Dec. 19, 1967 D. L. OLIVER ETAL 3,358,960

CORE INSERT FOR CONCRETE STRUCTURES

Filed Oct. 21, 1965 3 Sheets-Sheet 1

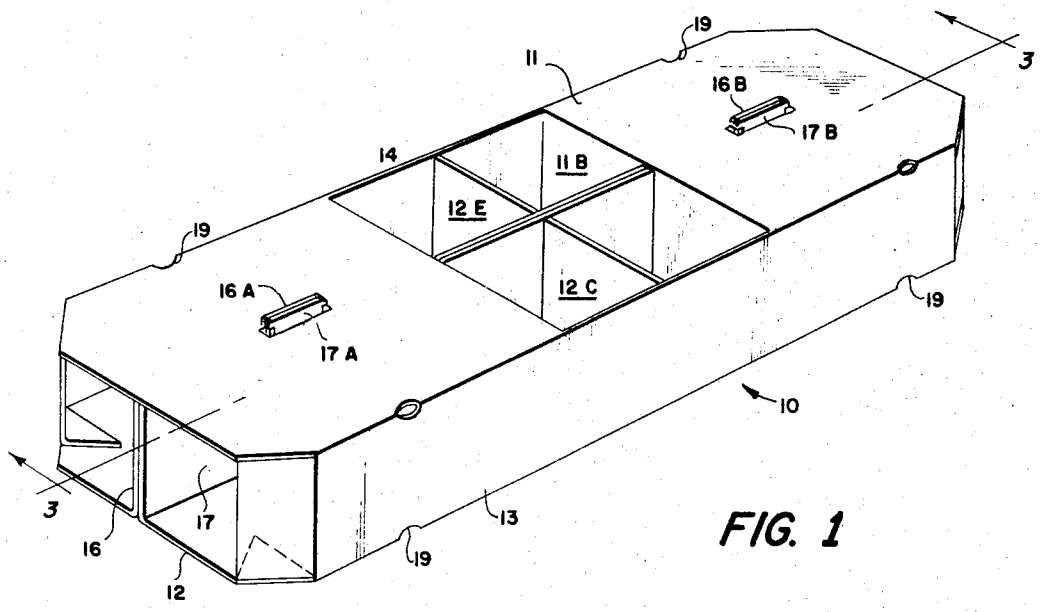


FIG. 1

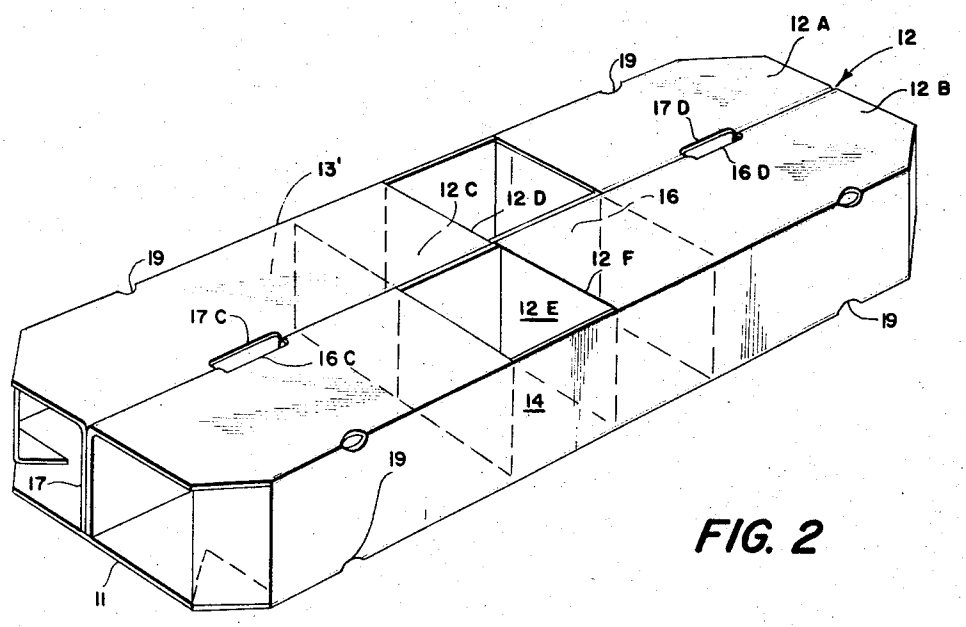


FIG. 2

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CORE INSERT FOR CONCRETE STRUCTURES

