April 14, 1959 V. G. RANEY 2,881,501

CONCRETE BOX-FORM CONSTRUCTION

Filed July 11, 1955

Fig. 1.

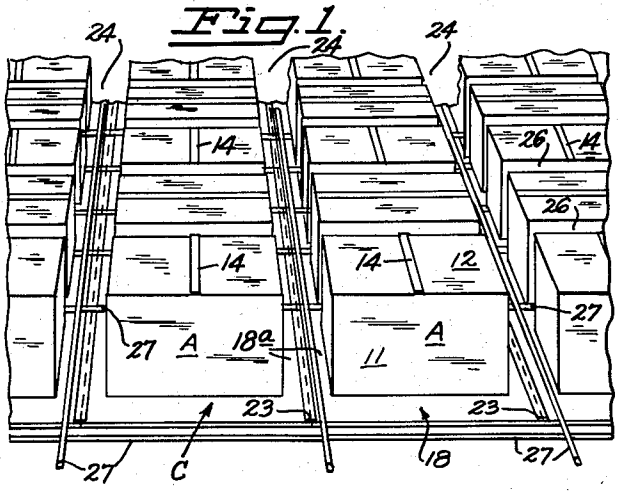


Fig. 2.

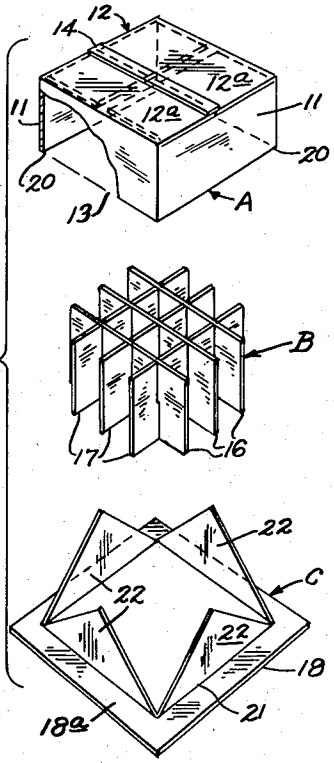


Fig. 5.

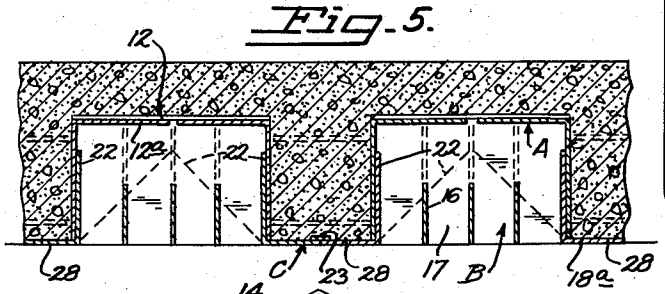


Fig. 4.

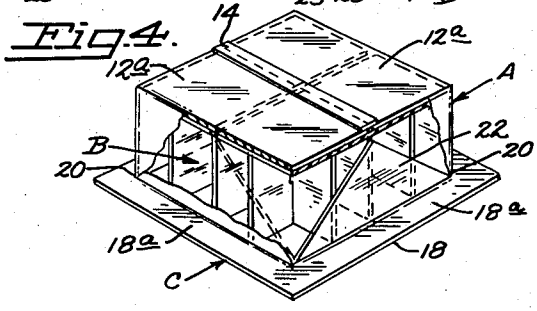
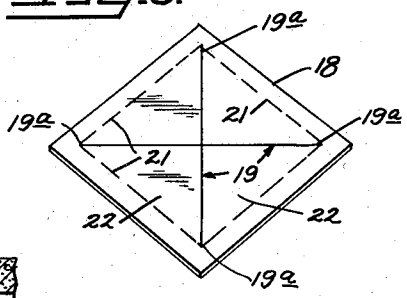


Fig. 3.



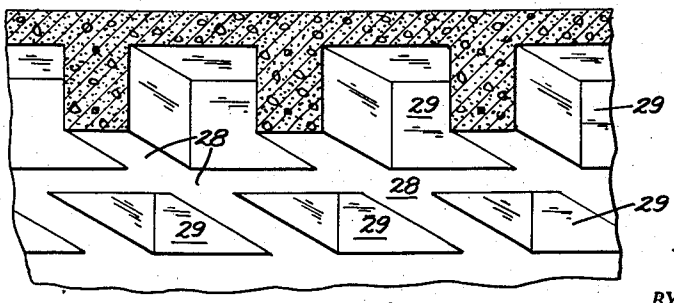


Fig. 6.

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CONCRETE BOX-FORM CONSTRUCTION

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1 Claim. (Cl. 25—131.5)

This invention relates to the art of pouring concrete slabs, and more particularly relates to a concrete box-form structure designed to create voids in reinforced concrete slabs.

