Jan. 8, 1963 L. F. TUMEY 3,071,836

DOUBLE-T BEAM FORMING APPARATUS

Filed April 6, 1960 2 Sheets-Sheet 1

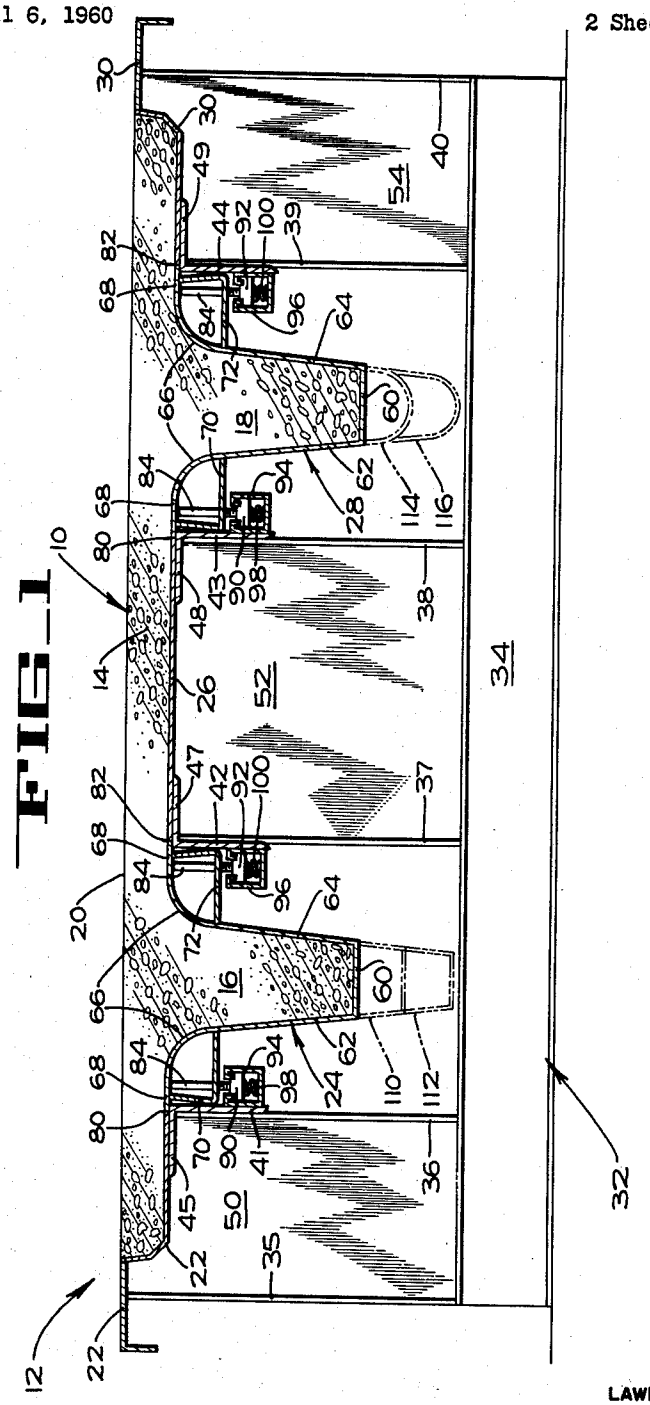


FIG. 1

INVENTOR
LAWRENCE F. TUMEY

BY Hans G. Hoffmeister

ATTORNEY

Jan. 8, 1963 L. F. TUMEY 3,071,836

DOUBLE-T BEAM FORMING APPARATUS

Filed April 6, 1960 2 Sheets-Sheet 2

FIG. 2

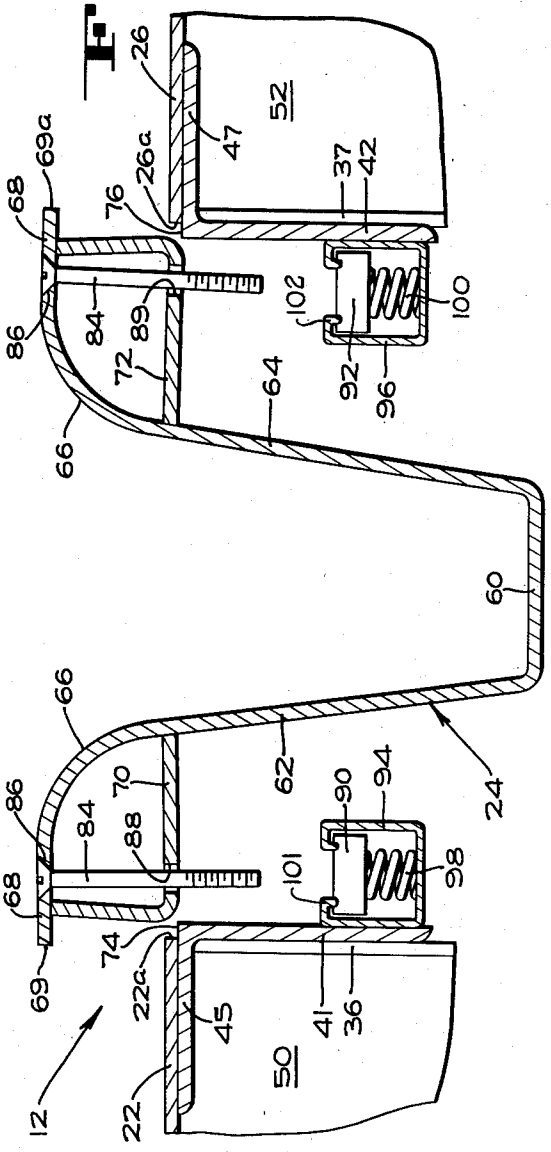


FIG. 3

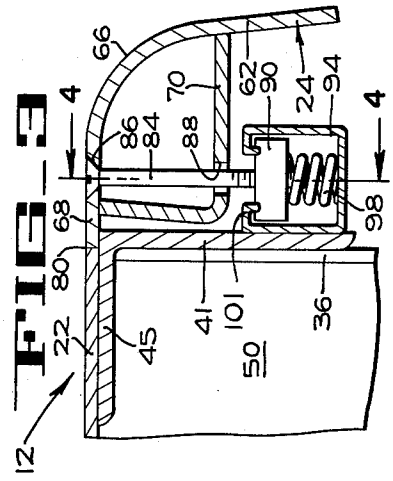
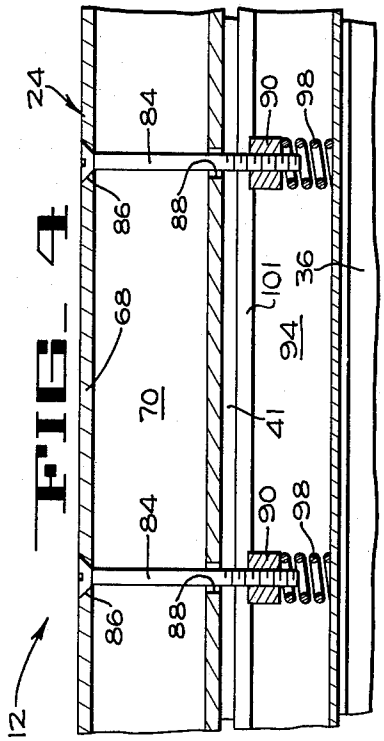


FIG. 4



INVENTOR
LAWRENCE F. TUMEY

BY Hans G. Hoffmeister.
ATTORNEY

United States Patent Office

3,071,836

Patented Jan. 8, 1963

3,071,836

DOUBLE-T BEAM FORMING APPARATUS

Lawrence F. Tumey, Lakeland, Fla., assignor to FMC Corporation, a corporation of Delaware

Filed Apr. 6, 1960, Ser. No. 20,384
3 Claims. (Cl. 25—121)

This invention pertains to beam forming apparatus and more particularly relates to apparatus for forming concrete beams of double-T cross section.