Filed Oct. 21, 1965 3 Sheets-Sheet 2

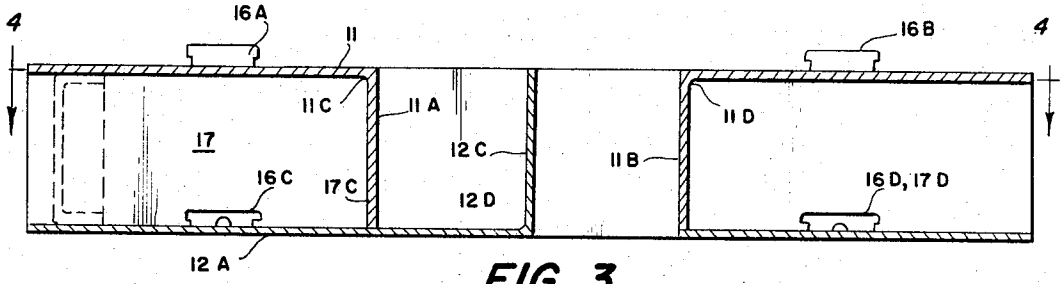


FIG. 3

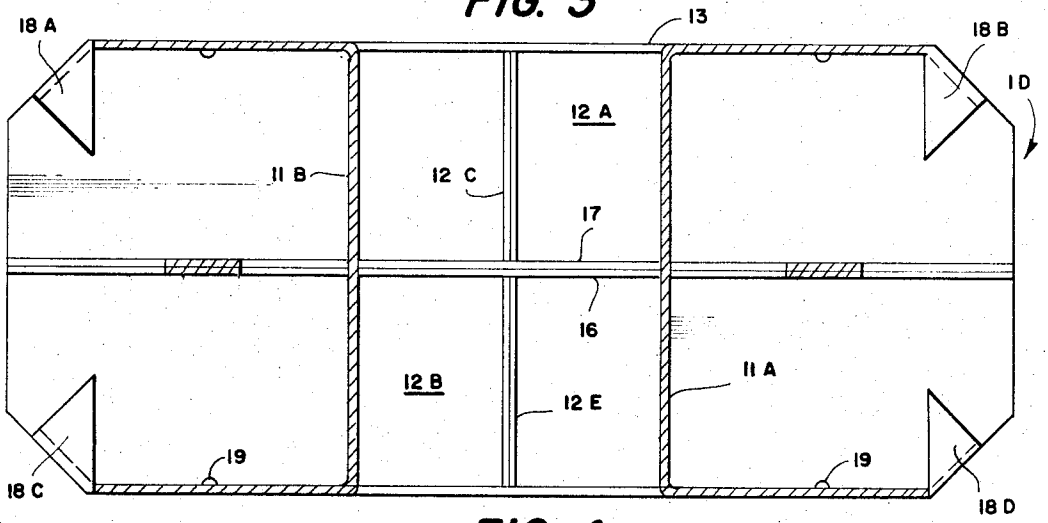


FIG. 4

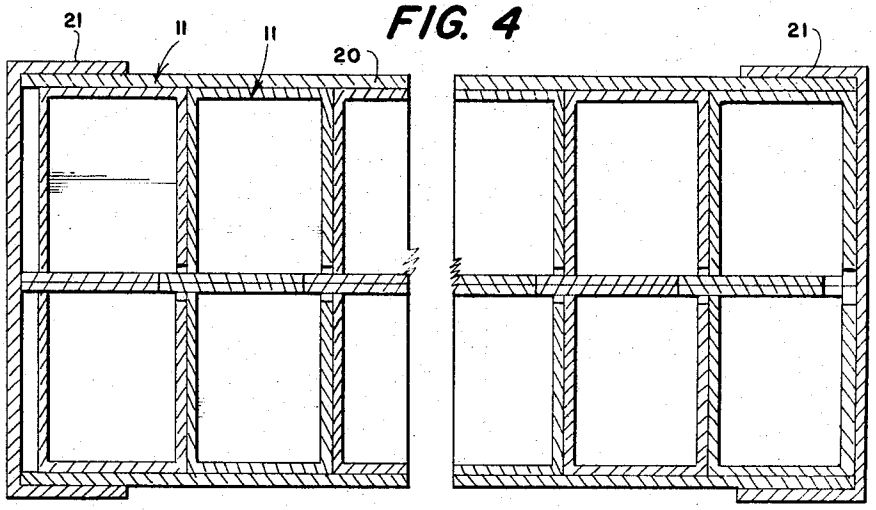


FIG. 6

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Filed Oct. 21, 1965 3 Sheets-Sheet 3