Heretofore it has been proposed to pour relatively large reinforced concrete slabs on the ground at the site of building erection. After the concrete has set, the slabs are elevated by hydraulic jacks or the like to provide a prefabricated elevated floor structure for the building under erection. In the fabrication of such slabs it is desirable to create voids in the concrete to lighten the weight thereof and to reduce the amount of reinforcing steel required. In this regard, conventional slotted corrugated paper or fibreboard cartons have been utilized as box-form units to create the desired number and pattern of voids in the concrete. More specifically, it has been conventional to place a plurality of such cartons in spaced longitudinal and transverse rows with the closed ends of the cartons facing up and the open ends down and with the flaps of the open bottom ends extending laterally outwardly in ground engaging contact. According to usual practice, the laterally extending flaps of adjacent boxes are taped together to maintain said box-form units in proper spaced relation, and reinforcing steel is then laid between the intersecting spaced rows of box-form units in generally rectangular criss-cross pattern. Wet concrete is poured over the mold form units and allowed to set and the slab thus formed is then elevated by hydraulic jacks or the like to its proper position as an elevated floor structure within the building as above noted. After elevation of the slab, the paper box-form units are removed leaving a series of voids in the underside of the slab arranged in what may conveniently be described as a "waffle" type pattern.

Although reasonable success has been attained in pouring concrete slabs according to the above practices, the use of conventional slotted corrugated paper or fibreboard cartons as box-form units results in certain attendant disadvantages. For example, the laterally extending carton flaps used as spacers between adjacent box form units also form the pouring surfaces for the beam or girder defining portions of the finished slab. It is highly desirable that these portions of the completed slab be formed absolutely flat and without depressions or cavities such as are created by the rectangular spaces or voids defined by the carton flaps at each corner or intersection of longitudinal and transverse rows of box-form units where the flaps do not join or abut one another.

Another disadvantage in utilizing conventional slotted cartons with laterally extending bottom flaps in the above manner is that the wet concrete frequently seeps under the bottom corner edges of the carton units tending to float said units within the wet mixture. This, in turn, leads to imperfect formation of the slab, and can also render it difficult to subsequently remove the units from the voids which they form in the hardened concrete.

The particular embodiment of the present invention which is illustrated in the drawings and which will be described hereinafter in more detail comprises a conventional half slotted carton made of corrugated paper or fibreboard material defining four sides, a closed upper end and an open bottom end and provided with a reinforcing partition snugly fitted interiorly of the carton. The carton is positioned open end down on a rectangular sheet of corrugated paper or fibreboard material having a length and width substantially exceeding the length and width of the open bottom carton positioned thereon. The laterally extending margins of the rectangular sheet define a continuous peripheral spacer flange extending laterally outwardly from the bottom edge of the carton. The inner portion of the rectangular sheet which the carton overlies is formed with a substantially X-shaped incisure or die-cut defining four substantially triangular-shaped locking tabs which are bent perpendicularly upwardly from the plane of the flat section into frictionally wedged engagement between the interior sides of the carton and the reinforcing partition fitted therein.

A principal object and advantage of the unit embodying the present invention is that the flat section of material on which the carton rests defines a continuous and uninterrupted peripheral spacer flange extending completely around the bottom edges of each box forming unit. Unlike the spacer flaps utilized in the prior art devices of the character above mentioned, the rectangular flange of the present unit does not establish any voids or gaps at intersecting rows of box units. As a consequence, any desired number of the box units may be positioned in intersecting spaced longitudinal and transverse rows with the marginal edges of adjacent spacer flanges of all units positioned in abutting edge-to-edge relationship. With adjacent spacer flanges of the units taped in edge-to-edge relation, there is established a completely smooth and flat pouring surface which will not create cavities or depression in the beam or girder forming surfaces of the completed slab structure.

Another object and advantage of the unit constructed in accordance with the present invention is that the spacer flange member provides a seal around the entire open bottom of each carton unit and prevents seepage of concrete under the edges of the carton with attendant disadvantages and difficulties encountered in the prior art structures.

A further feature of the present unit is that the spacer flange member in conjunction with the manner in which it is interlocked by upwardly extending tabs frictionally wedged between the reinforcing partition and the inner sides of the carton provides additional structural strength for the walls of the carton unit and thus renders the unit better able to withstand the vertical load and hydraulic pressure of wet concrete poured thereover.

Another feature of the invention is that the novel flange construction incorporated therein provides an easier and more positive way of accurately spacing the box-form units relative to one another in desired pattern.

Other numerous objects and advantages of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

Fig. 1 is a fragmentary perspective view of a plurality of box form units embodying the invention positioned and taped together in intersecting spaced longitudinal and transverse rows preparatory to pouring of concrete thereover.

Fig. 2 is a perspective view of a box form unit showing the major components in exploded relationship and showing other parts broken away in section.

Fig. 3 is a perspective view of the spacer flange component indicating the manner in which it is die cut and folded to from the locking tabs.

Fig. 4 is a perspective view of the box form unit of Fig. 2 shown in assembled condition and with portions broken away in section.

Fig. 5 is a fragmentary transverse sectional view of a concrete slab which has been poured utilizing the box form unit pattern of Fig. 1 and with the box form units still in form position.

