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PRECAST CONCRETE CONSTRUCTION

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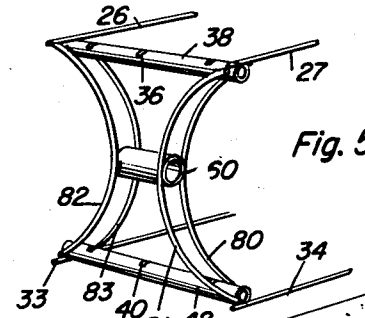
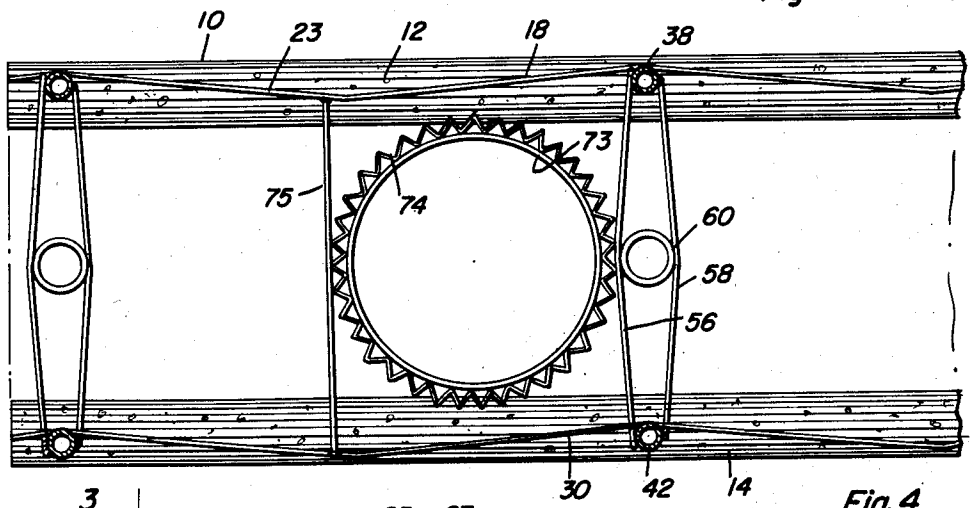


Fig. 5

Fig. 1

Fig. 3



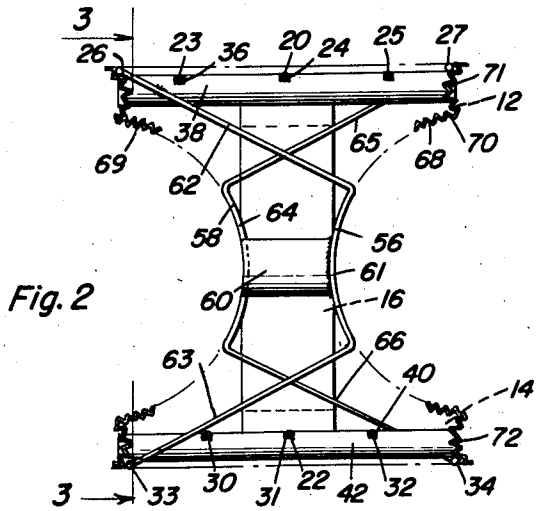
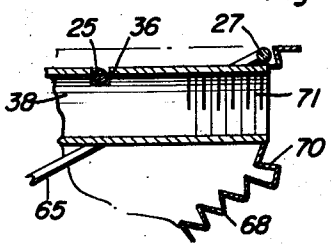


Fig. 2

Fig. 4



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PRECAST CONCRETE CONSTRUCTION

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3 Claims. (Cl. 72—61)

This invention relates to a precast concrete section that has a multiplicity of uses such as for walls, columns and floor and roof systems.

An object of the invention is to provide a precast concrete section that utilizes the compression strength of the concrete to a high degree of efficiency.

My precast concrete shape or section will permit the use of low cost standard pipe as forms in a manner that will simplify prestressing, allowing application of simple mechanized equipment for form setting, pouring and stripping as well as cleaning on a large scale production basis.

The precast shape can be used as a unit or units of a wall and floor system or of a deck including columns that are capable of being quickly bolted together to form a reinforced concrete structure for efficient erection by mechanized equipment.

My section can use a preformed reinforcing system that can be placed as a unit and will resist normal stress of handling and erecting, the shear and bending stresses developed from loading applications as a beam and the vertical and lateral stresses of columns and preloading, in addition to the good and sufficient anchorage of sleeves in my section that are used for bolting and which also act as a spreader in the assembly of the forms.

Another object of the invention is to apply expanded metal or like material to armor the minor cavities and reinforce the exposed edges of the flanges of my section. The section has concrete of hard, dense type by which the flanges are made, and light, insulating concrete in the web. In addition, in several embodiments of my invention I allow the passage of service lines such as pipes and conduits, by openings in the webs that are armored to assure that ample strength at this point of the shape exists.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of a precast concrete section or shape that is ready for use.

Figure 2 is a schematic view showing the reinforcing in cross section with part of the reinforcing omitted and the concrete omitted.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2 but showing the concrete in elevation.

Figure 4 is an enlarged sectional detail showing the juncture of several of the parts and the reinforcing network of the precast concrete section.

Figure 5 is a fragmentary perspective view with parts omitted, showing a modification of the reinforcing wires or bars that extend from the flanges through the web of the section.