Double-T concrete beams are conventionally cast in forms which cannot be adjusted to produce beams having stem depths of various dimensions or if the apparatus does provide an adjustment to produce beams of various stem depths, the beams produced in the adjustable apparatus are not acceptable for some uses. Some conventionally produced double-T beams are unacceptable because the lower edges of the stems of these beams are very irregular and of unsightly appearance. The appearance of these lower edges is a factor determining whether or not the beam will be satisfactory when exposed in a building ceiling, for example.

An object of the invention is to provide improved beam forming apparatus having an adjsutment for producing beams of various stem depths therein.

Another object of the invention is to provide improved beam forming apparatus which imparts a regular surface to the lower edges of a beam formed therein.

Another object is to provide double-T forming apparatus that is adapted to use stem forming members of various dimensions for producing double-T beams having stem depths of various dimensions.

These and other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which:

FIGURE 1 is a transverse vertical section of the double-T beam forming apparatus of the invention, illustrating a concrete double-T beam therein.

FIGURE 2 is a fragmentary section similar to FIGURE 1, taken on an enlarged scale and illustrating one of two removable stem forming members of the double-T beam forming apparatus in partly assembled position.

FIGURE 3 is a section similar to FIG. 2, showing a portion of the forming apparatus illustrated in FIGURE 1 with the stem forming member fully assembled.

FIGURE 4 is a section along lines 4—4 of FIGURE 3.

A double-T concrete beam **10** (FIG. 1) formed in the double-T concrete beam forming apparatus **12** of this invention comprises a slab section **14** and a pair of spaced, parallel stem sections **16** and **18**. Double-T beams **10** of this nature can be installed as long unsupported spans in the floors of multi-storied buildings, for example. The smooth upper surface **20** of the beam provides a floor for one floor of the building while the stem portions **16** and **18** of the beam are exposed in the ceiling of the floor below.

The double-T beam forming apparatus **12** extends longitudinally for the distance required to form a beam of the desired length. The portion of the double-T beam forming apparatus **12** which contacts and shapes the fluid concrete mix received therein includes a side forming member **22**, a channel-shaped stem forming member **24**, a bedplate **26**, a similar channel-shaped stem forming

member **28**, and a side forming member **30**. The two side forming members **22** and **30** of the apparatus and the bedplate **26** are welded or otherwise rigidly connected to a suitable supporting framework **32**. The supporting framework **32** (FIG. 1) includes a suitable member of longitudinally spaced transverse I-beams or other structural steel members **34** (one of which is shown in FIG. 1) and six upright support members **35, 36, 37, 38, 39** and **40**, supported upon the transverse members **34** and extending longitudinally of the apparatus **12**. Elongate angle members **41, 42, 43** and **44** extend along and are attached to the upper edges of upright support members **36, 37, 38** and **39**, respectively. The side forming member **22** is welded to the upper edge of the upright support member **35** and to the horizontal flange **45** of the angle member **41**, the bedplate **26** is welded to the horizontal flanges **47** and **48** of the angle members **42** and **43**, respectively, and side forming member **30** is welded to the horizontal flange **49** of the angle member **44** and to the upper edge of the upright support member **40**. If desired, suitable stiffeners or gusset plates can be welded between the upright support members, for example, any desired number of gusset plates **50, 52** and **54**, respectively, can be welded between upright supports **35** and **36**, between upright supports **37** and **38**, and between upright supports **39** and **40**. One of each of the gusset plates **50, 52** and **54** is shown in FIG. 1.

Double-T concrete beams in a wide range of sizes are required to meet the various design and load requirements that are encountered in modern building design. In order not to have to provide a different form for each size of beam to be cast, many mechanisms have been devised to vary the size of an existing forming installation to permit the casting of beams having various dimensions. Heretofore these expedients for adjustment have included the use of filler members for filling portions of the form where it was desired that no concrete enter, and several proposals have been made for making portions of the forms removable to be replaced by portions of a different size. These expedient solutions have proven costly and otherwise unsatisfactory because they are so cumbersome, expensive, and time-consuming, or because they produce an unsatisfactorily irregular beam. The stem forming members **24** and **28** of the double-T concrete beam forming apparatus **12** of the present invention are adapted to be removed and readily replaced by stem forming members of different dimensions to provide for the production of smooth surfaced beams having various stem depths.