Fig. 6 is a perspective view of a concrete slab viewed from below showing the box form units removed from the voids in the concrete.

Referring now more particularly to the drawings, a box form unit constructed in accordance with the invention may be considered as comprising three major components including an open-ended box structure A, a reinforcing partition B, and a spacer flange member C.

The box component A is shown as comprising a conventional half-slotted carton made of corrugated paper or fibreboard sheet material. More specifically, the carton is illustrated as defining four sides, indicated at **11**, a closed top **12**, and an open bottom **13**. The closed top **12** may be formed by the usual overlapping flaps **12***a* taped together at their adjoining outside edges as at **14**.

The reinforcing structure B may be considered as comprising a conventional slotted partition also made of corrugated paper or fibreboard. Slotted partitions of the type indicated at B are well known in the paper box industry and, accordingly, the same does not per se constitute part of the present invention. It will suffice to remark that the partition comprises a first spaced parallel series of partitioning walls **16** which are slotted and interlocked with a second series of parallel slotted partitioning walls **17** extending at right angles to walls **16**. The cellular partition B is shaped and proportioned to be snugly fitted interiorly of the box structure A.

The spacer flange forming member, heretofore designated generally at C, is shown as comprising a rectangular section **18** of corrugated paper or fiberboard material having a length and width substantially greater than the length and width of the open bottom carton A. The rectangular section **18** is formed with an X-shaped incisure defined by die-cuts **19**. It is observed that the die-cuts extend diagonally of the rectangular section **18** and the terminal points **19***a* of said cuts are made to coincide in relative spacing and distance to the corners **20** of box structure A. Said die-cuts **19**, in conjunction with fold lines **21** joining the terminal points **19***a* together in rectangular pattern, define triangular-shaped locking tabs **22**. As shown in Figs. 4 and 5, when the box unit has been assembled for use as shown in Figs. 4 and 5, the locking tabs **22** are folded and projected upwardly interiorly of the box structure A into snug frictional wedged engagement between the inner wall surfaces of sides **11** of the carton and the cellular slotted partition B.

In assembled condition it is observed that the margins of the section **18** extend laterally outwardly beyond the bottom edges of the box structure A to define a continuous uninterrupted peripheral spacer flange **18***a* for the box form unit.

Fig. 1 illustrates how a plurality of box form units of the character above described may be positioned relative to one another to provide a unitary form construction preparatory to pouring a concrete slab. As illustrated, the box units A are arranged in intersecting spaced longitudinal and transverse rows with the spacer flange **18***a* of each unit in edge-to-edge abutment with spacer flanges **18***a* of adjacent units. As shown in Fig. 1, abutting edges of adjacent spacer flanges are taped securely together as indicated at **23**. The arrangement of box form units in this fashion establishes a series of parallel longitudinal passages **24** which are diposed perpendicular to transverse extending passageways **26** intersecting passageways **24**. Reinforcing steel rods **27** may be positioned in the passageways **24** and **26**. The form construction indicated in Fig. 1 may be completed by providing side and end form pieces (not shown) around the periphery of the box form units through utilization of conventional wooden form boards or the like.

It is noted that the abutting and taped flange portions **18***a* of the box units provide uninterrupted flat smooth pouring form surfaces for the concrete beam or girder forming portions **28** of the slab shown in Figs. 5 and 6.

Moreover and as previously indicated, the upwardly projecting locking tabs **22** which are interlocked between the reinforcing partition B and the interior side walls of the carton unit A provide a seal round the bottom edge of the carton which prevents seepage of the wet concrete into the interior of the form units. Additionally the interlocked flange component functions to reinforce and add rigidity and strength around the bottom edge of the carton unit.

After the concrete has been poured over the box form units, it is allowed to set whereupon the entire slab is elevated to its proper position within the building structure being erected. Thereafter the box form units are stripped from the slab leaving the desired voids **29** in the completed slab structure.

Although the present invention has been described in some detail by way of illustration and example, it is understood that certain changes and modifications may be practiced within the spirit of the invention as limited only by the scope of the claim appended hereto.

What is claimed is:

A concrete mold form comprising: a box-type unit made from corrugated paper material defining four sides, a closed top, and an open bottom; cellular reinforcing means mounted interiorly of said unit; an integral rectangular flat section of corrugated paper material having a length and width substantially exceeding the length and width of the open bottom box unit; means for mounting said unit on said flat section with the margins of said flat section extending laterally beyond the bottom edges of said unit defining a continuous peripheral spacer flange, said means including an X-shaped incisure defining diagonally extending cuts formed through said flat section; the terminal points of said cuts located and spaced relative to one another to coincide with the four corners of the open bottom box unit; four straight fold lines extending in rectangular pattern joining adjacent terminal points of said diagonally extending cuts and defining four triangular-shaped locking tabs; each locking tab bent upwardly along its fold line interiorly of said box unit in frictional wedged engagement between said cellular reinforcing means and an adjacent side of said unit.

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