In the accompanying drawing there is a precast concrete section or form **10** which exemplifies my invention. This is made of concrete which is homogeneous or which has two or more compositions. One preferred embodiment has the upper and lower flanges **12** and **14** made of hard, dense concrete, while the web or at least the core of the web **16** is made of lightweight insulating cement. The cross-sectional shape of my section is that of a modified I-beam with the web having its outer surfaces rounded.

A reinforcing network **18** in section **10** is constructed of an upper group **20** of reinforcing rods and a lower group **22** of reinforcing or prestressting rods or wires. The rods are embedded in the flanges and are approximately parallel to each other. The rods in group **20** could vary in number depending on the size of section **10**. The illustration has three intermediate rods **23**, **24** and **25** and two outer rods **26** and **27** along the upper and outer edges of the upper flange **12**. The lower group **22** of rods includes intermediate rods **30**, **31** and **32** plus the outer rods **33** and **34**. The outer rods are located in the lower outer corners of lower flange **14**. The intermediate rods **23**, **24** and **25** are disposed in notches **36** of spacer **38** that extends transversely across the upper flange **12**. The spacer **38** is a short piece of pipe or tubing with the notches **30** in the walls thereof. These provide for the possible acceptance of rods when bolting a number of sections **10** together or otherwise joining them. They also provide for ease in transversely post stressing. The outer rods **26** and **27** are on the upper surfaces of the spacer **38**. Intermediate rods **30**, **31** and **32** are in notches **40** of spacer **42**. This spacer is in the lower flange **14** of section **10** and responds in function and construction to spacer **38**. The outer rods **33** and **34** are at the ends of spacer **42**. It is to be noted that the notches **40** are inwardly of the web **16** while the notches **36** are outwardly of web **16**. This is to show that the reinforcing rods can be placed in either location.

Bars or wires constitute a part of the reinforcing network. In Figure 2 the bars **56** and **58** are on opposite sides of the short spacer **60**. This spacer is in the center of the web and is a short piece of pipe on whose sides the intermediate parts of bars **56** and **58** are welded. Bar **56** has an arcuate center part **61** following the contour of the surface of the web **16**, and straight ends **62** and **63** that extend through parts of the web and parts of the upper and lower flanges. The terminal parts of the ends **62** and **63** are welded to the reinforcing rods **26** and **33**. Bar **58** has an arcuate center part **64** and straight ends **65** and **66** extending therefrom. The extreme terminal parts of ends **65** and **66** are welded to reinforcing rods **34** and **27** respectively. (See Figure 4.)

Two elongated form panels **68** and **69** are in the lateral surface areas of the web and flanges. It is preferred that these panels be made of expanded metal or some other apertures metal. Panel **68** has an arcuate (in cross section) center portion **70** which follows the curve that actually helps to form the curve of the web. Strips **71** and **72** are along the outer edges of the upper and lower flanges respectively and these protect the edges of the flanges. Panel **69** is constructed in the same way.

In order to care for the passage of service lines, pipes, etc. one or more openings **73** are formed completely through the web **16**. Spacers **60** form openings through the web in a direction transverse to the longitudinal axis of my section **10**, but openings **73** are to be larger. The openings formed by spacers **60** are primarily intended to receive tie wires, bolts, etc. but could be used for services, for example, a BX cable in certain applications. Openings **73** are reinforced in their walls by a cylindrical form **74** of apertured metal that is embedded in the concrete of the section **10**. It is arranged transversely of the longitudinal axis of the section and materially strengthens the wall of opening **73**. As shown in Figure 3 a light brace

75 can be welded between reinforcing rods to hold them in shape and assemble properly during pouring.

Reference is now made to Figure 5. In this modification, there are four reinforcing wires or bars 80, 81, 82 and 83, which like bars or wires 56 and 58, serve a connecting as well as reinforcing function. The bars 80, 81, 82 and 83 differ from those of Figure 2 by being formed completely arcuately instead of having only a portion of an arc with straight ends. The attachment to the end reinforcing rods is the same as described in connection with Figure 2 and the function of the bars 80, 81, 82 and 83 is the same as the function of bars 56 and 58.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A precast concrete construction comprising a beam having upper and lower flanges and an interconnecting web portion, a plurality of longitudinally spaced tubes embedded within said upper and lower flanges and extending transversely thereof and completely therethrough so as to open upon opposite sides of said flanges, said tubes being arranged in said upper and lower flanges in vertically registered pairs and there being a spacer tube aligned substantially medially between the tubes of each pair within said web and extending completely therethrough to open on both sides thereof, reinforcing bars interconnecting each pair of tubes and intermediate spacer tube, and longitudinally extending reinforcing rods in said upper and lower flanges interconnecting the tubes therein.

2. A precast concrete construction comprising a beam having upper and lower flanges and an interconnecting web portion, a plurality of longitudinally spaced tubes embedded within said upper and lower flanges and extending transversely thereof and completely therethrough so as to open upon opposite sides of said flanges, said tubes being arranged in said upper and lower flanges in vertically registered pairs and there being a spacer tube aligned substantially between the tubes of each pair within said web and extending completely therethrough to open on both sides thereof, the tubes in said upper and lower flanges being transversely notched, longitudinally extending reinforcing rods received in the notches of said tubes and secured rigidly thereto to interconnect such tubes, and reinforcing bars interconnecting each pair of tubes and the intermediate spacer tube associated therewith.

3. The assembly as defined in and by claim 2 wherein the web portion presents concave opposite side edges, said reinforcing bars being of generally U-shaped configuration having mutually divergent legs extending into the outer edges of the upper and lower flanges and having bight portions disposed substantially at the outer surface of the opposite side edge of the web.

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