The stem forming member **24** (FIGS. 1 and 2) includes a bottom wall **60**, a side wall **62**, and a similar side wall **64**. The upper region **66** of each side wall **62** and **64** is curved outward, and each curved region **66** merges into an outwardly directed, substantially horizontal flange **68**. An angle member **70** is welded between the upper portion of the side wall **62** and the associated flange **68** to stiffen the upper portion of one side of the stem forming member **24**, and a second angle member **72** is similarly welded between the upper portion of the side wall **64** and the flange **68** associated with it to stiffen the upper portion of the other side of the stem forming member **24**.

The side forming member **22** of the molding apparatus which is connected to the horizontal flange **45** of the angle member **41** (FIG. 2) does not extend over the en-

tire surface of the horizontal flange 45 of the angle member 41, and it thus defines a shelf 74 (FIG. 2). The bedplate 26 and the horizontal flange 47 of the angle member 42 are located with respect to each other in a similar manner to provide a shelf 76. The edge of one flange 68 of the stem forming member 24 is adapted to fit onto the shelf 74 and the edge of the other flange 68 is adapted to fit onto the shelf 76, thus to support the stem forming member 24, within the forming apparatus 12 as seen in FIG. 1. The stem forming member 24 is manufactured so that its lateral edges 69 and 69*a* are normally spread apart a greater distance in a horizontal plane than are the inner edges 22*a* and 26*a* (FIG. 2) of the members 22 and 26 which define the shelves 74 and 76, respectively. With this construction the edges 69, 69*a* of the stem forming member must be sprung toward each other in order to be inserted between the edges 22*a* and 26*a* on the side forming member 22 and the bedplate 26. This permits the plates to form a tightly sealed joint 80 and 82 where the adjacent edges meet. This sealing engagement prevents leakage of the fluid concrete mix.

When the stem forming member 24 has been inserted into the apparatus, it is releasably secured therein by a plurality of counter-sunk screws 84 (FIGS. 1 and 2) extending through and downward from each flange 68, countersunk holes 86 being provided in the flanges 68 for this purpose. The screws 84 extend through holes 88 and 89 in the angle members 70 and 72, respectively, and their threaded lower ends are screwed into nuts 90 and 92 which are located inside box channel members 94 and 96, respectively. The diameters of the holes 88 and 89, as shown in FIG. 2, are considerably larger than the diameters of the screws 84, and as noted in FIG. 3, the angle member 70 is spaced from the rigid slab supporting structure. Thus, the stem forming member is flexibly connected to the rigid slab supporting structure and thus reduces the hazard of breakage of the casting by permitting the several parts of the mold to shift relatively to each other to accommodate any tendency for the casting to move within the mold. Springs 98 and 100 urge the nuts 90 and 92 upward into engagement with depending flanges 101 and 102 on the box channel members 94 and 96, respectively. The box channel member 94 is welded or otherwise attached to the vertical flange of the angle member 41, and the box channel member 96 is similarly attached to the angle member 42. The springs 98 and 100 are compression springs and are attached to the nuts 90 and 92, respectively, and the nuts 90 and 92 with springs attached, are slidable along the box channels in which they are mounted. This construction permits the nuts to move independently within the channel member 94 or 96 if such movement is necessary to attain alignment of the nut with its screw.

Whereas only the stem forming member 24 has been specifically described, it is to be understood that the other stem forming member 28 is substantially identical thereto in consrtuction and manner of installation. The same reference numerals have been applied to corresponding parts of both stem forming members 24 and 28. By tightening the several screws on each side of both stem forming members 24 and 28 the horizontal flanges 68 of the stem forming member are forced to tightly engage the shelves 74 and 76 and seal the entire double-T concrete beam forming apparatus 12 against concrete leakage.

