundation walls and leveled and then these leveled beams are used to support the necessary forms casting piers, supporting the intermediate portion of the beams or sleepers, and which piers are permanently tied to the beams or sleepers.

Then after the beam has been fixed in place by the piers 10 the ends of the beams may be permanently tied into the wall 1 with a minimum of effort and labor.

It will also be noted that I have provided relatively inexpensive form members which may be employed in the practice of my method, the pier members being capable of repeated use, while the thin sheet metal form members 40 for the sockets may be manufactured of such inexpensive material and in such inexpensive manner that they may be left in the wall 1.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the details of construction shown herein, except as defined in the appended claims.

I claim:

1. The method of placing beams in buildings which consists of temporarily supporting opposite ends of the beams in the desired positions, leveling said beams in said temporary supports, placing forms for piers to support the intermediate portions of the beams and suspending said forms from said leveled beams, and then casting said piers in said forms whereby the piers will accurately fit the leveled beams without further adjustment.

2. The method of placing beams in buildings which consists of temporarily supporting opposite ends of the beams in the desired positions, leveling said beams in said temporary supports, suspending from said leveled beams forms for the casting of piers to support the intermediate portions of said beams, said forms extending upwardly above the lower edge of said beams to partially surround said beams, and then casting in said piers in said forms to partially imbed said beams in said piers and to support said beams in leveled condition without further adjustment.

3. The method of placing beams in building constructions which consists of forming the foundation wall with beam-receiving sockets therein, temporarily supporting the ends of beams in said sockets, inserting shims between said temporary support and the bottom of said beams to level said beams, placing forms for piers to support the intermediate portions of the beams and suspending said forms from said leveled beams, then casting said piers in said forms whereby the piers will accurately fit the leveled beams without further adjustment, then removing said shims, and then casting concrete in said sockets to fill said sockets and surround said beam ends to permanently fix said beam ends in said foundation wall.

4. In a form for casting piers for beams, a pair of complementary form members which when assembled together define a form for a complete

5 pier, means for coupling said form members together, and slots formed in said complementary form members for engaging a beam to support said members on the beam during the casting of the pier.

10 5. In a form for casting piers for beams, a pair of complementary form members which when assembled together define a form for a pier, each of said form members being provided with a pair of transverse slots for receiving the lower flange of a beam to suspend said form from said beam.

15 6. In a form for casting piers for beams, a pair of complementary form members provided with meeting edges disposed along a central longitudinal plane, the upper end of each of said form members being provided with a recess extending longitudinally along said meeting edges and a laterally extending slot communicating with said

recess, said slot and said recess adapted to receive one half of the width of the web and the lower flange of a beam whereby when said form members are assembled together upon a beam said form is suspended solely by said beam.

7. In a form for casting piers for beams, a pair of complementary form members which when assembled define a form for a complete pier, means for coupling said form members together, slots formed in the upper end of said form members into which the lower edge of a beam may extend, and means on said form members for suspending said form members from said beam during the casting of the piers with the upper end of the form members extending above the lower edge of said beam.

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