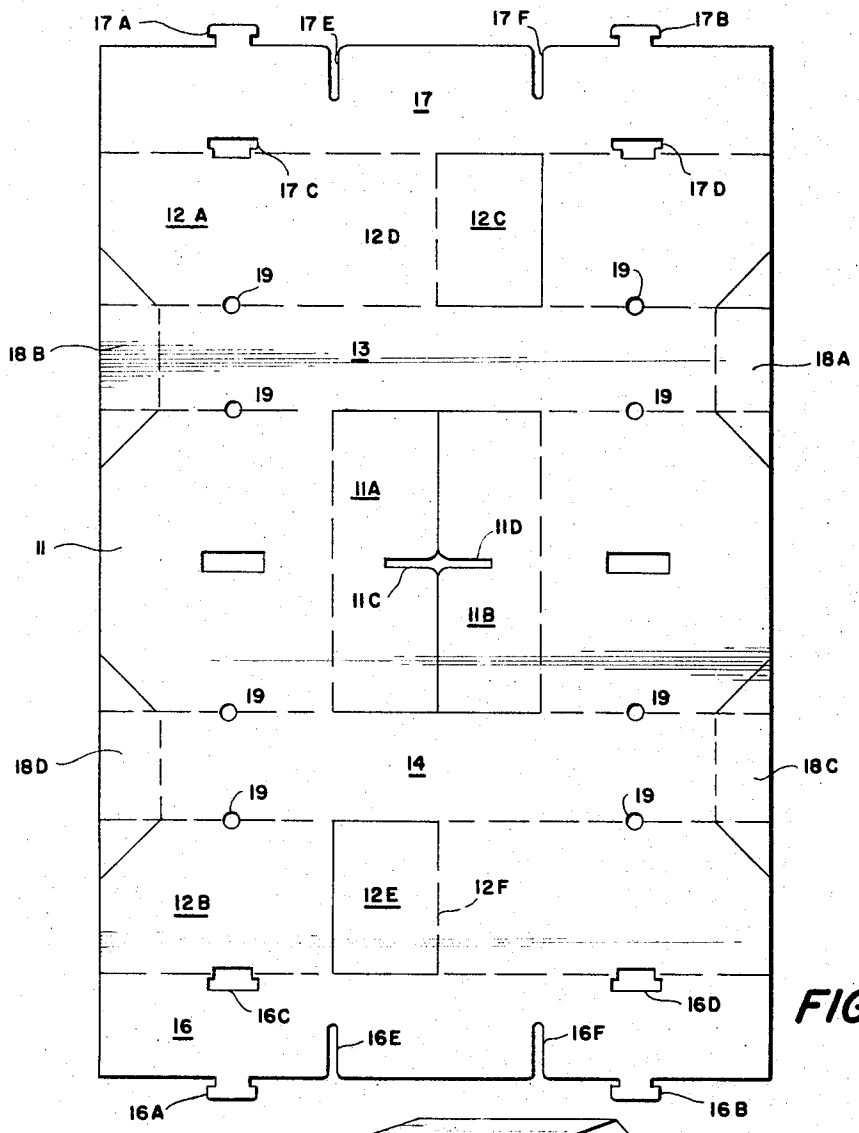


FIG. 5

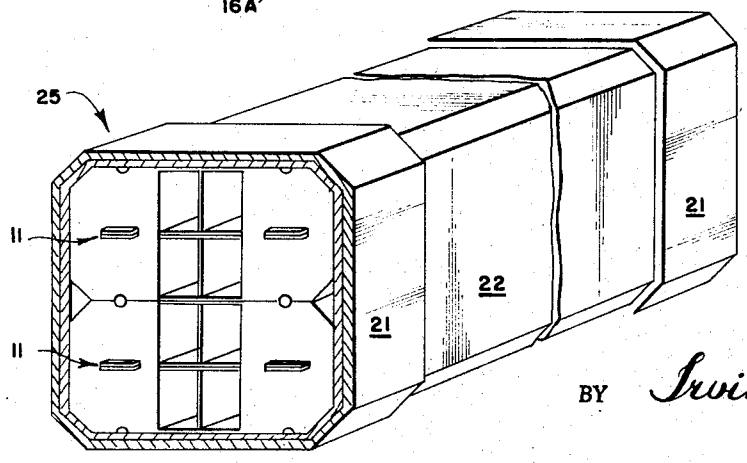


FIG. 7

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CORE INSERT FOR CONCRETE STRUCTURES

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21 Claims. (Cl. 249—175)

The present invention relates to a core insert for concrete structures, and more particularly to a core insert made of a single sheet of corrugated paperboard and having flanges and panels arranged to provide easy erection and great structural strength.

Concrete beams and slabs are often made with a void or hollow in the central part, and in order to provide this void, a core is provided in the mold, so that the concrete is poured into the mold and about the core. This is shown, for example, in Patent #2,192,183. In that patent, a core is shown which is formed by a tube having a supporting grid-like structure therein. This construction has not gained wide commercial acceptance.

Another proposal for core inserts has utilized a relatively large number of insert elements, requiring time consuming assembly in the field; in addition, such other proposal has resulted in an insert which is not as strong as desired, and which requires that a great number of elements be individually handled.

An object of the present invention is to provide an insert for a core made of a single sheet of material, preferably corrugated paperboard.

Another object of the present invention is the provision of an insert having high strength against both lateral and vertical collapse, and which can be used for cores of large width.

Yet another object of the present invention is to provide an insert which may be shipped flat and readily erected at the site of use.