It will be apparent that stem forming members having various side wall lengths can be used in the apparatus to produce beams having different stem depths. Beams having any desired stem depth within a reasonable range can be produced with the apparatus disclosed. For example, a mold form such as either of those shown in phantom at 110 and 112, respectively, may be substituted for each of the molds 24 and 28, to produce a beam whose stem depth is greater than that of a beam whose stems are molded in the forms 24 and 28. It will also be apparent that stem forming members whose lower corners are rounded, such as either of those shown in phantom at 114 and 116, respectively, can be employed to produce beams having stems with smoothly rounded bottom surfaces.

While particular embodiments of the present invention has been shown and described it will be understood that the beam molding apparatus of the present invention is capable of further modification and variation without departing from the principles of the invention and that the scope of the invention should be limited only by the scope and proper interpretation of the claims appended hereto.

The invention having thus been described, that which is claimed and desired to be protected by Letters Patent is:

1. A molding apparatus for forming a concrete beam and slab section comprising a supporting framework, two laterally spaced slab supporting forms, a channel-shaped member of resilient material received between said forms and having two side walls interconnected by a bottom wall and a flange at the top of each side wall projecting outwardly and into engagement with said forms, bracing angle members connected at their longitudinal edges between each of said flanges and its associated side wall, fastening members extending from said flanges through said bracing angles to said supporting framework to connect said flanges to said supporting framework, said fastening members being loosely received through said bracing angles to allow for relative movement between said flanges and said slab supporting forms.

2. Forming apparatus for precasting concrete structural members comprising a supporting framework, a plurality of spaced apart slab forming members connected to said supporting framework having substantially flat upper bearing surfaces and recessed corners adjacent the intervening spaces, a channel-shaped forming member of resilient material receivable within each of said spaces, each of said channel-shaped members having two side walls connected by a bottom wall and outwardly projecting flanges at the top of said side walls, said flanges normally being separated a distance greater than the width of the respective space separating the associated slab forming members whereby said flanges are resiliently urged into pressure engagement with the respectively associated recessed corners of said associated slab forming members and the upper surfaces of said flanges are aligned with said bearing surfaces of said slab forming members to present a substantially smooth flat surface across said flanges and said slab forming members when the channel-shaped forming member is inserted into said space, fastening members extending through said flanges and connected to said supporting framework, and angle bracing members rigidly fastened at their longitudinal edges to each of said flanges and said associated side walls and having openings therein for passing said fastening members therethrough, said openings having circumferences larger than those of said fastening members to allow said bracing members to shift relatively to said fastening members.

3. Molding apparatus for forming concrete structural members comprising a supporting framework, a plurality of slab supporting forms having substantially flat upper bearing surfaces rigidly connected to said supporting framework at intervals defined to permit stem forms of various sizes to fit therein, said slab supporting forms having recessed corners adjacent intervening spaces, a resilient stem forming member having two side walls interconnected by a bottom wall and a flange at the top of each side wall projecting outwardly therefrom, the outer edges of said flanges normally being spaced a distance greater than that between said recessed corners of said slab supporting forms, said stem forming member being deformable so as to fit within one of said intervening spaces and resiliently urge said flanges into sealing engagement with said recessed corners whereby the upper

surfaces of said flanges and said bearing surfaces are aligned to form a substantially smooth flat surface, and means mounted upon said slab supporting forms below the recessed corner and adjacent to said side walls for releasably linking said flanges with said supporting framework to permit a small amount of flexible movement of said flanges with respect to said slab supporting forms and to permit rapid replacement of said stem forming member.

References Cited in the file of this patent

UNITED STATES PATENTS

535,888	Brumer	Mar. 19, 1895
1,287,599	Leland et al.	Dec. 10, 1918
2,306,548	Leemhuis	Dec. 29, 1942
2,949,657	Anson	Aug. 23, 1960

OTHER REFERENCES

Construction Methods and Equipment article by Food Machinery and Chemical Corp., April 1949, p. 243.