ABSTRACT: In the reinforced concrete frame for a building consisting essentially of columns assembled with horizontal beams and with floor units extending between adjacent parallel beams, the beams and floor units are precast for assembly on the building site. According to the invention, in order to provide a simple but strong connection between the beams and columns a bracket consisting of a hollow steel joist section embedded in a column and projecting laterally is received within a channel-shaped steel shoe embedded in the end of the beam in interfitting relation on assembly of the beams and columns. To ensure accurate alignment and eliminate possible canted of the beam a second length of channel-shaped steel section is embedded in the column above said bracket and receives a tubular steel section secured to and projecting from the end of the beam upon assembly of the shoe and bracket. A stuff bar pushed through the tubular section may serve to connect two beams similarly supported on opposite sides of a column. The shoe and tubular section are welded to reinforcing bars, while floor units of double T-shaped cross section, the ends of which rest on flanges of the beams, are also secured by welding reinforcing elements thereof to reinforcing bars extending laterally from the beams.
This invention concerns improvements in the construction of reinforced concrete frames for buildings of the kind comprising columns which support the ends of transverse beams which in turn are intended to carry the floor plates spanning from beam to beam, and is particularly concerned with frames for multistory buildings.

The object of the invention is to simplify and improve the construction of the parts and to facilitate their erection so that a strong and endurable structure may be obtained. For this purpose particular regard is paid to the manner of connecting together the parts which make up the framed structure.

In the construction of a building frame of the kind referred to employing beams which are precast and not cast in situ, it is usual to provide brackets upon the columns to receive and support the ends of the beams which extend from column to column. According to one feature of the invention a bracket upon a column to support the end of a beam is constructed by a steel projection which may be of inverted channel shape, but is preferably tubular, portion being embedded in the reinforced concrete column while a portion projects laterally to provide a step over which will fit an inverted channel-shaped steel shoe which is at least partially embedded in the concrete of the end of the beam but is open of access on the underside.

It is preferably welded to longitudinal reinforcement bars of the beam. If the column is intended to support beams on both sides thereof the bracket section passes completely through the column, a portion projecting on opposite sides thereof to provide the beam supports.

According to a further feature of the invention means are provided at the end of the beam, spaced somewhat from the shoe above referred to, and adapted to register with corresponding means provided upon the column to ensure a predetermined alignment and eliminate any possible twisting or lateral tilting of the beam. Such means advantageously consist of interfitting steel members, preferably a short length of channel-shaped or tubular rolled steel section embedded in the column with its longitudinal axis horizontal and with one or each end projecting laterally from the side of the column and adapted to cooperate in interfitting relation with a corresponding tubular or channel-shaped steel section cast in the end of the beam.

The arrangement is such that when placing the end of a beam in position so that the shoe rests upon the bracket the beam is first suspended with its end more or less in contact with the column, but above the desired final position, and as the beam is lowered the shoe comes to rest upon the bracket at the same time as the members constituting the registering means referred to come together in nesting relation, one within the channel of the other. The floors of the building preferably consist of reinforced concrete members of double T-shaped cross section, the ends of which rest on laterally extending flanges of the beams, the latter having laterally projecting reinforcement bars which are welded to the upper projecting portions of stirrups of reinforcement bars embedded in the end portions of said floor members.

The invention is hereinafter more fully described with reference to the accompanying drawings, wherein:

FIG. 1 is an isometric view of portion of the floor and frame of a building as seen from below.

FIGS. 2, 3 and 4 are similar isometric views showing respective portions of FIG. 1 in unassembled condition.

FIG. 5 is an isometric view from above of the end portion of the beam shown in FIG. 3.

FIG. 6 is a similar isometric view of a column and beam in assembled relation.

FIG. 7 is an isometric view corresponding to FIG. 2, but to a larger scale showing in full lines the metal members embedded.
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1. In or for a building frame, a reinforced concrete column, a bracket consisting of a hollow steel section embedded in and projecting laterally from said column, a length of channel-shaped steel section embedded in said column and projecting laterally therefrom above said bracket, a reinforced concrete beam for assembly with said column perpendicularly thereto, a steel shoe of inverted channel shape embedded in the end of said beam and open of access from below, a tubular steel section secured to and projecting from the end of the beam above said shoe, said shoe receiving said bracket in interfitting relation and said channel-shaped steel section receiving said tubular section in interfitting relation upon assembly of said column and beam.

2. In or for a building frame as claimed in claim 1, reinforcing bars extending as stirrups between and welded to the shoe and to the tubular steel section in the end portion of a beam, the beam also having longitudinal reinforcing bars welded to the shoe.

3. In or for a building frame, a reinforced concrete column, a bracket consisting of a hollow steel section embedded in and projecting laterally from said column, a length of channel-shaped steel section embedded in said column and projecting laterally therefrom above said bracket, a reinforced concrete beam for assembly with said column perpendicularly thereto, a steel shoe of inverted channel shape embedded in the end of said beam and open of access from below, a tubular steel section secured to and projecting from the end of the beam above said shoe, said shoe receiving said bracket in interfitting relation and said channel-shaped steel section received said tubular steel section in interfitting relation upon assembly of said column and beam, and a stuff bar inserted through said tubular steel section for contract with said channel-shaped steel section and secured at opposite ends to the beam and column.

4. In a building frame a reinforced concrete column, a bracket consisting of a hollow steel section embedded in and projecting laterally from opposite sides of said column, a length of channel-shaped steel section embedded in and projecting laterally from opposite sides of said column above said bracket, a pair of reinforced concrete beams for assembly with said column perpendicularly thereto, a steel shoe of inverted channel shape embedded in the end of each of said beams and open of access from below, a tubular steel section secured to and projecting from the end of each beam above said shoe, each of said shoes receiving said bracket in interfitting relation and said channel-shaped steel section receiving each of said tubular steel sections in interfitting relationship upon assembly of said column and beams, and a stuff bar inserted through said tubular steel section and secured at opposite ends to the respective beams.

5. In a building frame as claimed in claim 4, a series of reinforced concrete beams and columns assembled together, said beams having bottom flanges extending laterally, reinforced concrete floor units of double T-shaped cross section supported at their ends upon said flanges and reinforcement bars extending laterally from the beams and welded to exposed portions of reinforcement bars partly embedded in the floor units.