A still further object of the present invention is the provision of an insert which can be assembled with a plurality of other such inserts, for handling as a unit, and without requiring additional fastening elements.

Still another object of the present invention is to provide an insert which may be readily used to construct a core of twice the size of the insert itself.

Other objects and many of the attendant advantages of the present invention will be readily understood from the following specification and drawings, wherein:

FIG. 1 is a perspective view of the front of an insert in accordance with the present invention.

FIG. 2 is a perspective view, similar to FIG. 1, but showing the back of the insert.

FIG. 3 is a cross-sectional view taken on the line 3—3 of FIG. 1.

FIG. 4 is a cross-sectional view taken on the line 4—4 of FIG. 3.

FIG. 5 is a plan view of a blank for forming the insert shown in FIGS. 1–4.

FIG. 6 is a cross-sectional view showing a number of inserts assembled together in a tube.

FIG. 7 is a perspective view of a core of double size utilizing inserts of the present invention, with parts broken away.

Referring now to the drawings, wherein corresponding reference numerals have been used to designate corresponding parts throughout the several views, there is shown in FIG. 1 an insert **10** which is of generally parallelepipedal form, having panels defining a front face **11**, a rear face **12**, a top **13** and a bottom **14**. A pair of adjacent flanges **16** and **17** extend across the full width of the insert **10** between front face **11** and rear face **12**, parallel to the top **13** and bottom **14**. This insert is of

ordinary corrugated board, and is placed within an impregnated, water-proofed tube with impregnated water-proofed end caps, to be hereinafter described.

As may be seen in FIG. 2, the rear face **12** is defined by a pair of panels **12A** and **12B**, panel **12A** being integral with the top **13** and with the flange **17**, and panel **12B** being integral with the bottom **14** and flange **16**. A flap **12C**, partially removed from panel **12A**, is integrally connected with panel **12A** at fold line **12D**, and extends to the plane of front face **11**, engaging top **13** and flange **17**. Similarly, a flap **12E** is partially removed from panel **12B**, is joined to panel **12E** at a fold line **12F**, and also extends to the plane of front face **11**, engaging bottom **14** and flange **16**. The flaps **12C** and **12E** are coplanar, and are perpendicular to the front and rear faces and top and bottom, as may be seen in FIGS. 1 and 2.

The flap **12C** is shown in FIG. 3, wherein it may be seen that it lies substantially midway between the open ends of the insert **10**.

Referring now to FIGS. 1 and 3, the front face **11**, which is integral with top **13** and bottom **14**, has a pair of integral flaps **11A** and **11B** partially removed from the middle portion thereof, flap **11A** being joined to the front face panel **11** by a fold line **11C** and flap **11B** by a fold line **11D**. The flaps **11A** and **11B** are parallel to flaps **12C** and **12E**, and have the same lengths, so that they extend from the front to rear of the insert. These flaps have slits therein for interlocking with similar slits in the flanges **16** and **17**.

The front panel **11** has a pair of spaced openings through which pass the projections **16A** and **16B** and **17A** and **17B**, which extend forwardly from and are integral with the flanges **16** and **17**, respectively; the projections have enlarged heads, and, further, as shown in FIGS. 2 and 3, the flanges **16** and **17** have cutouts **16C**, **16D** and **17C**, **17D** which are slightly smaller in width than the projection heads to provide an interlock for adjacent inserts **10**.

In FIG. 4 there is shown a cross-sectional view of the insert **10**, with the flanges **16** and **17** having the projections removed, the panels **12A** and **12B** defining the rear face, the coplanar flaps **12C** and **12E** and the flaps **11A** and **11B**; the flaps **11A** and **11B** engage the top **13** and bottom **14**. Consequently, the laterally spaced flaps **11A**, **11B**, **12C** and **12E**, in cooperation with front face **11** and back face **12** provide top to bottom strength against vertical compression from the poured, unset concrete, across a substantial width. There may also be seen in FIG. 4 the eight-sided configurations of the insert **10**, as well as triangular flaps **18A**, **18B**, **18C** and **18D** which are infolded at each corner of the insert.

In FIG. 5, there is shown the single blank from which the insert **11** is made, with parts numbered correspondingly. As shown in FIG. 5, the flaps **11A** and **11B** have slits **11C** and **11D** therein, and these cooperate in known fashion with the slits **16E**, **17E** and **16F**, **17F**, respectively, in the flanges **16** and **17**. There are also shown apertures **19** which facilitate water drainage and handling of the erected insert, these being at the top and bottom of the front panel **11** and rear panel **12**.

When a number of the inserts **11** are to be positioned within a tube, after erection from the blank shown in FIG. 5, the inserts may be joined together in succession by positioning the projections of one insert **11** into the corresponding cutouts **16C**, **16D** and **17C**, **17D** of an adjacent insert **11**, so that thereby a number of inserts may be assembled as a sub-unit and placed within a tube, thereby achieving ease and rapidity in handling. In FIG. 6, there is shown a number of inserts thus connected, and positioned within a tube **20** having end caps **21** thereon.

In addition, the inserts **11** permit the achieving of voids of either double width or double height, a void **25** of double height being shown in FIG. 7, wherein there may be seen the end caps **21** on a tube **22** of double height, within the tube there being an upper and a lower series of the insert units **11**. This utilization of the insert **11** is possible because of the substantially imperforate support areas of the tops and bottoms **14**, although substantially the same arrangement could be achieved for a double-width core by virtue of the engagement of the ends of adjacent inserts **11**, including specifically the ends of the front face **11** and back face **12** and of the flanges **16** and **17**.

There has been provided an insert capable of being made of a single sheet of suitable material, which can be shipped flat and conveniently erected at the site. Because of the flanges **16** and **17**, at an angle to the rear face **12** and interlocked with the flap components **11A**, **11B**, **12C** and **12E**, the insert of the present invention possesses great strength against lateral crushing forces. In addition, because of the three spaced vertically extending flap components **11A**, **11B** and **12C**, **12E**, which are disposed at an angle with and extend the full height of the front and rear faces, the insert of the present invention has great strength against vertical crushing forces. The insert of the present invention may be readily assembled with other like inserts so as to form a composite and easily handled sub-unit. Further, the inserts of the present invention may be utilized to form a double depth or a double width core.

Words such as "front," "back" etc. are used herein for convenience of description only, and are not words of limitation.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A reinforcing insert of corrugated paperboard for positioning within a tube adapted to form a void in a cast concrete structure comprising a generally parallel-epipedal structure having panels defining front and rear faces, and a top and bottom, a pair of adjacent flanges extending between said front and rear faces parallel to said top and bottom, said rear face being defined by a pair of panels each integral with one of the top and bottom and each having a said flange integral therewith, a flap partially removed from each panel of said rear face and extending to the plane of said front face, said flaps being perpendicular to said faces, top and bottom and being coplanar, said front face being integral with the top and bottom and having a pair of integral flaps parallel to and laterally of said flaps of said rear face and of substantially the same length, said top and bottom being substantially imperforate, said flanges having projections extending beyond said front face and corresponding cutouts therein adjacent said rear face for matingly receiving the projections of an adjacent insert.

2. A reinforcing insert of corrugated paperboard for positioning within a tube adapted to form a void in a cast concrete structure comprising a generally parallel-epipedal structure having panels defining front and rear faces, and a top and bottom, a pair of adjacent flanges extending between said front and rear faces parallel to said top and bottom, said rear face being defined by a pair of panels each integral with one of the top and bottom and each having a said flange integral therewith, a flap partially removed from each panel of said rear face and extending to the plane of said front face, said flaps being perpendicular to said faces, top and bottom and being coplanar, said front face being integral with the top and bottom, said top and bottom being substantially imperforate, said flanges having projections extending beyond said front face and corresponding cutouts therein

adjacent said rear face to matingly receiving the projections of an adjacent insert.

3. A reinforcing insert of corrugated paperboard for positioning within a tube adapted to form a void in a cast concrete structure comprising a generally parallel epipedal structure having panels defining front and rear faces, and a top and bottom, a pair of adjacent flanges extending between said front and rear faces parallel to said top and bottom, said rear face being defined by a pair of panels each integral with one of the top and bottom and each having a said flange integral therewith, a flat partially removed from each panel of said rear face and extending to the plane of said front face, said flaps being perpendicular to said faces, top and bottom and being coplanar, said front face being integral with the top and bottom, said flanges having projections extending beyond said front face and corresponding cutouts therein adjacent said rear face for matingly receiving the projections of an adjacent insert.

4. A reinforcing insert of corrugated paperboard for positioning within a tube adapted to form a void in a cast concrete structure comprising a generally parallel-epipedal structure having panels defining front and rear faces, and a top and bottom, a pair of adjacent flanges extending between said front and rear faces parallel to said top and bottom, said rear face being defined by a pair of panels each integral with one of the top and bottom and each having a said flange integral therewith, said front face being integral with the top and bottom and having a pair of spaced integral flaps perpendicular to said faces, top and bottom and extending to said rear face, said flanges having projections extending beyond said front face and corresponding cutouts therein adjacent said rear face for matingly receiving the projections of an adjacent insert.

5. A reinforcing insert of corrugated paperboard for positioning within a tube adapted to form a void in a cast concrete structure comprising a generally parallelepipedal structure having panels defining front and rear faces, and a top and bottom, flange means extending between said front and rear faces parallel to said top and bottom, and integral with one of said front and rear faces, said rear face being defined by a pair of panels each integral with one of the top and bottom, flap means extending between and perpendicularly to said top and bottom, said flanges having projections extending beyond said front face and for corresponding cutouts therein adjacent said rear face for matingly receiving the projections of an adjacent insert.

6. A reinforcing insert of corrugated paperboard for positioning within a tube adapted to form a void in a cast concrete structure comprising a generally parallel-epipedal structure having panels defining front and rear faces, and a top and bottom, flange means extending between said front and rear faces parallel to said top and bottom, and integral with one of said front and rear faces, said rear face being defined by a pair of panels each integral with one of the top and bottom, flap means extending between and perpendicularly to said top and bottom integral with at least one of said faces.

7. A reinforcing insert for a core for cast concrete comprising means defining a top and a bottom having front and rear edges, means in spaced parallel planes at the front and rear edges of said top and bottom for supporting said top from said bottom, means extending parallel to and intermediate said top and bottom and engaging said supporting means, means extending between and perpendicularly to said top and bottom and engaging said last mentioned means for interconnecting said top, bottom and last mentioned means, and projections and corresponding cutouts for connecting said insert to a like insert adjacent thereto.

8. A reinforcing insert for a core for cast concrete comprising means defining a top and a bottom having front and rear edges, means in spaced parallel planes at

the front and rear edges of said top and bottom for supporting said top from said bottom, means extending parallel to and intermediate said top and bottom and engaging said supporting means, and means extending between and perpendicularly to said top and bottom and engaging said last mentioned means for inter-connecting said top, bottom and last mentioned means, said supporting means including means defining apertures adjacent said bottom for drainage.

9. The insert of claim **8**, said insert being of a single blank of material.

10. A reinforcing insert for a core for cast concrete comprising means defining a top and a bottom having front and rear edges, means in spaced parallel planes at the front and rear edges of said top and bottom for supporting said top from said bottom, means extending parallel to and intermediate said top and bottom and structurally connected with said supporting means for transferring forces between said supporting means, and means connected with at least one said supporting means extending between and perpendicularly to said top and bottom intermediate the ends thereof and engaging said last mentioned means for interconnecting said top, bottom and last mentioned means.

11. A reinforcing insert as set forth in claim **10**, and further comprising integral means for connecting one said insert to a like insert adjacent thereto.

12. A reinforcing insert as set forth in claim **11**, said last mentioned means comprising projections and corresponding cutouts.

13. A reinforcing insert as set forth in claim **7**, said supporting means including means defining apertures adjacent said bottom for drainage.

14. The insert of claim **7**, said insert being of a single blank of material.

15. A reinforcing insert for a core for cast concrete comprising means defining a generally right parallelepipedal structure having a front face and a rear face, and means for assembling one said insert to an adjacent said insert comprising projection means extending from one said face and cutout means for matingly receiving said projection means at the opposite face thereof.

16. The reinforcing insert of claim **15**, said projection means comprising laterally spaced projections.

17. The reinforcing insert of claim **13**, said projection means being integral with said first mentioned means.

18. The reinforcing insert of claim **15**, said front and rear faces comprising means defining apertures extending to upper and lower edges of said faces, whereby to provide for the drainage of moisture through said insert.

19. The reinforcing insert of claim **15**, said projection means and said cut-out means comprising means for interlocking one said insert to a said adjacent insert.

20. The reinforcing insert of claim **15**, said projection means having enlarged head means and said cut-out means being slightly smaller than said enlarged head means, whereby to provide for interlocking of adjacent inserts.

21. A reinforcing insert for a core for cast concrete comprising an integral insert of paperboard having spaced, similar vertically extending panels and vertically extending flaps connected with at least one said panel disposed at an angle to said panels extending substantially the full height of said panels, horizontal flange means connected with at least one said panel, and means interlocking said flaps and said flange means at intermediate portions thereof.

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